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| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 07/05/2022 | 11376814 | P006DK.WO.US (87942.0009) | 7187 |

26582 7590 06/15/2022

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

# ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 707 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Lars Christensen, Slagelse, DENMARK;
Peter Johansen, Odense C, DENMARK;
Torben Fogtmann, Nyborg, DENMARK;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Danapak Flexibles A/S, Slagelse, DENMARK;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PTO/SB/08A&B
OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 1 of 2

| *Complete if Known* | |
|---|---|
| Application Number | Herewith |
| Filing Date | Herewith |
| First Named Inventor | Christensen et al. |
| Art Unit | To be assigned |
| Examiner Name | To be assigned |
| Docket Number | P006DK.WO.US (87942.0009) |

**U.S. PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Document Number Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 01 | US 6,120,860-A | 09-19-2000 | Bowen et al. | 8 pgs. |
| | 02 | US 2005/037162-A1 | 02-17-2005 | John Peter Adams | 12 pgs. |
| | 03 | US 2004/234790-A1 | 11-25-2004 | Smith et al. | 4 pgs. |
| | 04 | US 2005/112337-A1 | 05-26-2005 | Randy D. Jester | 19 pgs. |

Change(s) applied to document.
/P.P./
1/6/2022

**FOREIGN PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Foreign Document Number Country Code[3] –Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 05 | WO 00/44559-A1 | 08-03-2000 | Levander et al. | 16 pgs. | |
| | 06 | WO 2005/037539-A1 | 04-28-2005 | Morris et al. | 22 pgs. | |
| | 07 | EP 2 939 667-A1 | 11-04-2005 | Nipro Patch Co. Ltd. | 24 pgs. | |
| | 08 | WO 2013/004243-A1 01/2013 | 01-10-2013 | Fertin Pharma AS | 28 pgs. | |
| | 09 | WO 91/09731-A1 | 07-11-1991 | Alza Corp. | 23 pgs. | |
| | 10 | WO 2015/174502-A1 | 11-19-2015 | Nichiban KK | 36 pgs. | |

**NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[6] |
|---|---|---|---|
| | 11 | DATABASE WPI Week 201579, Derwent Publications Ltd., London, GB; AN 2015-71769A, XP002759263; 2 pgs. | |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 2.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**



**ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S/**

# PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26582 7590 04/08/2022

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

| | |
|---|---|
| Wendy Nishida | (Typed or printed name) |
| /Wendy Nishida/ | (Signature) |
| May 24, 2022 | (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

TITLE OF INVENTION: METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1200 | $0.00 | $0.00 | $1200 | 07/08/2022 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| SHEWAREGED, BETELHEM | 1785 | 428-219000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 Holland & Hart LLP
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Danapak Flexibles A/S

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Slagelse, DENMARK

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 08-2623

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Steven A. Avena/ Date May 24, 2022

Typed or printed name Steven A. Avena Registration No. 75,211

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 15780999 |
| **Filing Date:** | 01-Jun-2018 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Filer:** | Steven Anthony Avena/Wendy Nishida |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |

Filed as Large Entity

**Filing Fees for U.S. National Stage under 35 USC 371**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| UTILITY APPL ISSUE FEE | 1501 | 1 | 1200 | 1200 |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **1200** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 45783168 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Steven Anthony Avena/Wendy Nishida |
| **Filer Authorized By:** | Steven Anthony Avena |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 24-MAY-2022 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 17:07:28 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | DA |
| Payment was successfully received in RAM | $1200 |
| RAM confirmation Number | E20225NH08073340 |
| Deposit Account | 082623 |
| Authorized User | Wendy Nishida |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492 (National application filing, search, and examination fees)

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Issue Fee Payment (PTO-85B) | P006DanapakIssueFee.pdf | 151476<br>c8041122f8469bbc99bb326a6685ced9ba1207a7 | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 38385<br>82e0b4e1193d5d370bb58b003fd16973c659dfda | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 189861 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

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# NOTICE OF ALLOWANCE AND FEE(S) DUE

26582 7590 04/08/2022

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

| EXAMINER |
|---|
| SHEWAREGED, BETELHEM |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1785 | |

DATE MAILED: 04/08/2022

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

TITLE OF INVENTION: METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1200 | $0.00 | $0.00 | $1200 | 07/08/2022 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.**

# PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
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By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

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Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

| |
|---|
| (Typed or printed name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

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| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1200 | $0.00 | $0.00 | $1200 | 07/08/2022 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| SHEWAREGED, BETELHEM | 1785 | 428-219000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

26582 7590 04/08/2022

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

| EXAMINER | |
|---|---|
| SHEWAREGED, BETELHEM | |
| ART UNIT | PAPER NUMBER |
| 1785 | |

DATE MAILED: 04/08/2022

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Notice of Allowability | Application No. 15/780,999 | Applicant(s) Christensen et al. | |
|---|---|---|---|
| | Examiner BETELHEM SHEWAREGED | Art Unit 1785 | AIA (FITF) Status Yes |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to RCE filed on 03/21/2022.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are See Continuation Sheet . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☑ All  b) ☐ Some*  c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☑ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 03/21/2022.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/BETELHEM SHEWAREGED/
Primary Examiner, Art Unit 1785

Continuation of 3. The allowed claim(s) is/are: 1-6,9-21,24-35 and 37

***Notice of Pre-AIA or AIA Status***

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

***Reasons for Allowance***

2. **Claims 7, 8, 22, 23, 36 are canceled, and claims 1-6, 9-21, 24-35 and 37 are pending.**

3. **Pending claims 1-6, 9-21, 24-35 and 37 are allowed.**

4. The following is an examiner's statement of reasons for allowance: The closest prior art **Riis et al. (WO 2015/123211 A1)** teaches a multilayer film and a method of making the same: the multilayer film contains a multilayer base film and a sealant film, wherein the multilayer base film comprises OPET/primer/LDPE/EAA/aluminum foil, and the sealant film comprises a three-layer coextrusion of copolymer of ethylene with acrylic acid (EAA), low density polyethylene (LDPE) and ethylene-norbornene copolymer (COC). The low density polyethylene (LDPE) of the multilayer base film meets the claimed first outer layer, the aluminum foil meets the claimed base layer, the copolymer of ethylene with acrylic acid (EAA) meets the claimed tie layer, and the ethylene-norbornene copolymer (COC) meets the claimed contact layer. Riis teaches the ethylene-norbornene copolymer (COC) has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of 1.33 and 1.32 towards nicotine and lidocaine, respectively. **However**, Riis does not teach or suggest a polyamide or an

ethylene vinyl alcohol as the contact layer, and the co- extrusion layer is coated to the base layer such that the base layer and the contact layer are connected by the tie layer as recited in claims 1, 13, 16, 21, 24, 25 and 29.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

## *Conclusion*

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BETELHEM SHEWAREGED whose telephone number is (571)272-1529. The examiner can normally be reached Monday -Friday 7am-4:30pm.
7. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.
8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
9. Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BS
March 22, 2022

/BETELHEM SHEWAREGED/
Primary Examiner
Art Unit 1785

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| CPC | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Symbol | | | | | | | Type | Version |
| B32B | / | 7 | / | 12 | | | F | 2013-01-01 |
| B32B | / | 15 | / | 082 | | | I | 2013-01-01 |
| B32B | / | 15 | / | 085 | | | I | 2013-01-01 |
| B32B | / | 27 | / | 08 | | | I | 2013-01-01 |
| B32B | / | 27 | / | 306 | | | I | 2013-01-01 |
| B32B | / | 27 | / | 308 | | | I | 2013-01-01 |
| B32B | / | 27 | / | 325 | | | I | 2013-01-01 |
| B32B | / | 27 | / | 36 | | | I | 2013-01-01 |
| B05D | / | 1 | / | 265 | | | I | 2013-01-01 |
| B32B | / | 15 | / | 20 | | | I | 2013-01-01 |
| B32B | / | 27 | / | 32 | | | I | 2013-01-01 |
| B32B | / | 27 | / | 34 | | | I | 2013-01-01 |
| B32B | / | 37 | / | 153 | | | I | 2013-01-01 |
| B32B | / | 2255 | / | 20 | | | A | 2013-01-01 |
| B32B | / | 2307 | / | 31 | | | A | 2013-01-01 |
| B32B | / | 2307 | / | 714 | | | A | 2013-01-01 |
| B32B | / | 2439 | / | 80 | | | A | 2013-01-01 |
| B32B | / | 2553 | / | 00 | | | A | 2013-01-01 |
| B32B | / | 2250 | / | 05 | | | A | 2013-01-01 |
| B32B | / | 2307 | / | 7244 | | | A | 2013-01-01 |
| B32B | / | 2307 | / | 7265 | | | A | 2013-01-01 |
| B32B | / | 2323 | / | 00 | | | A | 2013-01-01 |
| B32B | / | 2398 | / | 20 | | | A | 2013-01-01 |
| B32B | / | 2439 | / | 00 | | | A | 2013-01-01 |

| CPC Combination Sets | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Symbol | | | | | | | Type | Set | Ranking | Version |
| | / | | / | | | | | | | |

| NONE | | Total Claims Allowed: | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 32 | |
| /BETELHEM SHEWAREGED/<br>Primary Examiner, Art Unit 1785 | 22 March 2022 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 13 | 1 |

U.S. Patent and Trademark Office — Part of Paper No.: 20220322

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| INTERNATIONAL CLASSIFICATION | | | | |
|---|---|---|---|---|
| CLAIMED | | | | |
| B32B | / | 7 | / | 12 |

| NON-CLAIMED | | | | |
|---|---|---|---|---|
| | / | | / | |

| US ORIGINAL CLASSIFICATION | |
|---|---|
| CLASS | SUBCLASS |
| 428 | 219 |

| CROSS REFERENCES(S) | | | | | | |
|---|---|---|---|---|---|---|
| CLASS | SUBCLASS (ONE SUBCLASS PER BLOCK) | | | | | |
| | | | | | | |

| NONE<br>(Assistant Examiner) (Date) | Total Claims Allowed: 32 | |
|---|---|---|
| /BETELHEM SHEWAREGED/<br>Primary Examiner, Art Unit 1785<br>(Primary Examiner) 22 March 2022 (Date) | O.G. Print Claim(s)<br>13 | O.G. Print Figure<br>1 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | **Examiner** | **Art Unit** |
| | BETELHEM SHEWAREGED | 1785 |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

**CLAIMS**

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 8 | 10 | 17 | 19 | 24 | 28 | 32 | 37 | | | | | | |
| 2 | 2 | 9 | 11 | 18 | 20 | 25 | 29 | | | | | | | | |
| 3 | 3 | 10 | 12 | 19 | 21 | 26 | 30 | | | | | | | | |
| 4 | 4 | 11 | 13 | | 22 | 27 | 31 | | | | | | | | |
| 5 | 5 | 12 | 14 | | 23 | 28 | 32 | | | | | | | | |
| 6 | 6 | 13 | 15 | 20 | 24 | 29 | 33 | | | | | | | | |
| | 7 | 14 | 16 | 21 | 25 | 30 | 34 | | | | | | | | |
| | 8 | 15 | 17 | 22 | 26 | 31 | 35 | | | | | | | | |
| 7 | 9 | 16 | 18 | 23 | 27 | | 36 | | | | | | | | |

| | | | |
|---|---|---|---|
| NONE | | **Total Claims Allowed:** | |
| (Assistant Examiner) | (Date) | 32 | |
| /BETELHEM SHEWAREGED/<br>Primary Examiner, Art Unit 1785 | 22 March 2022 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 13 | 1 |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| CPC - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| B32B 7/12, 15/082, 27/08 | 04/21/2021 | BS |
| AS TO DATE | 09/01/2021 | BS |
| AS TO DATE | 12/04/2021 | BS |
| | | |
| | | |

| CPC Combination Sets - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US Classification - Searched* | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 428 | 219 | 04/21/2021 | BS |
| | | | |
| | | | |

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| Search Notes | | |
|---|---|---|
| **Search Notes** | **Date** | **Examiner** |
| WEST | 04/21/2021 | BS |
| Inventor Name Search - PALM | 04/21/2021 | BS |
| WEST | 09/01/2021 | BS |
| WEST | 12/04/2021 | BS |
| Inventor Name Search - PALM | 12/04/2021 | BS |
| Reviewed IDS filed on 03/21/2022 | 03/22/2022 | BS |
| | | |
| | | |

| Interference Search | | | |
|---|---|---|---|
| **US Class/CPC Symbol** | **US Subclass/CPC Group** | **Date** | **Examiner** |
| B32B | 7/12, 15/082, 15/085, 27/08, 27/306 | 12/04/2021 | BS |
| | | | |
| | | | |

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

**CLAIMS**

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 12/04/2021 | 03/22/2022 | | | | | | | |
| 1 | 1 | = | = | | | | | | | |
| 2 | 2 | = | = | | | | | | | |
| 3 | 3 | = | = | | | | | | | |
| 4 | 4 | = | = | | | | | | | |
| 5 | 5 | = | = | | | | | | | |
| 6 | 6 | = | = | | | | | | | |
| | 7 | | | | | | | | | |
| | 8 | | | | | | | | | |
| 7 | 9 | = | = | | | | | | | |
| 8 | 10 | = | = | | | | | | | |
| 9 | 11 | = | = | | | | | | | |
| 10 | 12 | = | = | | | | | | | |
| 11 | 13 | = | = | | | | | | | |
| 12 | 14 | = | = | | | | | | | |
| 13 | 15 | = | = | | | | | | | |
| 14 | 16 | = | = | | | | | | | |
| 15 | 17 | = | = | | | | | | | |
| 16 | 18 | = | = | | | | | | | |
| 17 | 19 | = | = | | | | | | | |
| 18 | 20 | = | = | | | | | | | |
| 19 | 21 | = | = | | | | | | | |
| | 22 | | | | | | | | | |
| | 23 | | | | | | | | | |
| 20 | 24 | = | = | | | | | | | |
| 21 | 25 | = | = | | | | | | | |
| 22 | 26 | = | = | | | | | | | |
| 23 | 27 | = | = | | | | | | | |
| 24 | 28 | = | = | | | | | | | |
| 25 | 29 | = | = | | | | | | | |
| 26 | 30 | = | = | | | | | | | |
| 27 | 31 | = | = | | | | | | | |
| 28 | 32 | = | = | | | | | | | |
| 29 | 33 | = | = | | | | | | | |
| 30 | 34 | = | = | | | | | | | |
| 31 | 35 | = | = | | | | | | | |
| | 36 | | | | | | | | | |
| 32 | 37 | = | = | | | | | | | |

PTO/SB/08A&B
OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 1 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

**U.S. PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 01 | US 2003/0066778-A1 | 04-10-2003 | Colombo | 7 pgs. |

**FOREIGN PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Foreign Document Number<br>Country Code[3] –Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | | | | | | |

**NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[6] |
|---|---|---|---|
| | 01 | DuPont Selar® PA3426 Blends With Nylon 6; downloaded from internet on September 10, 2005; http://www.dupont.com/packaging/products/selar/pdsprint/a3426; 11 pgs. | |
| | 02 | DuPont Selar® PA3426 Product Data Sheet; Version 44.0; Last modified on March 29, 2017; 2 pgs. | |
| | 03 | DuPont Selar® PA3426 Product Data Sheet (updated 2010); January 7, 2010; Copyright E.I. du Pont de Nemours and Company, Inc.; 3 pgs. | |
| | 04 | Encyclopedia of Polymer Science and Engineering, Vol. 4, John Wiley & Sons; Volume 4; Composites, Fabrication to Die Design; 4 pgs. | |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 03/22/2022 |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 2.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Office, U.S. patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S/

PTO/SB/08A&B
OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

| Sheet | 2 | of | 2 |
|---|---|---|---|

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

## CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | / Steven A. Avena / | Date (YYYY-MM-DD) | 2022-03-21 |
|---|---|---|---|
| Name/Print | Steven A. Avena | Registration Number | 75,211 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S/

# WEST Search History for Application 15780999

## Creation Date: 2022032217:39

## Prior Art Searches

| Query | DB | Hits | Op. | Plur. | Thes. | Date |
|---|---|---|---|---|---|---|
| **20200269544.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **6120860.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and hsp** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(nicotine or rivastigmine or fentairyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 145209 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and ((nicotine or rivastigmine or fentairyl or lidocaine) )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer) and ((cyclic olefin) or polyamide or (ethylene vinyl alcohol))** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and (EVAL or selar or coc)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(6120860.pn. ) and sealant** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(eval$ C109B)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 10 | ADJ | YES | | 04-19-2021 |
| **((eval$ C109B) ) and seal$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference) same ((Hansen$ solubility parameter) or hsp)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 153 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) ) and packag$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 33 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB | 21 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ ) not ((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 12 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 334 | ADJ | YES | | 04-21-2021 |
| **(relative energy difference) same (cyclic olefin copolymer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-21-2021 |
| **20050037162.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 3 | ADJ | YES | | 04-21-2021 |
| **(20050037162.pn. ) and chemical$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(20050037162.pn. ) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 509 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 73 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine) same food** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 04-21-2021 |
| **ethylene norbornene copolymer** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1224 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) same (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20170174405.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2015123211.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrude or extrude)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrud$ or extrud$)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20200269544.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |
| **20200269544.pn. and (co-extrusion layer) and (tie layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **2015123211.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 08-31-2021 |
| **20150225151.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |
| **(20200269544.pn. ) and (first outer layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20200269544.pn. ) and (first outer layer) and (second outer layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and paper** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(20150225151.pn. ) and (heat$ seal$)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrate** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrat$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrat$ and scalp$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **20030066778.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 3 | ADJ | YES | | 03-22-2022 |
| **20030066778.pn. and (polyamide or nylon)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 03-22-2022 |
| **20030066778.pn. and (polyamide or nylon) and ((energy difference) or (RED value) or HSP or (solubility parameter) or nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 03-22-2022 |

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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# REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
## (Submitted Only via EFS-Web)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Application Number | 15/780,999 | Filing Date | 2018-06-01 | Docket Number (if applicable) | P006DK.WO.US(87942.0009 | Art Unit | 1785 |
| First Named Inventor | Christensen et al. | | | Examiner Name | Betelhem Shewareged | | |

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

### SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

### MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

### FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 082623

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| Signature of Registered U.S. Patent Practitioner | | | |
|---|---|---|---|
| Signature | / Steven A. Avena / | Date (YYYY-MM-DD) | 2022-03-21 |
| Name | Steven A. Avena | Registration Number | 75211 |

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on March 21, 2022

HOLLAND & HART LLP

By: / Wendy Nishida /
Wendy Nishida

PATENT
Attorney Docket No.: P006DK.WO.US (87942.0009)
Client Ref. No.: AWA#138101

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Confirmation No.: 7187 |
| Christensen et al. | Examiner: Betelhem Shewareged |
| Application No.: 15/780,999 | Art Unit: 1785 |
| Filed: June 1, 2018 | **INFORMATION DISCLOSURE STATEMENT** |
| For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM | |
| Customer No.: 26582 | |

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Pursuant to the duty of disclosure set forth at 37 CFR §1.56 and the requirements for filing an Information Disclosure Statement set forth at 37 CFR §§1.97-1.98, enclosed is Form PTO/SB/08 (hereinafter "the Form") with a list of all items being submitted for consideration by the Office. A legible copy of each item listed in the Form that is not a U.S. patent or a published U.S. patent application, and not identified as being cumulative, is enclosed.

The disclosure of the remaining documents identified on the Form is not to be construed as an admission that any of the documents, alone or in any combination, is considered to be material to patentability as defined in 37 CFR §1.56(b). Moreover, the disclosure of these documents is not to be construed as an admission that any of the documents are prior art as to the above-identified application.

Applicants believe a fee is required for submission of this statement. However, if additional fees are required, the Commissioner is authorized to deduct such a fee from the

undersigned's Deposit Account No. 08-2623. Please deduct any additional fees from, or credit any overpayment to, the above-noted Deposit Account.

Respectfully submitted,

/ Steven A. Avena /

Steven A. Avena
Reg. No. 75,211

HOLLAND AND HART LLP
P.O. Box 11583
Salt Lake City, UT 84110
Tel: 303-473-2700
Fax: 303-473-2720

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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 1 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

**U.S. PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 01 | US 2003/0066778-A1 | 04-10-2003 | Colombo | 7 pgs. |

**FOREIGN PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Foreign Document Number<br>Country Code[3] –Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | | | | | | |

**NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[6] |
|---|---|---|---|
| | 01 | DuPont Selar® PA3426 Blends With Nylon 6; downloaded from internet on September 10, 2005; http://www.dupont.com/packaging/products/selar/pdsprint/a3426; 11 pgs. | |
| | 02 | DuPont Selar® PA3426 Product Data Sheet; Version 44.0; Last modified on March 29, 2017; 2 pgs. | |
| | 03 | DuPont Selar® PA3426 Product Data Sheet (updated 2010); January 7, 2010; Copyright E.I. du Pont de Nemours and Company, Inc.; 3 pgs. | |
| | 04 | Encyclopedia of Polymer Science and Engineering, Vol. 4, John Wiley & Sons; Volume 4; Composites, Fabrication to Die Design; 4 pgs. | |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 2.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Office, U.S. patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**

PTO/SB/08A&B
OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 2 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

## CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| | | | |
|---|---|---|---|
| Signature | / Steven A. Avena / | Date (YYYY-MM-DD) | 2022-03-21 |
| Name/Print | Steven A. Avena | Registration Number | 75,211 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 15780999 |
| **Filing Date:** | 01-Jun-2018 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Filer:** | Steven Anthony Avena/Wendy Nishida |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |

Filed as Large Entity

**Filing Fees for U.S. National Stage under 35 USC 371**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Miscellaneous:** | | | | |
| RCE- 1ST REQUEST | 1801 | 1 | 1360 | 1360 |
| | | **Total in USD ($)** | | **1360** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 45274333 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Steven Anthony Avena/Wendy Nishida |
| **Filer Authorized By:** | Steven Anthony Avena |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 21-MAR-2022 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 15:32:22 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | DA |
| Payment was successfully received in RAM | $1360 |
| RAM confirmation Number | E20223KF32544148 |
| Deposit Account | 082623 |
| Authorized User | Wendy Nishida |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492(a) (Basic national fee only)

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P006Danapak.pdf | 4657198<br>6c55948af6fc929f76bf739453948d7c6e22f247 | yes | 26 |

| Multipart Description/PDF files in .zip description | | |
|---|---|---|
| **Document Description** | **Start** | **End** |
| Request for Continued Examination (RCE) | 1 | 2 |
| Transmittal Letter | 3 | 4 |
| Information Disclosure Statement (IDS) Form (SB08) | 5 | 6 |
| Non Patent Literature | 7 | 17 |
| Non Patent Literature | 18 | 19 |
| Non Patent Literature | 20 | 22 |
| Non Patent Literature | 23 | 26 |

**Warnings:**

**Information:**

| | | | | | |
|---|---|---|---|---|---|
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 38540<br>c187b8568c86eb442b155dd7f3fd3f94b2928e83 | no | 2 |

**Warnings:**

**Information:**

| **Total Files Size (in bytes):** | 4695738 |
|---|---|

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# NOTICE OF ALLOWANCE AND FEE(S) DUE

26582 7590 01/03/2022

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

| EXAMINER |
|---|
| SHEWAREGED, BETELHEM |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1785 | |

DATE MAILED: 01/03/2022

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

TITLE OF INVENTION: METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1200 | $0.00 | $0.00 | $1200 | 04/04/2022 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.**

# PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26582 7590 01/03/2022

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

| |
|---|
| (Typed or printed name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

TITLE OF INVENTION: METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1200 | $0.00 | $0.00 | $1200 | 04/04/2022 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| SHEWAREGED, BETELHEM | 1785 | 428-219000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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26582 7590 01/03/2022

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

| EXAMINER | |
|---|---|
| SHEWAREGED, BETELHEM | |
| ART UNIT | PAPER NUMBER |
| 1785 | |

DATE MAILED: 01/03/2022

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Notice of Allowability | Application No. 15/780,999 | Applicant(s) Christensen et al. | |
|---|---|---|---|
| | Examiner BETELHEM SHEWAREGED | Art Unit 1785 | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--*

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to communication filed on 11/22/2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are See Continuation Sheet . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☑ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☑ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/BETELHEM SHEWAREGED/
Primary Examiner, Art Unit 1785

Continuation of 3. The allowed claim(s) is/are: 1-6,9-21,24-35 and 37

***Notice of Pre-AIA or AIA Status***

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

***Reasons for Allowance***

2. Claims 13-20, 29-31 and 37 are directed to an allowable product. Pursuant to the procedures set forth in MPEP § 821.04(B), claims 1-6, 9-12, 21, 24-28 and 32-35, directed to the process of making or using an allowable product, previously withdrawn from consideration as a result of a restriction requirement, are hereby rejoined and fully examined for patentability under 37 CFR 1.104.

3. Because all claims previously withdrawn from consideration under 37 CFR 1.142 have been rejoined, **the restriction requirement as set forth in the Office action mailed on 11/18/2020 is hereby withdrawn**. In view of the withdrawal of the restriction requirement as to the rejoined inventions, applicant(s) are advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Once the restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

4. **Claims 1, 16, 21, 24, 25 and 29 are amended, claims 7, 8, 22, 23 and 36 are canceled, and claims 1-6, 9-21, 24-35 and 37 are pending.**

5. **Pending claims 1-6, 9-21, 24-35 and 37 are allowed.**

6. The following is an examiner's statement of reasons for allowance: The closest prior art **Riis et al. (WO 2015/123211 A1)** teaches a multilayer film and a method of making the same: the multilayer film contains a multilayer base film and a sealant film, wherein the multilayer base film comprises OPET/primer/LDPE/EAA/aluminum foil, and the sealant film comprises a three-layer coextrusion of copolymer of ethylene with acrylic acid (EAA), low density polyethylene (LDPE) and ethylene-norbornene copolymer (COC). The low density polyethylene (LDPE) of the multilayer base film meets the claimed first outer layer, the aluminum foil meets the claimed base layer, the copolymer of ethylene with acrylic acid (EAA) meets the claimed tie layer, and the ethylene-norbornene copolymer (COC) meets the claimed contact layer. Riis teaches the ethylene-norbornene copolymer (COC) has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of 1.33 and 1.32 towards nicotine and lidocaine, respectively. **However**, Riis does not teach or suggest a polyamide or an ethylene vinyl alcohol as the contact layer, and the co- extrusion layer is coated to the base layer such that the base layer and the contact layer are connected by the tie layer as recited in claim 13.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

## *Conclusion*

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BETELHEM SHEWAREGED whose telephone number is (571)272-1529. The examiner can normally be reached Monday -Friday 7am-4:30pm.
9. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.
10. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
11. Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BS
December 4, 2021

/BETELHEM SHEWAREGED/
Primary Examiner
Art Unit 1785

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| CPC - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| B32B 7/12, 15/082, 27/08 | 04/21/2021 | BS |
| AS TO DATE | 09/01/2021 | BS |
| AS TO DATE | 12/04/2021 | BS |
| | | |
| | | |

| CPC Combination Sets - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US Classification - Searched* | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 428 | 219 | 04/21/2021 | BS |
| | | | |
| | | | |

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| Search Notes | | |
|---|---|---|
| **Search Notes** | **Date** | **Examiner** |
| WEST | 04/21/2021 | BS |
| Inventor Name Search - PALM | 04/21/2021 | BS |
| WEST | 09/01/2021 | BS |
| WEST | 12/04/2021 | BS |
| Inventor Name Search - PALM | 12/04/2021 | BS |
| | | |
| | | |

| Interference Search | | | |
|---|---|---|---|
| **US Class/CPC Symbol** | **US Subclass/CPC Group** | **Date** | **Examiner** |
| B32B | 7/12, 15/082, 15/085, 27/08, 27/306 | 12/04/2021 | BS |
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| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

**CLAIMS**

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 12/04/2021 | | | | | | | | |
| 1 | 1 | = | | | | | | | | |
| 2 | 2 | = | | | | | | | | |
| 3 | 3 | = | | | | | | | | |
| 4 | 4 | = | | | | | | | | |
| 5 | 5 | = | | | | | | | | |
| 6 | 6 | = | | | | | | | | |
| | 7 | | | | | | | | | |
| | 8 | | | | | | | | | |
| 7 | 9 | = | | | | | | | | |
| 8 | 10 | = | | | | | | | | |
| 9 | 11 | = | | | | | | | | |
| 10 | 12 | = | | | | | | | | |
| 11 | 13 | = | | | | | | | | |
| 12 | 14 | = | | | | | | | | |
| 13 | 15 | = | | | | | | | | |
| 14 | 16 | = | | | | | | | | |
| 15 | 17 | = | | | | | | | | |
| 16 | 18 | = | | | | | | | | |
| 17 | 19 | = | | | | | | | | |
| 18 | 20 | = | | | | | | | | |
| 19 | 21 | = | | | | | | | | |
| | 22 | | | | | | | | | |
| | 23 | | | | | | | | | |
| 20 | 24 | = | | | | | | | | |
| 21 | 25 | = | | | | | | | | |
| 22 | 26 | = | | | | | | | | |
| 23 | 27 | = | | | | | | | | |
| 24 | 28 | = | | | | | | | | |
| 25 | 29 | = | | | | | | | | |
| 26 | 30 | = | | | | | | | | |
| 26 | 31 | = | | | | | | | | |
| 28 | 32 | = | | | | | | | | |
| 29 | 33 | = | | | | | | | | |
| 30 | 34 | = | | | | | | | | |
| 31 | 35 | = | | | | | | | | |
| | 36 | | | | | | | | | |
| 32 | 37 | = | | | | | | | | |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| CPC | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | | | | | Type | Version |
| B32B | / | 7 | / | 12 | F | 2013-01-01 |
| B32B | / | 15 | / | 082 | I | 2013-01-01 |
| B32B | / | 15 | / | 085 | I | 2013-01-01 |
| B32B | / | 27 | / | 08 | I | 2013-01-01 |
| B32B | / | 27 | / | 306 | I | 2013-01-01 |
| B32B | / | 27 | / | 308 | I | 2013-01-01 |
| B32B | / | 27 | / | 325 | I | 2013-01-01 |
| B32B | / | 27 | / | 36 | I | 2013-01-01 |
| B32B | / | 2255 | / | 20 | A | 2013-01-01 |
| B32B | / | 2307 | / | 31 | A | 2013-01-01 |
| B32B | / | 2307 | / | 714 | A | 2013-01-01 |
| B32B | / | 2439 | / | 80 | A | 2013-01-01 |
| B32B | / | 2553 | / | 00 | A | 2013-01-01 |

| CPC Combination Sets | | | | | | | |
|---|---|---|---|---|---|---|---|
| Symbol | | | | | Type | Set | Ranking | Version |
| | / | | / | | | | | |

| NONE | | Total Claims Allowed: | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 32 | |
| /BETELHEM SHEWAREGED/<br>Primary Examiner, Art Unit 1785 | 04 December 2021 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 13 | 1 |

U.S. Patent and Trademark Office — Part of Paper No.: 20211204

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| INTERNATIONAL CLASSIFICATION | | | | |
|---|---|---|---|---|
| CLAIMED | | | | |
| B32B | / | 7 | / | 12 |

| NON-CLAIMED | | | | |
|---|---|---|---|---|
| | / | | / | |

| US ORIGINAL CLASSIFICATION | |
|---|---|
| CLASS | SUBCLASS |
| 428 | 219 |

| CROSS REFERENCES(S) | | | | | | |
|---|---|---|---|---|---|---|
| CLASS | SUBCLASS (ONE SUBCLASS PER BLOCK) | | | | | |
| | | | | | | |

| NONE<br>(Assistant Examiner) (Date) | Total Claims Allowed: 32 | |
|---|---|---|
| /BETELHEM SHEWAREGED/<br>Primary Examiner, Art Unit 1785<br>(Primary Examiner) 04 December 2021 (Date) | O.G. Print Claim(s) 13 | O.G. Print Figure 1 |

U.S. Patent and Trademark Office Part of Paper No.: 20211204

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | **Examiner** | **Art Unit** |
| | BETELHEM SHEWAREGED | 1785 |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

**CLAIMS**

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 8 | 10 | 17 | 19 | 24 | 28 | 32 | 37 | | | | | | |
| 2 | 2 | 9 | 11 | 18 | 20 | 25 | 29 | | | | | | | | |
| 3 | 3 | 10 | 12 | 19 | 21 | 26 | 30 | | | | | | | | |
| 4 | 4 | 11 | 13 | | 22 | 27 | 31 | | | | | | | | |
| 5 | 5 | 12 | 14 | | 23 | 28 | 32 | | | | | | | | |
| 6 | 6 | 13 | 15 | 20 | 24 | 29 | 33 | | | | | | | | |
| | 7 | 14 | 16 | 21 | 25 | 30 | 34 | | | | | | | | |
| | 8 | 15 | 17 | 22 | 26 | 31 | 35 | | | | | | | | |
| 7 | 9 | 16 | 18 | 23 | 27 | | 36 | | | | | | | | |

| | | | |
|---|---|---|---|
| NONE | | **Total Claims Allowed:** | |
| (Assistant Examiner) | (Date) | 32 | |
| /BETELHEM SHEWAREGED/<br>Primary Examiner, Art Unit 1785 | 04 December 2021 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 13 | 1 |

# WEST Search History for Application 15780999

## Creation Date: 2021120419:00

## Prior Art Searches

| Query | DB | Hits | Op. | Plur. | Thes. | Date |
|---|---|---|---|---|---|---|
| **20200269544.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **6120860.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and hsp** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(nicotine or rivastigmine or fentairyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 145209 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and ((nicotine or rivastigmine or fentairyl or lidocaine) )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer) and ((cyclic olefin) or polyamide or (ethylene vinyl alcohol))** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and (EVAL or selar or coc)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(6120860.pn. ) and sealant** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(eval$ C109B)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 10 | ADJ | YES | | 04-19-2021 |
| **((eval$ C109B) ) and seal$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference) same ((Hansen$ solubility parameter) or hsp)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 153 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) ) and packag$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 33 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB | 21 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ ) not ((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 12 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 334 | ADJ | YES | | 04-21-2021 |
| **(relative energy difference) same (cyclic olefin copolymer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-21-2021 |
| **20050037162.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 3 | ADJ | YES | | 04-21-2021 |
| **(20050037162.pn. ) and chemical$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(20050037162.pn. ) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 509 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 73 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine) same food** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 04-21-2021 |
| **ethylene norbornene copolymer** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1224 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) same (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20170174405.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2015123211.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrude or extrude)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrud$ or extrud$)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20200269544.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |
| **20200269544.pn. and (co-extrusion layer) and (tie layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **2015123211.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 08-31-2021 |
| **20150225151.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |
| **(20200269544.pn. ) and (first outer layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20200269544.pn. ) and (first outer layer) and (second outer layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and paper** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(20150225151.pn. ) and (heat$ seal$)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrate** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrat$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrat$ and scalp$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Confirmation No.: 7187 |
| Christensen et al. | Examiner: Betelhem Shewareged |
| For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM | Art Unit: 1785 |
| | **AMENDMENT** |
| Application No.: 15/780,999 | **CERTIFICATE OF TRANSMISSION** I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on: November 22, 2021. |
| Filed: June 1, 2018 | By: / Wendy Nishida / Wendy Nishida |
| Docket No.: P006DK.WO.US (87942.0009) | |
| Customer No.: 26582 | |

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the non-final Office Action dated September 7, 2021, please enter the following amendments and remarks:

**Amendments to the Claims begin** on page 2.

**Remarks** begin on page 9.

**Amendments to the Claims**

Please enter the following amendments to the claims:

1. (Withdrawn–Currently Amended) A method for providing a film, said method comprising the steps of:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer; and,

wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on a Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one ~~or more~~ of: ~~a cyclic olefin copolymer,~~ a polyamide**[[,]]** or an ethylene vinyl alcohol.

2. (Withdrawn) The method according to claim 1, wherein the base layer comprises one or more of a metal foil, a polymer, or fluoro polymers.

3. (Withdrawn) The method according to claim 1, wherein the tie layer is made of 1, 2, 3, 4 or 5 layers.

4. (Withdrawn) The method according to claim 3, wherein all the layers of the tie layer are coextruded with the contact layer.

5. (Withdrawn) The method according to claim 1, wherein the tie layer is constituted of one layer and wherein the layer is a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, wherein the third polymer is a glycidyl methacrylate or a maleic anhydride.

6. (Withdrawn) The method according to claim 5, wherein the tie layer comprises at least two layers, and wherein the first layer comprises the copolymer and the at least second or more layer(s) comprises one or more of ethylene ethyl acrylate (EEA), polyethylene (PE), ethyl methacrylate (EMA), ethylene acrylic acid (EAA).

7–8. (Cancelled)

9. (Withdrawn) The method according to claim 1, wherein the tie layer or plurality of layers constituting the tie layer, comprises a loading in the range of 7 to 20 g/m2 or the contact layer comprises a loading in the range of 4 to 20 g/m2 and the loading of the film is not more than 40 g/m2.

10. (Withdrawn) The method according to claim 1, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, fentanyl, or rivastigmine.

11. (Withdrawn) The method according to claim 10, wherein the composition is a patch.

12. (Withdrawn) The method according to claim 10, wherein an amount of the chemical remaining at day 0 after at least 7 days of storage at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

13. (Previously Presented) An aggressive chemical-resistant film, comprising:

a base layer that is one or more of water resistant or oxygen resistant;

a co-extrusion layer, wherein the co-extrusion layer comprises a tie layer; and

a contact layer, and wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;

wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol, and wherein the co-extrusion layer is coated to the base layer such that the base layer and the contact layer are connected by the tie layer.

14. (Previously Presented) The film according to claim 13, wherein the base layer comprises one or more of a metal foil, a polyamide, a polyvinylidene chloride, a silicium or aluminium oxide coated polyesters, or fluropolymers.

15. (Previously Presented) The film according to claim 13, wherein the tie layer or plurality of layers constituting the tie layer comprises a loading in the range of 7 to 20 g/m2 or the contact layer comprises a loading in the range of 4 to 20 g/m2 and the loading of the film is not more than 40 g/m2.

16. (Currently Amended) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material; and

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a co-extrusion layer, said co-extrusion layer comprising a tie layer and a contact layer, where the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;

wherein the polymer of the contact layer comprises one ~~or more~~ of: ~~a cyclic olefin copolymer,~~ a polyamide[],[] or an ethylene vinyl alcohol; and wherein the base layer side of the film is facing a first outer layer.

17. (Previously Presented) The laminate according to claim 16, wherein the laminate further comprises a second outer layer facing the exterior side of the first outer layer, wherein the second outer layer is a paper layer.

18. (Previously Presented) The laminate according to claim 16, wherein the laminate encloses a compound comprising one or more of nicotine, rivastigmine, fentanyl, or lidocaine.

19. (Previously Presented) The laminate according to claim 16, wherein the laminate is heat sealable.

20. (Previously Presented) The laminate according to claim 16, wherein a maximum of 10% of the active ingredient is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

21. (Withdrawn–Currently Amended) An aggressive chemical substance packed in a heat sealable laminate, said heat sealable laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, wherein the base layer side of the film is facing the outer layer; and, wherein the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;

wherein the polymer of the contact layer comprises one ~~or more~~ of: ~~a cyclic olefin copolymer,~~ a polyamide**[[,]]** or an ethylene vinyl alcohol.

22–23. (Cancelled)

24. (Withdrawn–Currently Amended) A method for providing an aggressive chemical resistant film said film being resistant against one or more of nicotine, rivastigmine, fentanyl or lidocaine, and wherein said method comprises:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a relative energy difference (RED) value

based on a Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one ~~or more~~ of: ~~a cyclic olefin copolymer,~~ a polyamide**[[,]]** or an ethylene vinyl alcohol.

25. (Withdrawn–Currently Amended) A method for providing an aggressive chemical resistant film, wherein said method comprises:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol, and wherein the polymer of the contact layer has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one ~~or more~~ of: ~~a cyclic olefin copolymer,~~ a polyamide**[[,]]** or an ethylene vinyl alcohol.

26. (Withdrawn) The method according to claim 25, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, fentanyl, or rivastigmine.

27. (Withdrawn) The method according to claim 26, wherein the composition is a patch.

28. (Withdrawn) The method according to claim 26, wherein an amount of the a chemical remaining after at least 7 days of storage wrapped in the film at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

29. (Currently Amended) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film ~~according to claim 25~~, said film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer**, wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol**.

30. (Previously Presented) The laminate according to claim 29, wherein the laminate is wrapped around a composition comprising the aggressive chemical substance and wherein a maximum of 10% w/w of the aggressive chemical substance based on nominal content is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

31. (Previously Presented) The laminate according to claim 30, wherein the aggressive chemical substance is one or more of rivastigmine, lidocaine, fentanyl, or nicotine.

32. (Withdrawn) The method according to claim 1, wherein the RED value is in the range of 0.8 to 10.

33. (Withdrawn) The method according to claim 1, wherein the RED value is in the range of 0.8 to 5.

34. (Withdrawn) The method according to claim 1, wherein the RED value is in the range of 1 to 2.

35. (Withdrawn) The method according to claim 2, wherein the metal foil is an aluminum foil.

36. (Cancelled)

37. (Previously Presented) The film according to claim 13, wherein the tie layer is constituted of one layer and wherein the one layer is made of a copolymer, said copolymer comprising a material selected from a copolymer of ethylene and acrylic acid,

ethylene and methacrylic acid and a third polymer, wherein the third polymer is made of a material selected from glycidyl methacrylate, and maleic anhydride.

## REMARKS

***Status of the Claims***

Before this Amendment, claims 13–20, 29–31, and 37 were present for examination and claims 1–6, 9–12, 21, and 24–28, and 32–35 were withdrawn from consideration. In this Amendment: claims 1, 16, 21, 24, 25, and 29 are amended; no claims are canceled; and no new claims are added. Therefore, claims 13–20, 29–31, and 37 are present for examination, and claims 13, 16, and 29 are the independent claims. Support for the amendments to the claims may be found throughout the Specification as filed including at least at Paragraphs [0034], [0047], [0116], [0120], and [0136]. No new matter is added with these amendments.

In the non-final Office Action dated September 7, 2021 ("Office Action"): claims 16, 18, 19, 29, and 31 were rejected under 35 U.S.C.§ 102 over International Patent Publication No. WO 2015/123211 to Riis et al. ("Riis"); claims 17, 20, and 30 were rejected under 35 U.S.C. § 103 over Riis; claim 29 was objected to for certain informalities; and claims 13–15 and 37 were allowed. Applicant respectfully requests reconsideration.

***Allowable Subject Matter***

The Office Action indicated that claims 13–15 and 37 are allowable. *See* Office Action, p. 5.

Applicant thanks the Examiner for this indication of allowable subject matter.

***Objections to the Claims***

The Office Action objected to claim 29 for certain informalities. *See* Office Action, p. 2.

Without conceding the merits of the objection of independent claim 29—and solely to expedite prosecution—Applicant has amended independent claim 29. For example, independent claim 29 has been amended to recite, in part, "an aggressive chemical resistant film, said film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer."

Accordingly, Applicant requests that the objection to claim 29 be withdrawn.

***35 U.S.C. § 102***

The Office Action rejected claims 16, 18, 19, 29, and 30 under 35 U.S.C. § 102 over Riis.

For a valid anticipation rejection, the Office must show that each feature of a claim appears in a single piece of prior art. The Federal Circuit has affirmed that "unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to . . . anticipate under 35 U.S.C. § 102." *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

*Independent Claims 16 and 29*

Without conceding the merits of the rejection of independent claims 16 and 29 under 35 U.S.C. § 102—and solely to expedite prosecution—Applicant has amended independent claims 16 and 29. For example, independent claim 16 has been amended to recite, in part, "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol." Independent claim 29 has been amended to recite similar subject matter.

Riis also does not disclose all the features of amended independent claim 16. For example, Riis does not disclose "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol," as recited in amended independent claim 16.

Riis is generally directed to "a film for packing a product that has a pharmaceutical active agent." Riis, Abstract. Riis describes that "the films described herein have a product contact layer containing ethylene norbornene copolymer, which is a cyclic olefin copolymer (COC)." *Id.*, ¶ [0052]. At the portions cited by the Office Action, Riis further describes that "the sealant film was a three-layer coextrusion of EAA, LDPE, and ethylene-norbornene copolymer (COC) which was extrusion coated onto the aluminum foil surface of the multilayer base film." *Id.*, ¶ [00174]. However, a sealant film comprising EAA, LDPE, and COC is not the same as "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol," as recited in amended independent claim 16. Rather, Riis describes that the "contact layer contain[s] . . . a cyclic olefin copolymer (COC)." *Id.*, ¶ [0052]. Therefore, Riis does not disclose "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol," as recited in amended independent claim 16.

In addition, the Office Action concedes that "Riis does not teach or suggest a polyamide or an ethylene vinyl alcohol as the contact layer . . . as recited in claim 13." Office Action, p. 5. It therefore follows that Riis does not disclose "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol," as recited in amended independent claim 16. Thus, Riis does not disclose the features of independent claim 16.

Therefore, for at least these reasons, amended independent claims 16 and 29 are allowable over Riis.

Accordingly, Applicant requests that the rejection of independent claims 16 and 29 under 35 U.S.C. § 102 be withdrawn.

*Dependent Claims 18, 19, and 31*

Dependent claims 18, 19, and 31 each depend from one of independent claims 16 and 29, and are therefore allowable for at least the same reasons that independent claims 16 and 29 are allowable.

Accordingly, for at least these reasons, Applicant requests that the rejection of dependent claims 18, 19, and 31 under 35 U.S.C. § 102 be withdrawn.

***35 U.S.C. § 103***

The Office Action rejected claims 17, 20, and 30 under 35 U.S.C. § 103 over the stated combinations of Riis.

Factual findings made by the Office are the "necessary underpinnings to establish obviousness." MPEP § 2141(II). The Office must set forth "the relevant teachings of the prior art relied upon." MPEP § 2142. In *KSR International Co. v. Teleflex Inc.*, the Supreme Court noted that the analysis supporting a rejection under 35 U.S.C. § 103 must be made explicit. *See* 550 U.S. 398, 418 (2007); MPEP § 2142. "[O]bviousness [also] requires a suggestion of all limitations in a claim." *In re Wada and Murphy*, Appeal 2007-3733 (citing *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003)).

*Dependent Claims 17, 20, and 30*

Dependent claims 17, 20, and 30 each depend from one of independent claims 16 and 29, and are therefore allowable for at least the same reasons that independent claims 16 and 29 are allowable.

Accordingly, for at least these reasons, Applicant requests that the rejection of dependent claims 17, 20, and 30 under 35 U.S.C. § 103 be withdrawn.

## CONCLUSION

Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is therefore respectfully requested.

The Commissioner is authorized to charge any fees or underpayments that may be due with this response, or credit any overpayments, to Deposit Account No. 08-2623.

If the Examiner believes a telephone conference would expedite prosecution of this Application, please call the undersigned at (303) 473-2700.

Respectfully submitted,

By: / Paul M. Schramm /
Paul M. Schramm
Reg. No. 62,050

Holland & Hart LLP
P.O. Box 11583
Salt Lake City, Utah 84147
Tel: 303-473-2700
Fax: 303-473-2720

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 44343909 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Paul M. Schramm/Wendy Nishida |
| **Filer Authorized By:** | Paul M. Schramm |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 22-NOV-2021 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 17:05:50 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P006Danapak2.pdf | 137041<br>76d05a165a88f140b4d2820e4a2235d90486b8cd | yes | 12 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Amendment/Req. Reconsideration-After Non-Final Reject | 1 | 1 |
| | Claims | 2 | 8 |
| | Applicant Arguments/Remarks Made in an Amendment | 9 | 12 |
| **Warnings:** | | | |
| **Information:** | | | |
| | **Total Files Size (in bytes):** | 137041 | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>15/780,999 | Filing Date<br>06/01/2018 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☑ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED - PART I

| FOR | (Column 1)<br>NUMBER FILED | (Column 2)<br>NUMBER EXTRA | | RATE ($) | FEE ($) |
|---|---|---|---|---|---|
| ☐ BASIC FEE<br>(37 CFR 1.16(a), (b), or (c)) | N/A | N/A | | N/A | |
| ☐ SEARCH FEE<br>(37 CFR 1.16(k), (i), or (m)) | N/A | N/A | | N/A | |
| ☐ EXAMINATION FEE<br>(37 CFR 1.16(o), (p), or (q)) | N/A | N/A | | N/A | |
| TOTAL CLAIMS<br>(37 CFR 1.16(i)) | minus 20 = | * | | x $100 = | |
| INDEPENDENT CLAIMS<br>(37 CFR 1.16(h)) | minus 3 = | * | | x $460 = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | | TOTAL | |

## APPLICATION AS AMENDED - PART II

| | | (Column 1) | | (Column 2) | (Column 3) | | | |
|---|---|---|---|---|---|---|---|---|
| AMENDMENT | 11/22/2021 | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | | RATE ($) | ADDITIONAL FEE ($) |
| | Total<br>(37 CFR 1.16(i)) | * 32 | Minus | ** 35 | = 0 | | x $100 = | 0 |
| | Independent<br>(37 CFR 1.16(h)) | * 7 | Minus | *** 7 | = 0 | | x $480 = | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | 0 |

| | | (Column 1) | | (Column 2) | (Column 3) | | | |
|---|---|---|---|---|---|---|---|---|
| AMENDMENT | | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | | RATE ($) | ADDITIONAL FEE ($) |
| | Total<br>(37 CFR 1.16(i)) | * | Minus | ** | = | | x $0 = | |
| | Independent<br>(37 CFR 1.16(h)) | * | Minus | *** | = | | x $0 = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | |

| | |
|---|---|
| * If the entry in column 1 is less than the entry in column 2, write "0" in column 3. | LIE |
| ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". | /NICOLE LOVE HENSLEY/ |
| *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". | |
| The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1. | |

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

26582 7590 09/07/2021

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147

| EXAMINER | |
|---|---|
| SHEWAREGED, BETELHEM | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1785 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 09/07/2021 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@hollandhart.com

| Office Action Summary | Application No. 15/780,999 | Applicant(s) Christensen et al. | |
|---|---|---|---|
| | Examiner BETELHEM SHEWAREGED | Art Unit 1785 | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☑ Responsive to communication(s) filed on 07/12/2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims***

5) ☑ Claim(s) 1-6,9-21,24-35 and 37 is/are pending in the application.

5a) Of the above claim(s) 1-6,9-12,21,24-28 and 32-35 is/are withdrawn from consideration.

6) ☑ Claim(s) 13-15 and 37 is/are allowed.

7) ☑ Claim(s) 16-20 and 29-31 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☑ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☑ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 07/12/2021.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

### *Notice of Pre-AIA or AIA Status*

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

### *Note*

2. Applicant's response filed on 07/12/2021 has been fully considered. Claims 13 and 14 are amended, claims 7, 8, 22, 23 and 36 are canceled, claim 37 is added, and claims 1-6, 9-21, 24-35 and 37 are pending. Currently, 1-6, 9-12, 21, 24-28 and 32-35 are withdrawn from consideration as non-elected invention.

### *Claim Objections*

3. Claim 29 is objected to because of the following informalities: Claim 29 is dependent upon withdrawn claim 25. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

5. **Claims 16, 18 and 19 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Riis et al. (WO 2015/123211 A1).**

6. **Claims 16 and 18**: Riis teaches a multilayer film containing a multilayer base film and a sealant film, wherein the multilayer base film comprises

OPET/primer/LDPE/EAA/aluminum foil, and the sealant film comprises a three-layer coextrusion of copolymer of ethylene with acrylic acid (EAA), low density polyethylene (LDPE) and ethylene-norbornene copolymer (COC) ([00174] and [0018]). The low density polyethylene (LDPE) of the multilayer base film meets the claimed first outer layer, the aluminum foil meets the claimed base layer, the copolymer of ethylene with acrylic acid (EAA) meets the claimed tie layer, and the ethylene-norbornene copolymer (COC) meets the claimed contact layer. Riis teaches the ethylene-norbornene copolymer (COC) has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of 1.33 and 1.32 towards nicotine and lidocaine **{instant claim 18}**, respectively (Table 1, [00117] and [00118]).

7. **Claim 19**: Riis teaches the sealant layer is heat sealable [0056], thus the multilayer film is heat sealable.

8. **Claims 29 and 31 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Riis et al. (WO 2015/123211 A1).**

9. **Claims 29 and 31**: Riis teaches a multilayer film containing a multilayer base film and a sealant film, wherein the multilayer base film comprises OPET/primer/LDPE/EAA/aluminum foil, and the sealant film comprises a three-layer coextrusion of copolymer of ethylene with acrylic acid (EAA), low density polyethylene (LDPE) and ethylene-norbornene copolymer (COC) ([00174] and [0018]). The low density polyethylene (LDPE) of the multilayer base film meets the claimed first outer layer, the aluminum foil meets the claimed base layer, the copolymer of ethylene with acrylic acid (EAA) meets the claimed tie layer, and the ethylene-norbornene copolymer

(COC) meets the claimed contact layer. Riis teaches the ethylene-norbornene copolymer (COC) has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of 1.33 and 1.32 towards nicotine and lidocaine **{instant claim 31}**, respectively (Table 1, [00117] and [00118]).

### *Claim Rejections - 35 USC § 103*

10. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

11. **Claims 17 and 20 are rejected under 35 U.S.C. 103 as being unpatentable over Riis et al. (WO 2015/123211 A1), as applied to claim 16 above.**

Riis teaches the claimed invention as set forth above.

12. **Claim 17**: The oriented polyethylene terephthalate (OPET) in the multilayer base film meets the claimed second outer layer but does not teach the use of paper instead OPET as the second outer layer. Riis, in [00174], teaches the claimed invention except that OPET instead of paper. However, Riis also shows paper is an equivalent structure known in the art (see [0067]). Therefore, because these two materials were art recognized equivalents before the effective filing date of the invention, one of ordinary skill in the art would have found it obvious to substitute OPET for paper.

13. **Claim 20**: Riis teaches the multilayer film has low scalping properties [00174]; COC of the sealant layer shows the amount of eluted nicotine based on nicotine direct

contact test is 3.47 mg or less, and the amount of eluted nicotine based on nicotine vapor test is 2.42 mg or less (Table 2 and [00139]-[00145]). It is well established that the density of liquid nicotine is about 1.010g/mL. Therefore, the percentage amounts of 3.47 mg and 2.42 mg are calculated to be 6.87% and 4.79%, respectively.

14. **Claim 30 are rejected under 35 U.S.C. 103 as being unpatentable over Riis et al. (WO 2015/123211 A1), as applied to claim 29 above.**

Riis teaches the claimed invention as set forth above.

15. **Claim 30**: Riis teaches the multilayer film has low scalping properties [00174]; COC of the sealant layer shows the amount of eluted nicotine based on nicotine direct contact test is 3.47 mg or less, and the amount of eluted nicotine based on nicotine vapor test is 2.42 mg or less (Table 2 and [00139]-[00145]). It is well established that the density of liquid nicotine is about 1.010g/mL. Therefore, the percentage amounts of 3.47 mg and 2.42 mg are calculated to be 6.87% and 4.79%, respectively.

***Allowable Subject Matter***

16. Claims 13-15 and 37 are allowed. Riis does not teach or suggest a polyamide or an ethylene vinyl alcohol as the contact layer, and the co- extrusion layer is coated to the base layer such that the base layer and the contact layer are connected by the tie layer as recited in claim 13.

***Correspondence***

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BETELHEM SHEWAREGED whose telephone number is (571)272-1529. The examiner can normally be reached on Monday -Friday 7am-4:30pm.
18. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.
19. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
20. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BS
September 1, 2021

/BETELHEM SHEWAREGED/
Primary Examiner
Art Unit 1785

| Notice of References Cited | Application/Control No. 15/780,999 | Applicant(s)/Patent Under Reexamination Christensen et al. | |
|---|---|---|---|
| | Examiner BETELHEM SHEWAREGED | Art Unit 1785 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | CPC Classification | US Classification |
|---|---|---|---|---|---|---|
| * | A | US-20150225151-A1 | 08-2015 | Osborn; Christopher L. | B32B27/34 | 604/307 |
| | B | | | | | |
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**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | CPC Classification |
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| | N | | | | | |
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**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
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| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| CPC - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| B32B 7/12, 15/082, 27/08 | 04/21/2021 | BS |
| AS TO DATE | 09/01/2021 | BS |
| | | |
| | | |

| CPC Combination Sets - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US Classification - Searched* | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 428 | 219 | 04/21/2021 | BS |
| | | | |
| | | | |

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes | | |
|---|---|---|
| Search Notes | Date | Examiner |
| WEST | 04/21/2021 | BS |
| Inventor Name Search - PALM | 04/21/2021 | BS |
| WEST | 09/01/2021 | BS |
| | | |
| | | |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| Interference Search | | | |
|---|---|---|---|
| US Class/CPC Symbol | US Subclass/CPC Group | Date | Examiner |
| | | | |

PTO/SB/08A&B
OMB 0651-0031
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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 1 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

**U.S. PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | | | | | |

**FOREIGN PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Foreign Document Number<br>Country Code[3] –Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 05 | EP 0245921-A2 | 11-19-1987 | International Paper Company | 12 pgs. | X |

**NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[6] |
|---|---|---|---|
| | | | |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 09/01/2021 |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 2.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Office, U.S. patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S/

PTO/SB/08A&B
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

| Sheet | 2 | of | 2 |
|---|---|---|---|

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

## CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | / Steven A. Avena / | Date (YYYY-MM-DD) | 2021-07-12 |
|---|---|---|---|
| Name/Print | Steven A. Avena | Registration Number | 75,211 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S/

# WEST Search History for Application 15780999

## Creation Date: 2021090116:44

## Prior Art Searches

| Query | DB | Hits | Op. | Plur. | Thes. | Date |
|---|---|---|---|---|---|---|
| **20200269544.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **6120860.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and hsp** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(nicotine or rivastigmine or fentairyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 145209 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and ((nicotine or rivastigmine or fentairyl or lidocaine) )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer) and ((cyclic olefin) or polyamide or (ethylene vinyl alcohol))** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and (EVAL or selar or coc)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |

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|---|---|---|---|---|---|---|
| **(6120860.pn. ) and sealant** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(eval$ C109B)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 10 | ADJ | YES | | 04-19-2021 |
| **((eval$ C109B) ) and seal$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference) same ((Hansen$ solubility parameter) or hsp)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 153 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) ) and packag$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 33 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB | 21 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ ) not ((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 12 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 334 | ADJ | YES | | 04-21-2021 |
| **(relative energy difference) same (cyclic olefin copolymer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-21-2021 |
| **20050037162.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 3 | ADJ | YES | | 04-21-2021 |
| **(20050037162.pn. ) and chemical$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

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|---|---|---|---|---|---|---|
| **(20050037162.pn. ) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 509 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 73 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine) same food** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 04-21-2021 |
| **ethylene norbornene copolymer** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1224 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) same (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20170174405.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

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|---|---|---|---|---|---|---|
| **2015123211.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrude or extrude)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrud$ or extrud$)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20200269544.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |
| **20200269544.pn. and (co-extrusion layer) and (tie layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **2015123211.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 08-31-2021 |
| **20150225151.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |
| **(20200269544.pn. ) and (first outer layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20200269544.pn. ) and (first outer layer) and (second outer layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and paper** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 08-31-2021 |

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|---|---|---|---|---|---|---|
| **(20150225151.pn. ) and (heat$ seal$)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrate** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrat$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |
| **(20150225151.pn. ) and migrat$ and scalp$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 08-31-2021 |

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# BIB DATA SHEET

**CONFIRMATION NO. 7187**

| SERIAL NUMBER | FILING or 371(c) DATE<br>RULE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | 428 | 1785 | P006DK.WO.US (87942.0009) |

**APPLICANTS**

Danapak Flexibles A/S, Slagelse, DENMARK;

**INVENTORS**

Lars Christensen, Slagelse, DENMARK;
Peter Johansen, Odense C, DENMARK;
Torben Fogtmann, Nyborg, DENMARK;

**** CONTINUING DATA ***************************

This application is a 371 of PCT/EP2016/082876 12/29/2016

**** FOREIGN APPLICATIONS ***************************

EUROPEAN PATENT OFFICE (EPO) 15202962.5 12/29/2015

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

05/18/2020

| Foreign Priority claimed ☑ Yes ☐ No<br>35 USC 119(a-d) conditions met ☑ Yes ☐ No<br>Verified and Acknowledged /BETELHEM SHEWAREGED/ Examiner's Signature | ☐ Met after Allowance<br>Initials | STATE OR COUNTRY | SHEETS DRAWINGS | TOTAL CLAIMS | INDEPENDENT CLAIMS |
|---|---|---|---|---|---|
| | | DENMARK | 3 | 35 | 7 |

**ADDRESS**

Holland & Hart LLP
PO Box 11583
Salt Lake City, UT 84147
UNITED STATES

**TITLE**

METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

| FILING FEE RECEIVED | | |
|---|---|---|
| 5060 | FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following: | ☐ All Fees<br>☐ 1.16 Fees (Filing)<br>☐ 1.17 Fees (Processing Ext. of time)<br>☐ 1.18 Fees (Issue)<br>☐ Other _____<br>☐ Credit |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Confirmation No.: 7187 |
| Christensen et al. | Examiner: Betelhem Shewareged |
| For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM | Art Unit: 1785 |
| | **AMENDMENT** |
| Application No.: 15/780,999 | **CERTIFICATE OF TRANSMISSION** I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on: July 12, 2021. |
| Filed: June 1, 2018 | By: / Wendy Nishida / Wendy Nishida |
| Docket No.: P006DK.WO.US (87942.0009) | |
| Customer No.: 26582 | |

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the non-final Office Action dated April 26, 2021, please enter the following amendments and remarks:

**Amendments to the Claims begin** on page 2.

**Remarks** begin on page 9.

**Amendments to the Claims**

Please enter the following amendments to the claims:

1. (Withdrawn) A method for providing a film, said method comprising the steps of:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer; and,

wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on a Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol.

2. (Withdrawn) The method according to claim 1, wherein the base layer comprises one or more of a metal foil, a polymer, or fluoro polymers.

3. (Withdrawn) The method according to claim 1, wherein the tie layer is made of 1, 2, 3, 4 or 5 layers.

4. (Withdrawn) The method according to claim 3, wherein all the layers of the tie layer are coextruded with the contact layer.

5. (Withdrawn) The method according to claim 1, wherein the tie layer is constituted of one layer and wherein the layer is a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, wherein the third polymer is a glycidyl methacrylate or a maleic anhydride.

6. (Withdrawn) The method according to claim 5, wherein the tie layer comprises at least two layers, and wherein the first layer comprises the copolymer and the at least second or more layer(s) comprises one or more of ethylene ethyl acrylate (EEA), polyethylene (PE), ethyl methacrylate (EMA), ethylene acrylic acid (EAA).

7–8. (Cancelled)

9. (Withdrawn) The method according to claim 1, wherein the tie layer or plurality of layers constituting the tie layer, comprises a loading in the range of 7 to 20 g/m2 or the contact layer comprises a loading in the range of 4 to 20 g/m2 and the loading of the film is not more than 40 g/m2.

10. (Withdrawn) The method according to claim 1, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, fentanyl, or rivastigmine.

11. (Withdrawn) The method according to claim 10, wherein the composition is a patch.

12. (Withdrawn) The method according to claim 10, wherein an amount of the chemical remaining at day 0 after at least 7 days of storage at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

13. (Currently Amended) An aggressive chemical-resistant film, comprising:

~~**at least**~~ a base layer that is one or more of water resistant or oxygen resistant;

a co-extrusion layer, wherein the co-extrusion layer comprises a tie layer; and

a contact layer, and wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;

wherein the polymer of the contact layer comprises one ~~**or more**~~ of: ~~**a cyclic olefin copolymer,**~~ a polyamide**[[,]]** or an ethylene vinyl alcohol**, and wherein the co-extrusion**

**layer is coated to the base layer such that the base layer and the contact layer are connected by the tie layer**.

14. (Currently Amended) The film according to claim 13, wherein the base layer comprises one or more of a metal foil, **a** polyamide, **a** polyvinylidene chloride, **a** silicium or aluminium oxide coated polyesters, or fluropolymers~~; or~~

~~**the tie layer is constituted of one layer and wherein the layer is made of a copolymer, said copolymer comprising a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a third polymer, wherein the third polymer is made of a material selected from glycidyl methacrylate, and maleic anhydride**~~.

15. (Previously Presented) The film according to claim 13, wherein the tie layer or plurality of layers constituting the tie layer comprises a loading in the range of 7 to 20 g/m2 or the contact layer comprises a loading in the range of 4 to 20 g/m2 and the loading of the film is not more than 40 g/m2.

16. (Withdrawn) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material; and

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, where the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;

wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol; and wherein the base layer side of the film is facing a first outer layer.

17. (Withdrawn) The laminate according to claim 16, wherein the laminate further comprises a second outer layer facing the exterior side of the first outer layer, wherein the second outer layer is a paper layer.

18. (Withdrawn) The laminate according to claim 16, wherein the laminate encloses a compound comprising one or more of nicotine, rivastigmine, fentanyl, or lidocaine.

19. (Withdrawn) The laminate according to claim 16, wherein the laminate is heat sealable.

20. (Withdrawn) The laminate according to claim 16, wherein a maximum of 10% of the active ingredient is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

21. (Withdrawn) An aggressive chemical substance packed in a heat sealable laminate, said heat sealable laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, wherein the base layer side of the film is facing the outer layer; and, wherein the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;

wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol.

22–23. (Cancelled)

24. (Withdrawn) A method for providing an aggressive chemical resistant film said film being resistant against one or more of nicotine, rivastigmine, fentanyl or lidocaine, and wherein said method comprises:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a

coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on a Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol.

25. (Withdrawn) A method for providing an aggressive chemical resistant film, wherein said method comprises:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol, and wherein the polymer of the contact layer has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol.

26. (Withdrawn) The method according to claim 25, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, fentanyl, or rivastigmine.

27. (Withdrawn) The method according to claim 26, wherein the composition is a patch.

28. (Withdrawn) The method according to claim 26, wherein an amount of the a chemical remaining after at least 7 days of storage wrapped in the film at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

29. (Withdrawn) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film according to claim 25, said film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer.

30. (Withdrawn) The laminate according to claim 29, wherein the laminate is wrapped around a composition comprising the aggressive chemical substance and wherein a maximum of 10% w/w of the aggressive chemical substance based on nominal content is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

31. (Withdrawn) The laminate according to claim 30, wherein the aggressive chemical substance is one or more of rivastigmine, lidocaine, fentanyl, or nicotine.

32. (Withdrawn) The method according to claim 1, wherein the RED value is in the range of 0.8 to 10.

33. (Withdrawn) The method according to claim 1, wherein the RED value is in the range of 0.8 to 5.

34. (Withdrawn) The method according to claim 1, wherein the RED value is in the range of 1 to 2.

35. (Withdrawn) The method according to claim 2, wherein the metal foil is an aluminum foil.

36. (Cancelled)

37. (New) The film according to claim 13, wherein the tie layer is constituted of one layer and wherein the one layer is made of a copolymer, said copolymer comprising a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid

and a third polymer, wherein the third polymer is made of a material selected from glycidyl methacrylate, and maleic anhydride.

## REMARKS

***Status of the Claims***

Before this Amendment, claims 13–15 were present for examination and claims 1–6, 9–12, 16–21, and 24–35 were withdrawn from consideration. In this Amendment: claims 13 and 14 are amended; no claims are canceled; and new claim 37 is added. Therefore, claims 13–15 and 37 are present for examination, and claim 13 is the independent claim. Support for the amendments to the claims may be found throughout the Specification as filed including at least at Paragraphs [0034], [0047], [0116], [0120], and [0136]. No new matter is added with these amendments.

In the non-final Office Action dated April 26, 2021 ("Office Action"): claims 13 and 14 were rejected under 35 U.S.C.§ 102 over International Patent Publication No. WO 2015/123211 to Riis et al. ("Riis") and claim 15 was rejected under 35 U.S.C. § 103 over Riis. Applicant respectfully requests reconsideration.

***35 U.S.C. § 102***

The Office Action rejected claims 13 and 14 under 35 U.S.C. § 102 over Riis.

For a valid anticipation rejection, the Office must show that each feature of a claim appears in a single piece of prior art. The Federal Circuit has affirmed that "unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to . . . anticipate under 35 U.S.C. § 102." *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

*Independent Claim 13*

Without conceding the merits of the rejection of independent claim 13 under 35 U.S.C. § 102—and solely to expedite prosecution—Applicant has amended independent claim 13. For example, independent claim 13 has been amended to recite, in part, "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol, and wherein the co-extrusion layer is coated to the base layer such that the base layer and the contact layer are connected by the tie layer."

Riis also does not disclose all the features of amended independent claim 13. For example, Riis does not disclose "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol," as recited in amended independent claim 13.

Riis is generally directed to "a film for packing a product that has a pharmaceutical active agent." Riis, Abstract. Riis describes that "the films described herein have a product contact layer containing ethylene norbornene copolymer, which is a cyclic olefin copolymer (COC)." *Id.*, ¶ [0052]. At the portions cited by the Office Action, Riis further describes that "the sealant film was a three-layer coextrusion of EAA, LDPE, and ethylene-norbornene copolymer (COC) which was extrusion coated onto the aluminum foil surface of the multilayer base film." *Id.*, ¶ [00174]. However, a sealant film comprising EAA, LDPE, and COC is not the same as "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol," as recited in amended independent claim 13. Rather, Riis describes that the "contact layer contain[s] . . . a cyclic olefin copolymer (COC)." *Id.*, ¶ [0052]. Therefore, Riis does not disclose "wherein the polymer of the contact layer comprises one of: a polyamide or an ethylene vinyl alcohol," as recited in amended independent claim 13.

Therefore, for at least these reasons, amended independent claim 13 is allowable over Riis.

Accordingly, Applicant requests that the rejection of independent claim 13 under 35 U.S.C. § 102 be withdrawn.

*Dependent Claims 14 and 37*

Applicant has added new dependent claim 37 to include subject matter previously recited in dependent claim 14. Dependent claims 14 and 37 depend from independent claim 13, and are therefore allowable for at least the same reasons that independent claim 13 is allowable.

Accordingly, for at least these reasons, Applicant requests that the rejection of dependent claim 14 under 35 U.S.C. § 102 be withdrawn.

***35 U.S.C. § 103***

The Office Action rejected claim 15 under 35 U.S.C. § 103 over the stated combinations of Riis.

Factual findings made by the Office are the "necessary underpinnings to establish obviousness." MPEP § 2141(II). The Office must set forth "the relevant teachings of the prior art relied upon." MPEP § 2142. In *KSR International Co. v. Teleflex Inc.*, the Supreme Court noted that the analysis supporting a rejection under 35 U.S.C. § 103 must be made explicit. *See* 550 U.S. 398, 418 (2007); MPEP § 2142. "[O]bviousness [also] requires a suggestion of all limitations in a claim." *In re Wada and Murphy*, Appeal 2007-3733 (citing *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003)).

*Dependent Claim 15*

Dependent claim 15 depends from independent claim 13 and is therefore allowable for at least the same reasons that independent claim 13 is allowable.

Accordingly, for at least these reasons, Applicant requests that the rejection of dependent claim 15 under 35 U.S.C. § 103 be withdrawn.

## CONCLUSION

Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is therefore respectfully requested.

The Commissioner is authorized to charge any fees or underpayments that may be due with this response, or credit any overpayments, to Deposit Account No. 08-2623.

If the Examiner believes a telephone conference would expedite prosecution of this Application, please call the undersigned at (303) 473-2700.

Respectfully submitted,

By: / Steven A. Avena /
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I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on July 12, 2021

HOLLAND & HART LLP

By: / Wendy Nishida /
Wendy Nishida

PATENT
Attorney Docket No.: P006DK.WO.US (87942.0009)
Client Ref. No.: AWA#138101

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Confirmation No.: 7187 |
| Christensen et al. | Examiner: Betelhem Shewareged |
| Application No.: 15/780,999 | Art Unit: 1785 |
| Filed: June 1, 2018 | **INFORMATION DISCLOSURE STATEMENT** |
| For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM | |
| Customer No.: 26582 | |

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Pursuant to the duty of disclosure set forth at 37 CFR §1.56 and the requirements for filing an Information Disclosure Statement set forth at 37 CFR §§1.97-1.98, enclosed is Form PTO/SB/08 (hereinafter "the Form") with a list of all items being submitted for consideration by the Office. A legible copy of each item listed in the Form that is not a U.S. patent or a published U.S. patent application, and not identified as being cumulative, is enclosed.

The disclosure of the remaining documents identified on the Form is not to be construed as an admission that any of the documents, alone or in any combination, is considered to be material to patentability as defined in 37 CFR §1.56(b). Moreover, the disclosure of these documents is not to be construed as an admission that any of the documents are prior art as to the above-identified application.

Applicants believe that no fee is required for submission of this statement. However, if a fee is required, the Commissioner is authorized to deduct such a fee from the undersigned's

Deposit Account No. 08-2623. Please deduct any additional fees from, or credit any overpayment to, the above-noted Deposit Account.

Respectfully submitted,

/ Steven A. Avena /

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 1 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

**U.S. PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
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**FOREIGN PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Foreign Document Number<br>Country Code[3] –Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 05 | EP 0245921-A2 | 11-19-1987 | International Paper Company | 12 pgs. | X |

**NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[6] |
|---|---|---|---|
| | | | |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 2.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Office, U.S. patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | 15/780,999 |
| **Filing Date** | June 1, 2018 |
| **First Named Inventor** | Christensen et al. |
| Art Unit | 1785 |
| Examiner Name | Betelhem Shewareged |
| Docket Number | P006DK.WO.US (87942.0009) |

## CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| | | | |
|---|---|---|---|
| Signature | / Steven A. Avena / | Date (YYYY-MM-DD) | 2021-07-12 |
| Name/Print | Steven A. Avena | Registration Number | 75,211 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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# Bibliographic data: EP0245921 (A2) — 1987-11-19

## Heat sealable barrier material for improved juice packaging.

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**Applicant(s):** INT PAPER CO [US] ± (INTERNATIONAL PAPER COMPANY)

**Classification:** **- international:** ***A23L2/42; A23L3/00; B32B27/10; B32B27/12; B32B27/16; B65D5/00; B65D65/40; B65D85/72;*** (IPC1-7): B32B27/10; B65D5/00

**- cooperative:** **B32B15/085 (US); B32B15/20 (US); B32B27/08 (US); B32B27/10 (EP, KR, US); B32B27/304 (US); B32B27/306 (US); B32B27/32 (US); B32B27/34 (US); B32B27/36 (US); B32B38/0008 (US); B65D5/00 (KR); B65D65/46 (KR);** B32B2307/31 (US); B32B2307/7244 (US); B32B2311/24 (US); B32B2323/046 (US); B32B2327/00 (US); B32B2327/06 (US); B32B2329/04 (US); B32B2367/00 (US); B32B2377/00 (US); B32B2439/70 (US); Y10T428/1303 (EP, US); Y10T428/2826 (EP, US); Y10T428/31692 (EP, US); Y10T428/3175 (EP, US); Y10T428/31797 (EP, US); Y10T428/31899 (EP, US); Y10T428/31902 (EP, US); Y10T428/31913 (EP, US); Y10T428/3192 (EP, US)

**Application number:** EP19870301665 19870225 Global Dossier

**Priority number(s):** US19860864142 19860516

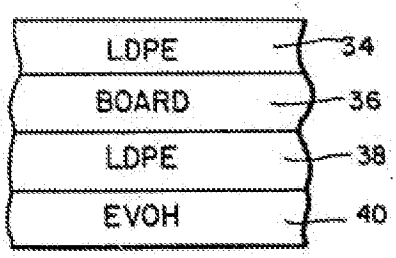
**Also published as:** EP0245921 (A3) EP0245921 (B1) EP0245921 (B2) AT63278 (T) AU597942 (B2) more

**Abstract of EP0245921 (A2)**

The present invention relates to an improved container for citrus juices and other liquids. The container utilizes a paperboard barrier laminate (34, 36, 38, 40) for the containment of essential oils and the prevention of losses of Vitamin C. Also disclosed is a process of making the laminate. The laminate makes use of a layer (40) of a heat-

sealable ethylene vinyl alcohol copolymer to enhance the barrier properties of the laminate.

FIG. 5.



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**A2**

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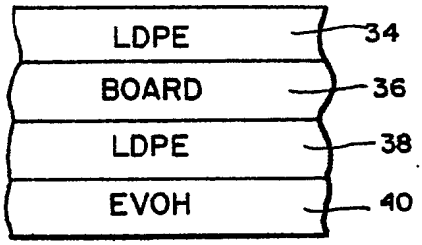
## (54) heat sealable barrier material for improved juice packaging.

(57) The present invention relates to an improved container for citrus juices and other liquids. The container utilizes a paperboard barrier laminate (34, 36, 38, 40) for the containment of essential oils and the prevention of losses of Vitamin C. Also disclosed is a process of making the laminate. The laminate makes use of a layer (40) of a heat-sealable ethylene vinyl alcohol copolymer to enhance the barrier properties of the laminate.

FIG. 5.




EP 0 245 921 A2

# HEAT SEALABLE BARRIER MATERIAL FOR IMPROVED JUICE PACKAGING

## BACKGROUND OF THE INVENTION

The invention relates to heat-sealable barrier laminates for the containment of essential oils and the prevention of loss of Vitamin C in paperboard cartons, as well as to a process for making such laminates. More particularly, this invention relates to barrier laminates which are comprised of an improved heat-sealable product contact material which does not absorb or transmit flavor or odor ingredients of citrus and other juices.

Heat-sealable low-density polyethylenes are well known to be components of current paperboard citrus juice cartons which provide little barrier to absorption and/or transmission of citrus juice essential flavor/aroma oils. Additionally, it is well known that impermeable materials such as aluminum foil, polar materials such as: polyamides, polyethylene terephthalates, polyvinylidene chlorides, polyvinyl chlorides, etc., and highly crystalline non-polar materials such as high-density polyethylene and polypropylene provide varying degrees of barrier to the absorption and/or transmission of non-polar citrus juice flavor oils such as d-limonene, et al. However, these materials could not be substituted for low density polyethylene since they lacked the requisite heat-sealability over a practical temperature range, necessary FDA clearance for direct contact to foods, stress cracking resistance and cutability during the scoring, and/or die cutting conversion processes. Due to the failures of these impermeable materials, past efforts have concentrated on using a combination of these flavor-oil resistant materials with low density polyethylene as the heat-sealable component.

The existing commercial structure for a paperboard carton for juice and similar products has utilized an easily heat-sealable barrier laminate composed of paperboard sandwiched between two layers of low density polyethylene (LDPE). The LDPE is an inexpensive heat-sealable moisture barrier. The conventional structure falters in that the LDPE layer absorbs the essential oils of the juice after short periods of time causing integrity decay of heat seals, stress cracking of the layer and allows transmission of the essential oils into the paperboard and to the atmosphere. Additionally, the conventional structure provides virtually no barrier resistance to oxygen causing the juice to lose Vitamin C in large amounts.

One other conventional structure adds two additional layers to the structure identified above, namely a foil layer and an additional LDPE layer. The expensive foil layer increases barrier resistance to the flow of oxygen, while the additional LDPE allows for ultimate heat-sealability of the laminate. The improved conventional structure has poor barrier properties relating to the absorption of essential oils and aromas, since the interior contacting layer is still LDPE.

The object of the present invention is to produce an improved juice packaging heat-sealable laminate material which does not absorb or transmit flavor/odor ingredients of citrus and other juices.

## SUMMARY OF THE INVENTION

The preferred embodiment of the present invention reveals a heat-sealable barrier laminate providing a substantial barrier to the loss of Vitamin C and an almost complete barrier to the loss of essential flavor oils over the shelf life period of the carton (six weeks) and far beyond the six week period as well. The preferred embodiment comprises from the outer surface to the inner surface contacting the essential oils and/or flavors: an exterior layer of a low density polyethylene, a paperboard substrate, an interior layer of a low density polyethylene and a layer of ethylene vinyl alcohol copolymer (EVOH) coated onto the interior layer of the low density polyethylene, in contact with the juice rendering the laminate heat-sealable.

The cartons constructed of the laminate of the present invention enable significant flavor oil retention of the citrus juice contained, and also significant prevention of loss of Vitamin C, resulting in a significant extension of the shelf life thereof and permits replacement of the costly aluminum foil barrier.

The preferred EVOH is sold under the product name Eval EP resins and is available from Eval Company of America.

The present invention has produced a suitable container which has excellent barrier properties utilizing a laminate which can be heat-sealed with its exterior and interior layers being a non-polar constituent (LDPE) and a polar constituent (EVOH) from front to back. The conventional theories have been that the laminate could not be heat-selaed on conventional apparatus at practical temperatures without having non-polar constituents on its ends. The liquid juice components are insoluble in the polar EVOH material, preventing flavor oil absorption and resulting swelling, stress cracking, and plasticization, heat seal degradation as occurs with LDPE as the contact layer.

The preferred laminate of the present invention not only exhibits significant barrier properties to extend the shelf life of the juice, but the laminate is produced using conventional extrusion equipment.

Stepwise, the paperboard is flame treated both sides, a layer of molten LDPE is placed onto the paperboard substrate by extrusion coating, the newly formed layer of LDPE is then corona discharge treated or flame treated in preparation for heat-sealing later in the process.

Secondly, the web is turned over and a layer of LDPE is extrusion coated onto the other exposed side of the paperboard substrate. This layer is also corona discharge treated or flame treated to facilitate adhesion to a subsequent EVOH layer.

Thirdly, a molten layer of EVOH is extrusion coated onto the interior layer of LDPE. The completed laminate can now be heat-sealed from front to back (LDPE to EVOH) at conventional temperatures (250°F to 500°F).

The newly formed laminate can then be scored, cut into blanks, folded and side-seam heat-sealed thereon for transport.

Once transported, the prepared blanks can be placed onto conventional equipment, such as a PurePak® machine made by Ex-Cell-O. The blanks are heat-sealed at the bottom, filled and heat-sealed at the top by the PurePak® machine to complete the filled carton.

The barrier laminate produced by the present invention not only exhibits excellent barrier properties and can be easily constructed but also meets FDA approval for use in food packaging. Eval Company of America's Eval EP is FDA approved for direct food contact and the preferred EVOH of the invention. Other EVOH's which heat seal at low temperatures (250°F to 500°F) and which can be cut on conventional machinery could also be used as the contacting barrier.

Thus, until the advent of the present invention no suitable containers for the containment of citrus juices have been developed which retain the advantages of using paperboard as the base material and is an FDA approved heat-sealable barrier laminate which is economical and can be formed using conventional extrusion coating equipment.

The present invention described herein is particularly useful as a paperboard laminate employed in the manufacture of citrus juice or other liquid containers. Such containers which make use of a heat-seal for seaming and closing such as folding boxes, square or rectangular containers or cartons, or even cylindrical tubes.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional elevation of an existing commercial structure of a laminate;

FIG. 2 is a cross-sectional elevation of an existing commercial structure of a laminate;

FIG. 3 is a cross-sectional elevation of an existing commercial structure of a laminate;

FIG. 4 is a cross-sectional elevation of an existing commercial structure of a laminate;

FIG. 5 is a cross-sectional elevation of the preferred embodiment of the laminate of the present invention;

FIG. 6 is a cross-sectional elevation of an alternate embodiment of the laminate of the present invention;

FIG. 7 is a cross-sectional elevation of an alternate embodiment of the laminate of the present invention;

FIG. 8 is block diagram representing the process for making the preferred embodiment of the laminate of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

The existing commercial structure for a paperboard carton for juice and similar products has made use of an easily heat-sealed barrier laminate composed of paperboard 4 (FIG. 1) sandwiched between two layers of low density polyethylene (LDPE) 2, 6. The LDPE is an inexpensive heat-sealable material which acts only to a limited extent as a moisture barrier to prevent loss of essential oils (flavor) and aroma. The problem encountered with conventional laminate structure has been that the essential oils of the juice (namely - D Limonene) has, after short periods of time, been absorbed into the LDPE layer causing heat seal decay, stress cracking, and swelling while stripping the juice of the essential oils. Additionally, the conventional structure (FIG 1) provides virtually no barrier resistance to oxygen which causes the juice to lose Vitamin C in great quantities after a relatively short period of time. To illustrate, the conventional paperboard $\frac{1}{2}$ gallon juice carton will lose 60.5% of its essential oil (D-Limonene) and 84.5% of its Vitamin C content in a storage period of six weeks (SEE TABLE 1).

One conventional existing paperboard carton (FIG. 2) utilizes two additional layers in addition to the layers disclosed in FIG. 1 to add greater barrier resistance to the passage of oxygen and resultant loss of Vitamin C. Aluminum foil 14 has been added to the laminate structure to increase the barrier's resistance to the flow of oxygen. The additional layer of LDPE 16 is needed to allow the laminate to be heat-sealed from front to back with the exterior LDPE 8 layer. The structure of the barrier laminate (FIG. 2) has poor barrier properties relating to the absorption of essential oils and aromas, since the heat-sealable contacting layer is still low density polyethylene. The shelf storage life of the juice carton made up of the barrier laminate of FIG. 2 still exhibits a percentage loss of essential oils (D-Limonene) of 35.5%, while greatly improving its barrier properties with respect to the percentage loss of Vitamin C, 24% (See Table 1). The addition of the foil layer allows the laminate to exhibit excellent $O_2$ barrier properties. Although, the use of a foil layer is extremely beneficial, the increased expense makes the use of foil economically less desirable.

FIGS. 3 and 4 disclose structures of barrier laminates described in U.S. Patent 4,513,036. FIG. 3 discloses a barrier laminate comprising a sandwich of LDPE 18-paperboard 20-High Density Polyethylene (HDPE) 22-LDPE 24. The laminate disclosed exhibits large losses of essential oils during its shelf life of six weeks, namely 60.5%, while also exhibiting large losses of Vitamin C during the six week period 87% (see Table 1). The economics and ease of fabrication of the laminates of FIG. 3 are outweighed by the poor barrier properties exhibited.

FIG. 4 discloses the preferred embodiment of U.S. Patent 4,513,036, namely a barrier laminate comprising LDPE 26-Paperboard 28-Polypropylene 30-LDPE 32. The additional polypropylene layer 30 adds to the barrier properties at relatively low additional costs. The barrier properties still are extremely deficient in its resistance to the passage of oxygen and its loss of Vitamin C, namely 71% after six weeks. The polypropylene laminate structure loses 39.5% of its essential oils (D-Limonene) after six weeks (see Table 1).

Both embodiments disclosed in the patent cited above do not adequately preserve the flavor/aroma and Vitamin C content of the juice. The structure of the existing commercial constructions have all faced the same problem due to the necessity for heat sealing the seams and closures while forming the carton blank and while filling the cartons with juice or the like. The necessity of forming a heat seal from the front to the back of the laminate has resulted in the use of an exterior layer of LDPE and an interior layer of LDPE, both non-polar compounds which exhibit excellent heat-sealing characteristics to one another (see FIGS. 1-4).

Referring to FIG. 5, the preferred embodiment of the laminate of the present invention is shown as comprising a paperboard substrate 36 which is most suitably high-grade paperboard stock, for example, 282 lb. Milk Carton Board, to which is applied on both sides a coating of low density polyethylene (LDPE) 34, 38 in a coating weight ranging from about 5 to about 40 pounds per ream. Any commercial extrusion coating grade LDPE is suitable for use herein. On the back or interior portion of the laminate, namely onto LDPE layer 38 is applied a layer of EVOH 40. The EVOH being a heat-sealable layer composed of Eval Company of America's Eval EP resins.

Referring now to FIG. 8, wherein a block diagram discloses the method of forming the heat-sealable barrier laminate of Figure 5.

The laminate can be easily fabricated. In Step A, the paperboard is flame treated two sides. Step B, a molten layer of the LDPE 34 is extrusion coated onto the paperboard substrate 36. Step C, the LDPE layer 34 is corona discharge or flame treated in preparation for subsequent heat-sealing Step D, the web is turned over to facilitate Step E, which has a layer of molten LDPE 38 extrusion coated onto the paperboard substrate 36. Step F, LDPE layer 38 is corona discharge treated to facilitate the adhesion of a subsequent EVOH coating, and lastly, Step G, a layer of EVOH 40 is extrusion coated onto LDPE layer 38 to complete the sandwich.

Referring now to FIG. 6, an alternate embodiment of the laminate of the present invention is shown. The embodiment adds an additional barrier layer which not only provides total containment of flavor oils, but also provides significant containment of Vitamin C. In this alternate embodiment, the paperboard substrate 44, is extrusion coated on the external surface thereof with a coating of heat-sealable LDPE 42. On the internal surface of the paperboard substrate 44 is applied a coating of LDPE 46. Overlying the LDPE web 46 is a layer of an oxygen barrier material 48. The oxygen barrier material can be any of the following group: foil, polyacrylonitrile or its copolymers, polyethylene terephthalate or its copolymers, polyvinylidene chloride or its copolymers, polyamide or its copolymers, polyvinyl alcohols or its copolymers, polyvinyl chloride or its copolymers or an additional layer of EVOH. Overlying the barrier material is a layer of heat-sealable EVOH 50 which will ultimately form the internal surface of the container constructed therefrom.

To enhance the adhesion of the additional barrier layer 48 to the LDPE layer 46 and the EVOH layer 50, additional tie layers 47, 49 can be interposed therebetween. Adhesives which are extrudable or coextrudable, such as Dupont's CXA series or recent vintage Plexars® from Norchem are suitable choices. When using ethylene vinyl alochol (EVOH) as both an oxygen barrier 48 and a heat seal layer 50 in FIG. 6, tie layer 47 can be eliminated by coextrusion coating an EVOH 48/tie layer 49/EVOH 50 composite extrudate onto LDPE layer 46 which has been previously flame or corona treated.

FIG. 7 reflects an embodiment similar to that of FIG. 5. Replacing the outer layer of a heat-sealable LDPE 34, is a blend layer 52 of EVOH and LDPE. The blend is made up of between five (5) to thirty (30) percent EVOH and the rest being LDPE. The laminate is comprised from outside to inside: LDPE/EVOH Blend 52-PAPERBOARD SUBSTRATE 54-LDPE 56-EVOH 58. The advantage of the LDPE/EVOH blend layer is that it eliminates the need for extensive surface treatment prior to heat sealing.

Although specific coating techniques have been described, any appropriate technique for applying the layers onto the paperboard substrate can be suitably employed, such as extrusion, coextrusion, or adhesive lamination or single and/or multilayer films to paperboard to achieve the stated inventions of this patent.

The unique barrier effect provided by the laminate of the present invention to the % loss of essential oils and to the % loss of Vitamin C is clearly demonstrated by the following example outlined in Table 1.

Standard ½ gallon juice containers were prepared and filled with juice. A typical essential oil in the juice was d-limonene. The filled cartons were stored for a test period of six weeks after which the juice was analyzed to determine the percentage loss by weight of the essential oil d-limonene and the percentage loss by weight of Vitamin C.

The six cartons tested were those shown in FIGS. 1-6 and described herein.

TABLE 1

| Test Sample ½ Gallon Juice Container | % Loss of Essential Oil | % Loss of Vitamin C |
|---|---|---|
| LDPE-BOARD-LDPE (FIG. 1) | 60.5 | 84 |
| LDPE-BOARD-LDPE-FOIL-LDPE (FIG. 2) | 35.5 | 24 |
| LDPE-BOARD-HDPE-LDPE (FIG. 3) | 60.5 | 87 |
| LDPE-BOARD-POLYPROPYLENE-LDPE (FIG. 4) | 39.5 | 71 |
| LDPE-BOARD-LDPE-EVOH (FIG. 5) | 0* | 30 |
| LDPE-BOARD-LDPE-EVOH-Tie Layer-EVOH (FIG. 6 with tie layer) | 0* | 24 |

*Less than one percent

It can be clearly seen that the container prepared from a laminate of the present invention provides an almost complete barrier to the loss of essential oils far greater than has been present in existing structures comprising LDPE heat seal layers. Additionally, the oxygen passage or percentage loss of Vitamin C has been greatly reduced over all prior laminates not containing aluminum foil.

The effectiveness of the laminate of the present invention as a barrier to migration of essential oils and flavors, as well as a barrier to a loss of Vitamin C permits a significant extension of shelf life of containers constructed therefrom.

## Claims

1. A container for liquids containing essential oils and/or flavors, said container constructed from a laminate comprising:

a) a paperboard substrate;

b) an outer layer of 1) a heat-sealable low density polyethylene polymer or 2) a blend of low density polyethylene polymer and ethylene vinyl alcohol copolymer coated on said outer surface of said paperboard substrate;

c) an inner layer of a heat-sealable low density polyethylene polymer coated on said inner surface of said paperboard substrate; and

d) a layer of a heat-sealable ethylene vinyl alcohol copolymer which can heat-seal on conventional equipment at temperatures ranging from 250°F - 500°F coated on said outer surface of said inner layer of said polyethylene polymer.

2. The container as claimed in claim 1 wherein said outer layer is a low density polyethylene polymer which is corona discharge treated to enhance heat-sealability of said laminate.

3. The container as claimed in claim 2 wherein said outer layer of a low density polyethylene polymer is flame treated to enhance heat-sealability of said laminate.

4. The container as claimed in claim 2 wherein said surface of said inner layer of said heat-sealable low density polyethylene polymer is corona discharge treated to enhance adhesion of said heat-sealable EVOH layer.

5. The container as claimed in claim 3 wherein said surface of said inner layer of said heat-sealable low density polyethylene polymer is flame treated to enhance adhesion of said heat-sealable EVOH layer.

6. The container according to claim 1 characterized by the fact that the outer layer b) is a heat-sealable low density polyethylene polymer coated on said outer surface of said paperboard substrate, and additionally comprises:

an oxygen barrier material layer coated on said outer surface of said inner layer of said polyethylene polymer;

a tie layer of a heat-sealable low density polyethylene polymer coated on said outer surface of said oxygen barrier materials; and

a heat-sealable layer of an ethylene vinyl alcohol copolymer coated on said outer surface of said tie layer.

7. The container as claimed in claim 6 wherein said oxygen barrier material layer is an ethylene vinyl alcohol copolymer.

8. The container as claimed in claim 6 wherein said oxygen barrier material layer is a polyvinyl alcohol.

9. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of aluminum foil.

10. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of polyethylene terephthalate.

11. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of glycol modified polyethylene terephthalate.

12. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of acid modified polyethylene terephthalate.

13. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of polyvinylidene chloride.

14. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of vinylidine chloride copolymer.

15. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of polyvinyl chloride polymer.

16. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of vinyl chloride copolymer.

17. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of polyamide.

18. The container as claimed in claim 6 wherein said oxygen barrier material layer is a layer of polyamide copolymers.

19. The container as claimed in claim 6 wherein said outer layer of said low density polyethylene polymer is corona discharge treated to enhance heat-sealability of said laminate.

20. The container as claimed in claim 6 wherein said outer layer of said low density polyethylene polymer is flame treated to enhance heat-sealability of said laminate.

21. The container as claimed in claim 19 wherein said inner layer of said low-density polyethylene polymer is corona discharge treated to enhance adhesion of said subsequent heat-sealable EVOH coating.

22. The container is claimed in claim 20 wherein said inner layer of said low-density polyethylene polymer is flame treated to enhance adhesion of said subsequent heat-sealable EVOH coating.

23. The container according to claim 1 characterized by the fact that the outer layer b) is a heat-sealable ethylene vinyl alcohol copolymer/low density polyethylene blend coated on said outer surface of said paperboard substrate.

24. The container as claimed in claim 23 wherein said surface of said inner layer of said heat-sealable low density polyethylene polymer is corona discharge treated to enhance adhesion of said heat-sealable EVOH layer.

25. The container as claimed in claim 23 wherein said surface of said inner layer of said heat-sealable low density polyethylene polymer is flame treated to enhance adhesion of said heat-sealable EVOH layer.

26. A process for improving the resistance of paperboard to the migration of essential oils and/or flavorings, said process comprising the steps of:

a) extrusion coating an outer layer of a low density polyethylene polymer onto said outer surface of said paperboard;

b) corona discharge treating or flame treating said outer layer of low density polyethylene polymer;

c) extrusion coating an inner layer of a low density polyethylene polymer onto said inner surface of said paperboard;

d) corona discharge treating or flame treating said inner layer of low density polyethylene polymer; and

e) extrusion coating a layer of 1) a heat-sealable ethylene vinyl alcohol copolymer or 2) coextrusion coating a three layer (ethylene vinyl alcohol/tie layer/ethylene vinyl alcohol) composite extrudate onto said surface of said inner layer of low density polyethylene polymer.

FIG. 1.

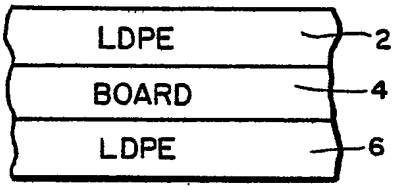
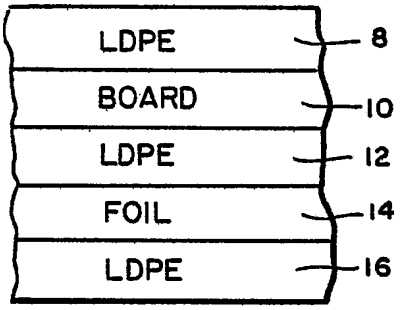



FIG. 2.




EXISTING COMMERCIAL STRUCTURES

FIG. 3.

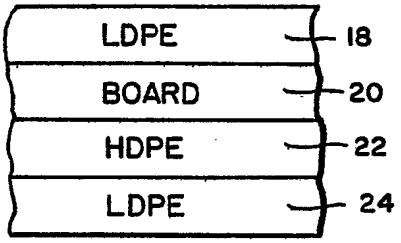
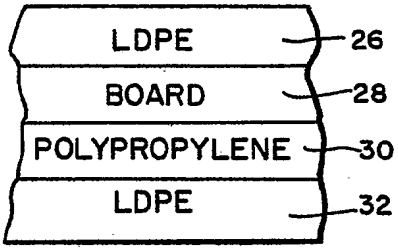



FIG. 4.




CHAMPION PATENT

FIG. 5.

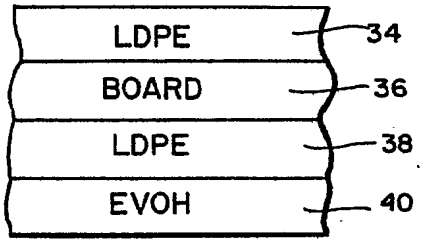



FIG. 6.

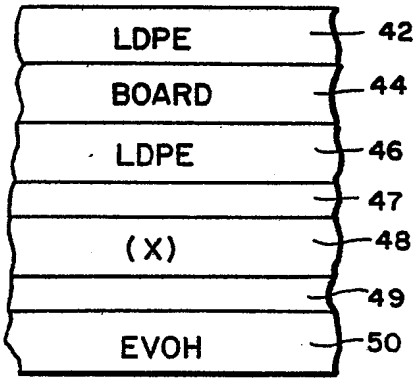
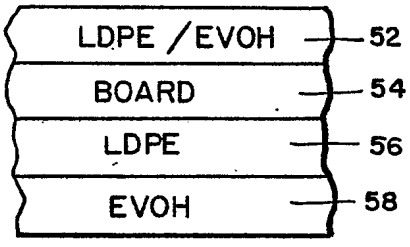



FIG. 7.



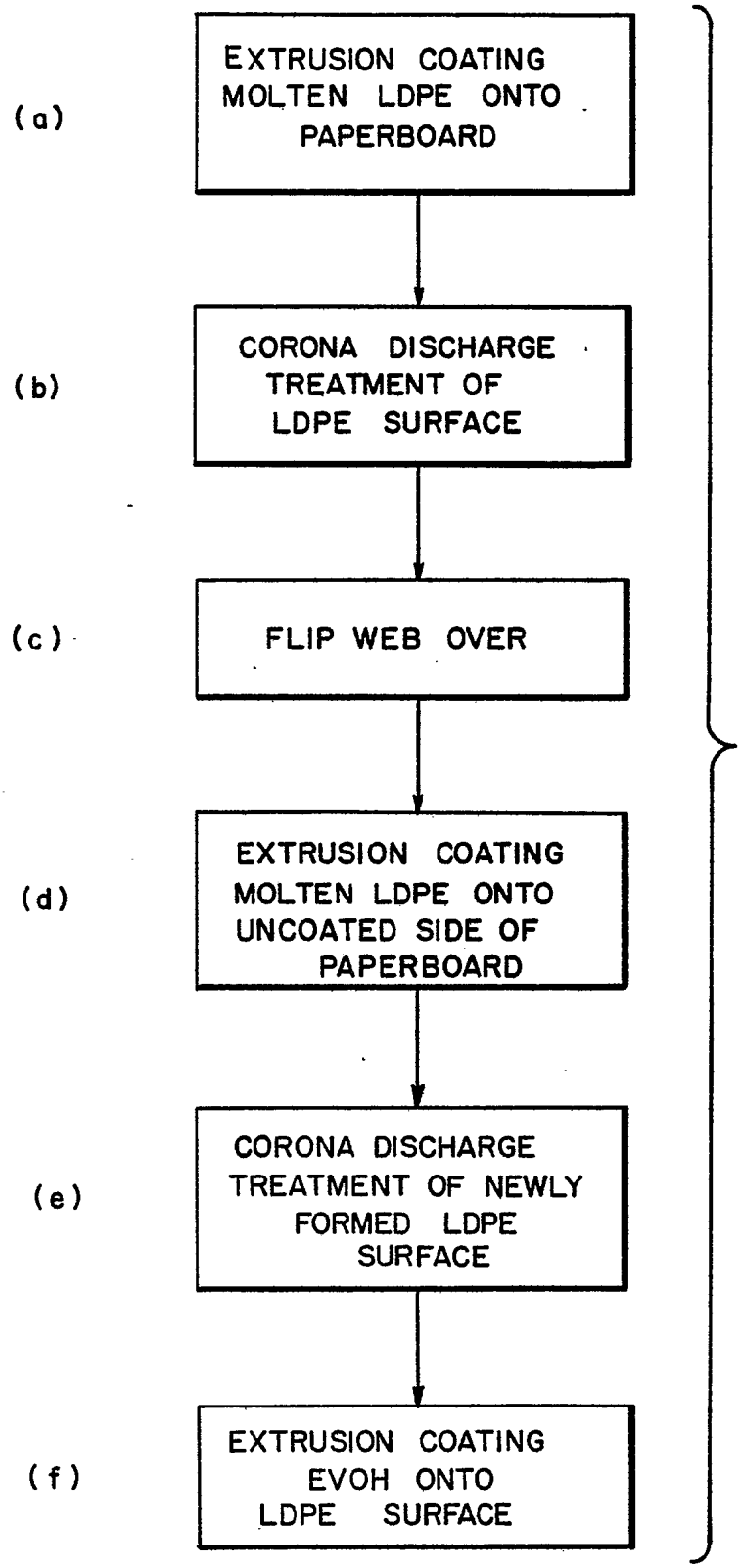

(a)
EXTRUSION COATING MOLTEN LDPE ONTO PAPERBOARD
(b)
CORONA DISCHARGE TREATMENT OF LDPE SURFACE
(c)
FLIP WEB OVER
(d)
EXTRUSION COATING MOLTEN LDPE ONTO UNCOATED SIDE OF PAPERBOARD
(e)
CORONA DISCHARGE TREATMENT OF NEWLY FORMED LDPE SURFACE
(f)
EXTRUSION COATING EVOH ONTO LDPE SURFACE

FIG. 8.

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 43219591 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Steven Anthony Avena/Wendy Nishida |
| **Filer Authorized By:** | Steven Anthony Avena |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 12-JUL-2021 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 14:36:37 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

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|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P006Danapak.pdf | 1052186<br>cc4959d4a9b1ed855aff6395abcbef149e59c8e4 | yes | 28 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Amendment/Req. Reconsideration-After Non-Final Reject | 1 | 1 |
| | Claims | 2 | 8 |
| | Applicant Arguments/Remarks Made in an Amendment | 9 | 12 |
| | Transmittal Letter | 13 | 14 |
| | Information Disclosure Statement (IDS) Form (SB08) | 15 | 16 |
| | Foreign Reference | 17 | 28 |

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**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**
**National Stage of an International Application under 35 U.S.C. 371**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**
**New International Application Filed with the USPTO as a Receiving Office**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

26582 7590 04/26/2021

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| EXAMINER | |
|---|---|
| SHEWAREGED, BETELHEM | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1785 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 04/26/2021 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@hollandhart.com

| Office Action Summary | Application No. 15/780,999 | Applicant(s) Christensen et al. | |
|---|---|---|---|
| | Examiner BETELHEM SHEWAREGED | Art Unit 1785 | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☑ Responsive to communication(s) filed on 02/03/2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims***

5) ☑ Claim(s) 1-6,9-21 and 24-35 is/are pending in the application.

5a) Of the above claim(s) 1-6,9-12,16-21 and 24-35 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 13-15 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☑ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☑ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 06/01/2020; 11/15/2019; 06/01/2018.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

***Notice of Pre-AIA or AIA Status***

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

***Election/Restrictions***

2. Applicant's election with traverse of Group I Species A (claims 13-15) in the reply filed on 02/03/2021 is acknowledged. The traversal is on the ground(s) that the none of the layers discussed in Bowen has been shown to have a RED value of greater than 0.8 towards nicotine, rivastigmine, fentanyl, or lidocaine; and additionally, none of the materials of Bowen includes a polymer contact layer of cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol. This is not found persuasive because a newly introduced reference Riis et al. (WO 2015/123211 A1) teaches a multilayer film containing a base film and a sealant film, wherein the base film comprises an aluminum foil, and the sealant film comprises a three-layer coextrusion of copolymer of ethylene with acrylic acid (EAA), low density polyethylene (LDPE) and ethylene-norbornene copolymer (COC) ([00174] and [0018]). The base film meets the claimed base layer, the copolymer of ethylene with acrylic acid (EAA) sublayer meets the claimed tie layer, and the ethylene-norbornene copolymer (COC) meets the claimed contact layer. Riis teaches the ethylene-norbornene copolymer (COC) has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of 1.33 and 1.32 towards nicotine and lidocaine, respectively (Table 1, [00117] and [00118]).

The requirement is still deemed proper and is therefore made FINAL.

***Note***

3. Claims 1, 10, 13, 14, 16, 21, 24, 25, 28, 29 and 31 are amended, claims 7, 8, 22, 23 and 36 are canceled, and claims 1-6, 9-21 and 24-35 are pending. Currently, claims 1-6, 9-12, 16-21 and 24-35 are withdrawn as a non-elected invention.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

5. **Claims 13 and 14 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Riis et al. (WO 2015/123211 A1).**

6. **Claims 13 and 14**: Riis teaches a multilayer film containing a base film and a sealant film, wherein the base film comprises an aluminum foil **{instant claim 14}**, and the sealant film comprises a three-layer coextrusion of copolymer of ethylene with acrylic acid (EAA), low density polyethylene (LDPE) and ethylene-norbornene copolymer (COC) ([00174] and [0018]). The base film meets the claimed base layer, the copolymer of ethylene with acrylic acid (EAA) **{instant claim 14}** sublayer meets the claimed tie layer, and the ethylene-norbornene copolymer (COC) meets the claimed contact layer. Riis teaches the ethylene-norbornene copolymer (COC) has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of 1.33 and 1.32 towards nicotine and lidocaine, respectively (Table 1, [00117] and [00118]).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claim 15 is rejected under 35 U.S.C. 103 as being unpatentable over Riis et al. (WO 2015/123211 A1), as applied to claim 13 above.**

Riis teaches the claimed invention as set forth above.

9. **Claim 15**: With respect to the loading/thickness of each layers, the experimental modification of this prior art in order to ascertain optimum operating conditions fails to render applicants' claims patentable in the absence of unexpected results. *In re Aller*, 105 USPQ 233. One of ordinary skill in the art would have been motivated to adjust the loading of each layer, and the motivation would be to control flexibility and lamination property. A prima facie case of obviousness may be rebutted; however, where the results of the optimizing variable, which is known to be result-effective, are unexpectedly good. *In re Boesch and Slaney*, 205 USPQ 215.

***Correspondence***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BETELHEM SHEWAREGED whose telephone number is (571)272-1529. The examiner can normally be reached on Monday -Friday 7am-4:30pm.

11. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BS
April 21, 2021

/BETELHEM SHEWAREGED/
Primary Examiner
Art Unit 1785

| ***Notice of References Cited*** | Application/Control No. 15/780,999 | Applicant(s)/Patent Under Reexamination Christensen et al. | |
|---|---|---|---|
| | Examiner BETELHEM SHEWAREGED | Art Unit 1785 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | CPC Classification | US Classification |
|---|---|---|---|---|---|---|
| * | A | US-20200269544-A1 | 08-2020 | Christensen; Lars | B32B27/08 | 1/1 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | E | | | | | |
| | F | | | | | |
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| | K | | | | | |
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**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | CPC Classification |
|---|---|---|---|---|---|---|
| | N | | | | | |
| | O | | | | | |
| | P | | | | | |
| | Q | | | | | |
| | R | | | | | |
| | S | | | | | |
| | T | | | | | |

**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| CPC - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| B32B 7/12, 15/082, 27/08 | 04/21/2021 | BS |
| | | |
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| CPC Combination Sets - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US Classification - Searched* | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 428 | 219 | 04/21/2021 | BS |
| | | | |
| | | | |

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes | | |
|---|---|---|
| Search Notes | Date | Examiner |
| WEST | 04/21/2021 | BS |
| Inventor Name Search - PALM | 04/21/2021 | BS |
| | | |
| | | |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 15/780,999 | Christensen et al. |
| | Examiner | Art Unit |
| | BETELHEM SHEWAREGED | 1785 |

| Interference Search | | | |
|---|---|---|---|
| US Class/CPC Symbol | US Subclass/CPC Group | Date | Examiner |
| | | | |

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 4

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | - |
| Examiner Name | - |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## U. S. PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 001 | 20160325534-A1 | 11-10-2016 | Hu et al. | |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]-Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 002 | WO-2017114922-A1 | 07-06-2017 | Danapak Flexibles A/S | | ☐ |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 4

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | - |
| Examiner Name | - |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## NON-PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No.[1] | Include name of the author(in CAPITAL LETTERS),title of the article(when appropriate), title of the item (book,magazine,journal,serial,symposium,catalog,etc.),date,page(s),volume-issue number(s),publisher, city and/or country where published. | T[2] |
|---|---|---|---|
| | | | ☐ |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
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| Sheet | 3 | of | 4 |
|---|---|---|---|

| Complete if Known | |
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| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | - |
| Examiner Name | - |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

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☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Paul M. Schramm/ | Date (YYYY-MM-DD) | 2020-06-01 |
|---|---|---|---|
| Name/Print | Paul M. Schramm | Registration Number | 62,050 |

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 2

| *Complete if Known* | |
|---|---|
| Application Number | Herewith |
| Filing Date | Herewith |
| First Named Inventor | Christensen et al. |
| Art Unit | To be assigned |
| Examiner Name | To be assigned |
| Docket Number | P006DK.WO.US (87942.0009) |

**U.S. PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Document Number: Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 01 | US 6,120,860-A | 09-19-2000 | Bowen et al. | 8 pgs. |
| | 02 | US 2005/037162-A1 | 02-17-2005 | John Peter Adams | 12 pgs. |
| | 03 | US 2004/234790-A1 | 11-25-2004 | Smith et al. | 4 pgs. |
| | 04 | US 2005/112337-A1 | 05-26-2005 | Randy D. Jester | 19 pgs. |

**FOREIGN PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Foreign Document Number: Country Code[3] –Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 05 | WO 00/44559-A1 | 08-03-2000 | Levander et al. | 16 pgs. | |
| | 06 | WO 2005/037539-A1 | 04-28-2005 | Morris et al. | 22 pgs. | |
| | 07 | EP 2 939 667-A1 | 11-04-2005 | Nipro Patch Co. Ltd. | 24 pgs. | |
| | 08 | WO 2013/004243-A1 | 01-10-203 | Fertin Pharma AS | 28 pgs. | |
| | 09 | WO 91/09731-A1 | 07-11-1991 | Alza Corp. | 23 pgs. | |
| | 10 | WO 2015/174502-A1 | 11-19-2015 | Nichiban KK | 36 pgs. | |

**NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[6] |
|---|---|---|---|
| | 11 | DATABASE WPI Week 201579, Derwent Publications Ltd., London, GB; AN 2015-71769A, XP002759263; 2 pgs. | |

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

| Sheet | 2 | of | 2 |
|---|---|---|---|

| *Complete if Known* | |
|---|---|
| Application Number | Herewith |
| Filing Date | Herewith |
| First Named Inventor | Christensen et al. |
| Art Unit | To be assigned |
| Examiner Name | To be assigned |
| Docket Number | P006DK.WO.US (87942.0009) |

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**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Paul M. Schramm/ | Date (YYYY-MM-DD) | 2017-06-01 |
|---|---|---|---|
| Name/Print | Paul M. Schramm | Registration Number | 62,050 |

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# WEST Search History for Application 15780999

## Creation Date: 2021042114:29

## Prior Art Searches

| Query | DB | Hits | Op. | Plur. | Thes. | Date |
|---|---|---|---|---|---|---|
| **20200269544.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **6120860.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **6120860.pn. and hsp** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(nicotine or rivastigmine or fentairyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 145209 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and ((nicotine or rivastigmine or fentairyl or lidocaine) )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(20200269544.pn. ) and (contact layer) and ((cyclic olefin) or polyamide or (ethylene vinyl alcohol))** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(6120860.pn. ) and (EVAL or selar or coc)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-19-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(6120860.pn. ) and sealant** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-19-2021 |
| **(eval$ C109B)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 10 | ADJ | YES | | 04-19-2021 |
| **((eval$ C109B) ) and seal$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference) same ((Hansen$ solubility parameter) or hsp)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 153 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) ) and packag$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 33 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB | 21 | ADJ | YES | | 04-19-2021 |
| **((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ ) not ((relative energy difference) same ((Hansen$ solubility parameter) or hsp) and packag$ )** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 12 | ADJ | YES | | 04-19-2021 |
| **(relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 334 | ADJ | YES | | 04-21-2021 |
| **(relative energy difference) same (cyclic olefin copolymer)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 4 | ADJ | YES | | 04-21-2021 |
| **20050037162.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 3 | ADJ | YES | | 04-21-2021 |
| **(20050037162.pn. ) and chemical$** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(20050037162.pn. ) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) and (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 509 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 73 | ADJ | YES | | 04-21-2021 |
| **(cyclic olefin copolymer) same (nicotine or rivastigmine or fentanyl or lidocaine) same food** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1 | ADJ | YES | | 04-21-2021 |
| **ethylene norbornene copolymer** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 1224 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) same (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20170174405.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and red** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **20150225151.pn. and (relative energy difference)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2015123211.pn.** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 8 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrude or extrude)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 0 | ADJ | YES | | 04-21-2021 |
| **(ethylene norbornene copolymer) and (relative energy difference) and tie and (coextrud$ or extrud$)** | PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS | 2 | ADJ | YES | | 04-21-2021 |

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## U. S. PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 001 | 20090208685-A1 | 08-20-2009 | Rivers et al. | |
| | 002 | 20110158564-A1 | 06-30-2011 | Krumme | |
| | 003 | 20150225151-A1 | 08-13-2015 | Osborn et al. | |
| | 004 | 20170158400-A1 | 06-08-2017 | Priscal et al. | |
| | 005 | 5613958-A | 03-25-1997 | Kochinke et al. | |
| | 006 | 6670423-B2 | 12-30-2003 | Hausmann | |
| | 007 | 6891018-B2 | 05-10-2005 | Murakami et al. | |
| | 008 | 6921563-B2 | 07-26-2005 | Goerlitz et al. | |
| | 009 | 8703283-B2 | 04-22-2014 | Goerlitz et al. | |
| | 010 | 8722164-B2 | 05-13-2014 | Bekele et al. | |
| | 011 | 9452593-B2 | 09-27-2016 | Tatarka et al. | |
| | 012 | 9487918-B2 | 08-25-2016 | Geerdinck et al. | |
| | 013 | 9663281-B2 | 05-30-2017 | Hall et al. | |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
|---|---|---|---|

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Sheet 2 of 7

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| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]-Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 014 | BR-102015012729-A2 | 01-17-2017 | Bemis Co. Inc. | | ☒ |
| | 015 | DE-102012113026-A1 | 06-26-2014 | SCHOTT AG | | ☒ |
| | 016 | DE-102013113718 A1 | 06-11-2015 | Buergofol GmbH | | ☒ |
| | 017 | DE-202008017320-U1 | 05-28-2009 | Alcan Technology & Management AG | | ☐ |
| | 018 | EP-1364777-B1 | 08-03-2005 | Ticona GmbH | | ☐ |
| | 019 | EP-1475228-B1 | 07-26-2017 | Mitsubishi Polyester Film GmbH | | ☒ |
| | 020 | EP-1525092-B1 | 05-23-2007 | Cryovac, Inc. | | ☐ |
| | 021 | EP-1769908-A1 | 04-04-2007 | Safta S.p.A | | ☐ |
| | 022 | EP-1775122-B1 | 09-03-2014 | Curwood, Inc. | | ☐ |
| | 023 | EP-2349867-B1 | 10-11-2017 | Cryovac, Inc. | | ☐ |
| | 024 | EP-2907769-B1 | 09-27-2017 | BPI.FORMIPAC | | ☐ |
| | 025 | EP-2939667-A1 | 11-04-2015 | NIPRO Patch Co., Ltd. | | ☐ |
| | 026 | EP-2986450-B1 | 01-30-2019 | Goglio S.p.A. | | ☐ |
| | 027 | EP-3000750-A1 | 03-30-2016 | Fujimori Kogyo Co., Ltd. | | ☐ |
| | 028 | EP-3112384-B1 | 07-18-2018 | SABIC Global Technologies B.V. | | ☐ |
| | 029 | EP-3144127-B1 | 01-31-2018 | SCHOTT Schweiz AG | | ☒ |
| | 030 | EP-3210907-B1 | 07-17-2019 | Kyodo Printing Co., Ltd. | | ☐ |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
|---|---|---|---|

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Sheet 3 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]-Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 031 | EP-3360530-A1 | 08-15-2018 | Mitsubishi Gas Chemical Company, Inc. | | ☐ |
| | 032 | WO-1995007816-A1 | 03-23-1995 | The Dow Chemical Company | | ☐ |
| | 033 | WO-2001064786-A1 | 09-07-2001 | Ticona GmbH | | ☒ |
| | 034 | WO-2005097486-A1 | 10-20-2005 | Curwood, Inc. | | ☐ |
| | 035 | WO-2010047906-A1 | 04-29-2010 | ExxonMobil Oil Company | | ☐ |
| | 036 | WO-2010075946-A1 | 07-08-2010 | Huhtamaki Forcchheim | | ☒ |
| | 037 | WO-2012119227-A1 B.S. | 09-13-2012 | Surface Medical Inc. | | ☐ |
| | 038 | WO-2013028398-A1 | 02-28-2013 | Avery Dennison Corporation | | ☐ |
| | 039 | WO-2013034273-A1 | 03-14-2013 | Siegfried Ltd. | | ☐ |
| | 040 | WO-2013116445-A1 | 08-08-2013 | E.I. Dupont de Nemours and Company | | ☐ |
| | 041 | WO-2014023995-A1 | 02-13-2014 | Probiotical S.p.A. | | ☐ |
| | 042 | WO-2015097208-A1 | 07-02-2015 | Solvay Specialty Polymers Italy S.p.A. | | ☐ |
| | 043 | WO-2015118215-A1 | 08-13-2015 | Tampereen Patenttitoimisto Oy | | ☐ |
| | 044 | WO-2015123211-A1 | 08-20-2015 | Bemis Company, Inc. | | ☐ |
| | 045 | WO-2015187173-A1 | 12-10-2015 | Perfecseal, Inc. | | ☐ |
| | 046 | WO-2015187174-A1 | 12-10-2015 | Perfecseal, Inc. | | ☐ |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 4 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]-Number[4]-Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 047 | WO-2015199637-A1 | 12-30-2015 | Perfecseal, Inc. | | ☐ |
| | 048 | WO-2016076844-A1 | 05-19-2016 | Bemis Company, Inc. | | ☐ |
| | 049 | WO-2016164794-A1 | 10-13-2016 | PolyOne Corporation | | ☐ |
| | 050 | WO-2016190081-A1 | 12-01-2016 | Dexerials Corporation | | ☒ |
| | 051 | WO-2016194555-A1 | 12-08-2016 | Polyplastics Co., Ltd. | | ☒ |
| | 052 | WO-2016200363-A1 | 12-15-2016 | Bemis Company, Inc. | | ☐ |
| | 053 | WO-2017034560-A1 | 03-02-2017 | Bemis Company, Inc. | | ☐ |
| | 054 | WO-2017063087-A1 | 04-20-2017 | Macro Technology Inc. | | ☐ |
| | 055 | WO-2017087032-A1 | 05-26-2017 | SiO2 Medical Products, Inc. | | ☐ |
| | 056 | WO-2017100182-A1 | 06-15-2017 | Bemis Company, Inc. | | ☐ |
| | 057 | WO-2017100358-A1 | 06-15-2017 | Bemis Company, Inc. | | ☐ |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 5 of 7

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| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## NON-PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No.[1] | Include name of the author(in CAPITAL LETTERS),title of the article(when appropriate), title of the item (book,magazine,journal,serial,symposium,catalog,etc.),date,page(s),volume-issue number(s),publisher, city and/or country where published. | T[2] |
|---|---|---|---|
| | | | ☐ |

| Examiner Signature | /BETELHEM SHEWAREGED/ | Date Considered | 04/21/2021 |
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| Sheet | 6 | of | 7 |
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| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Paul M. Schramm/ | Date (YYYY-MM-DD) | 2019-11-15 |
|---|---|---|---|
| Name/Print | Paul M. Schramm | Registration Number | 62,050 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S/

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S/

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Confirmation No.: 7187 |
| Christensen et al. | Examiner: Betelhem Shewareged |
| For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM | Art Unit: 1785 |
| Application No.: 15/780,999 | **RESPONSE TO RESTRICTION REQUIREMENT** |
| Filed: June 1, 2018 | **CERTIFICATE OF TRANSMISSION** I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on: February 3, 2021. |
| Docket No.: P006DK.WO.US (87942.0009) | By: / Wendy Nishida / Wendy Nishida |
| Customer No.: 26582 | |

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the Restriction Requirement dated November 18, 2020, please enter the following amendments and remarks:

**Amendments to the Claims** begin on page 2.

**Remarks** begin on page 9.

**Listing of Claims**

1. (Currently Amended) A method for providing a film, said method comprising the steps of:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer; and,

wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on a Hansen's Solubility parameter (HSP) ~~towards an aggressive chemical~~ of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

2. (Previously Presented) The method according to claim 1, wherein the base layer comprises one or more of a metal foil, a polymer, or fluoro polymers.

3. (Previously Presented) The method according to claim 1, wherein the tie layer is made of 1, 2, 3, 4 or 5 layers.

4. (Previously Presented) The method according to claim 3, wherein all the layers of the tie layer are coextruded with the contact layer.

5. (Previously Presented) The method according to claim 1, wherein the tie layer is constituted of one layer and wherein the layer is a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, wherein the third polymer is a glycidyl methacrylate or a maleic anhydride.

6. (Previously Presented) The method according to claim 5, wherein the tie

layer comprises at least two layers, and wherein the first layer comprises the copolymer and the at least second or more layer(s) comprises one or more of ethylene ethyl acrylate (EEA), polyethylene (PE), ethyl methacrylate (EMA), ethylene acrylic acid (EAA).

7–8. Cancelled.

9. (Previously Presented) The method according to claim 1, wherein the tie layer or plurality of layers constituting the tie layer, comprises a loading in the range of 7 to 20 $g/m^2$ or the contact layer comprises a loading in the range of 4 to 20 $g/m^2$ and the loading of the film is not more than 40 $g/m^2$.

10. (Currently Amended) The method according to claim 1, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, **fentanyl,** or rivastigmine.

11. (Previously Presented) The method according to claim 10, wherein the composition is a patch.

12. (Previously Presented) The method according to claim 10, wherein an amount of the chemical remaining at day 0 after at least 7 days of storage at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

13. (Currently Amended) An aggressive chemical-resistant film, comprising:

at least a base layer that is one or more of water resistant or oxygen resistant;

a coextrusion layer, wherein the co-extrusion layer comprises a tie layer; and

a contact layer, and wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;**

**wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

14. (Currently Amended) The film according to claim 13, wherein the base

layer comprises one or more of a metal foil, polyamide, polyvinylidene chloride, silicium or aluminium oxide coated polyesters, or fluropolymers; or

the tie layer is constituted of one layer and wherein the layer is made of a copolymer, said copolymer comprising a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a third polymer, wherein the third polymer is made of a material selected from glycidyl methacrylate, and maleic anhydride~~; or~~

~~wherein the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol~~.

15. (Previously Presented) The film according to claim 13, wherein the tie layer or plurality of layers constituting the tie layer comprises a loading in the range of 7 to 20 g/m$^2$ or the contact layer comprises a loading in the range of 4 to 20 g/m$^2$ and the loading of the film is not more than 40 g/m$^2$.

16. (Currently Amended) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material; **and**

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, where the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;**

**wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**; and~~, where~~ **wherein** the base layer side of the film is facing a first outer layer.

17. (Previously Presented) The laminate according to claim 16, wherein the laminate further comprises a second outer layer facing the exterior side of the first outer layer, wherein the second outer layer is a paper layer.

18. (Previously Presented) The laminate according to claim 16, wherein the laminate encloses a compound comprising one or more of nicotine, rivastigmine, fentanyl, or

lidocaine.

19. (Previously Presented) The laminate according to claim 16, wherein the laminate is heat sealable.

20. (Previously Presented) The laminate according to claim 16, wherein a maximum of 10% of the active ingredient is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

21. (Currently Amended) An aggressive chemical substance packed in a heat sealable laminate, said heat sealable laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, wherein the base layer side of the film is facing the outer layer; and, wherein the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;**

**wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

22–23. Cancelled

24. (Currently Amended) A method for providing an aggressive chemical resistant film said film being resistant against one or more of nicotine, rivastigmine, fentanyl or lidocaine, and wherein said method comprises**:** ~~**the steps of:**~~

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and

wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on a Hansen's Solubility parameter (HSP) ~~towards nicotine, rivastigmine, fentanyl and/or lidocaine~~ of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

25. (Currently Amended) A method for providing an aggressive chemical resistant film, ~~said film being resistant against one or more of nicotine, rivastigmine, fentanyl and lidocaine, and~~ wherein said method comprises: ~~the steps of:~~

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol**, and wherein the polymer of the contact layer has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

26. (Previously Presented) The method according to claim 25, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, fentanyl, or rivastigmine.

27. (Previously Presented) The method according to claim 26, wherein the composition is a patch.

28. (Currently Amended) The method according to claim 26, wherein an amount of the a~~ggressive~~ chemical ~~substance~~ remaining ~~at day 0~~ after at least 7 days of storage

**wrapped in the film** at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

29. (Currently Amended) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film according to claim 25, said film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer~~, where the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol~~.

30. (Previously Presented) The laminate according to claim 29, wherein the laminate is wrapped around a composition comprising the aggressive chemical substance and wherein a maximum of 10% w/w of the aggressive chemical substance based on nominal content is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

31. (Currently Amended) The laminate according to claim 30, wherein the aggressive chemical substance is one or more of rivastigmine, **lidocaine,** ~~lidocain,~~ fentanyl, or nicotine.

32. (Previously Presented) The method according to claim 1, wherein the RED value is in the range of 0.8 to 10.

33. (Previously Presented) The method according to claim 1, wherein the RED value is in the range of 0.8 to 5.

34. (Previously Presented) The method according to claim 1, wherein the RED value is in the range of 1 to 2.

35. (Previously Presented) The method according to claim 2, wherein the metal foil is an aluminum foil.

36. Cancelled.

## REMARKS

***Status of the Claims***

The Office Action dated November 18, 2020 ("Restriction Requirement") requested restriction of the claims to one of the following groups:

- Group I Claims 1–7, 9–12, 24–28, and 32–35
- Group II Claims 13–20 and 29–31 (including Species A, claims 13–15, and Species B, claims 16–20 and 29–31)
- Group III Claim 21

In response, Applicant provisionally elects Group II, species A, claims 13–15, with traverse. Claims 1, 10, 13, 14, 16, 21, 24, 25, 28, and 29 are amended, and claims 22, 23, and 36 are cancelled. Support for the claim amendments can be found throughout the written disclosure as filed, including at, for example, page 3, lines 23–32, page 7, lines 1–20, and page 13, line 19 to page 15, line 12. Claims 23, 23, and 36 are cancelled without prejudice or disclaimer. Consequently claims 1–22, and 24–35 are pending, and claims 1, 13, 16, 21, 24, and 25 are the independent claims.

***Traversal of Moot Restriction Requirement***

The Office asserts that Groups I–III lack unity of invention because they allegedly do not include a special technical feature that distinguishes over U.S. Patent No. 6,120,860 to Bowen ("Bowen"). Office Action, p. 5, citing Bowen, col. 3, lines 55–59 and col. 5, line 35 to col. 6, line 35.

Without conceding that Restriction is proper in view of Bowen, and solely in the interest of advancing prosecution, Applicant has amended each of the independent claims to further recite that "the contact layer comprises a polymer having a relative energy difference (RED value based on a Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine," and that "the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol," or equivalent language.

These amendments to the independent claims include special technical features that are common to each of the groups identified in the Restriction Requirement, and represent a technical contribution beyond what is discussed in Bowen.

Bowen is directed to a multilayer film structure having a first layer element and a second layer element. Bowen, abstract, col. 3, lines 55–59, and col. 5, line 35 to col. 6, line 35. The first layer element has a flexible barrier material layer and a sealant layer, and the second layer element has a high barrier material layer. *Id.* None of the barrier material layers discussed in Bowen has been shown to have a RED value of greater than 0.8 towards nicotine, rivastigmine, fentanyl, or lidocaine. Additionally, none of the barrier materials of Bown includes a polymer contact layer of cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol.

Consequently, as amended, independent claims 1, 13, 16, 21, 24, and 25 have unity of invention. Thus, the Restriction Requirement is rendered moot and should be withdrawn. *See* MPEP § 818.01, citing 37 CFR §§ 1.111, 1.143. Applicant accordingly requests that the Restriction Requirement be withdrawn, and that substantive examination begin on claims 1–22, and 24–35.

## CONCLUSION

Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is therefore respectfully requested.

The Commissioner is authorized to charge any fees or underpayments that may be due with this response, or credit any overpayments, to Deposit Account No. 08-2623.

If the Examiner believes a telephone conference would expedite prosecution of this Application, please call the undersigned at (303) 473-2700.

Respectfully submitted,

By: / Paul M. Schramm /
Paul M. Schramm
Reg. No. 62,050

Holland & Hart LLP
P.O. Box 11583
Salt Lake City, Utah 84147
Tel: 303-473-2700
Fax: 303-473-2720

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 41821625 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Paul M. Schramm/Wendy Nishida |
| **Filer Authorized By:** | Paul M. Schramm |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 03-FEB-2021 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 14:20:00 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

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|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P006Danapak.pdf | 186058<br>6c7e024c9131528fd2db0459e23a327ff03c0985 | yes | 13 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Transmittal Letter | 1 | 2 |
| | Response to Election / Restriction Filed | 3 | 3 |
| | Claims | 4 | 10 |
| | Applicant Arguments/Remarks Made in an Amendment | 11 | 13 |
| **Warnings:** | | | |
| **Information:** | | | |
| | **Total Files Size (in bytes):** | 186058 | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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|---|---|
| In re application of: | Confirmation No.: 7187 |
| Christensen et al. | Examiner: Betelhem Shewareged |
| For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM | Art Unit: 1785 |
| Application No.: 15/780,999 | **RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT** |
| Filed: June 1, 2018 | **CERTIFICATE OF TRANSMISSION** I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on: February 3, 2021. |
| Docket No.: P006DK.WO.US (87942.0009) | By: / Wendy Nishida / Wendy Nishida |
| Customer No.: 26582 | |

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the Notice of Non-Compliant Amendment dated January 27, 2021, Applicant re-submits the Response to Restriction Requirement originally filed on January 19, 2021. The resubmitted Response includes the correct status identifiers for the amended and previously presented claims.

The Commissioner is authorized to charge any fees or underpayments that may be due with this response, or credit any overpayments, to Deposit Account No. 08-2623.

Respectfully submitted,

By: / Paul M. Schramm /
Paul M. Schramm
Reg. No. 62,050

Holland & Hart LLP
P.O. Box 11583
Salt Lake City, Utah 84110
Tel: 303-473-2700
Fax: 303-473-2720

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

26582 7590 01/27/2021

HOLLAND & HART, LLP
222 South Main Street, Suite 2200
P.O. Box 11583
SALT LAKE CITY, UT 84147

| EXAMINER | |
|---|---|
| SHEWAREGED, BETELHEM | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1785 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 01/27/2021 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@hollandhart.com

| Notice of Non-Compliant Amendment (37 CFR 1.121) | Application No. 15/780,999 | Applicant(s) Christensen et al. |
|---|---|---|
| | Art Unit OCDD | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

The amendment document filed on 01/19/2021 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
  - ☐ A. Amended paragraph(s) do not include markings.
  - ☐ B. New paragraph(s) should not be underlined.
  - ☐ C. Other _____ .
- ☐ 2. Abstract:
  - ☐ A.Not presented on a separate sheet. 37 CFR 1.72.
  - ☐ B.Other _____ .
- ☐ 3. Amendments to the drawings:
  - ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet", "New Sheet", or "Annotated Sheet" as required by 37 CFR 1.121(d).
  - ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required .
  - ☐ C. Other _____ .
- ☑ 4. Amendments to the claims:
  - ☐ A. A complete listing of all of the claims is not present.
  - ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
  - ☑ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
  - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
  - ☑ E. Other: Claim 28 has not been provided with the proper status identifier .
- ☐ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4): For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period** if the non-compliant amendment is an after-final amendment or an amendment filed after allowance, or a drawing submission (only) If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.
2. Applicant is given **two months** from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a Quayle action. If any of above boxes 1 to 4 are checked, the correction required is only the corrected section of the non-compliant amendment in compliance with 37 CFR 1.121.

   **Extensions of time** are available under 37 CFR 1.136(a) only if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.

   **Failure to timely respond** to this notice will result in:

   **Abandonment** of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or

   **Non-entry** of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

Legal Instruments Examiner (LIE), if applicable /TAMMY ACREE/ Telephone No: (571)272-7017

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Confirmation No.: 7187 |
| Christensen et al. | Examiner: Betelhem Shewareged |
| For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM | Art Unit: 1785 |
| Application No.: 15/780,999 | **RESPONSE TO RESTRICTION REQUIREMENT** |
| Filed: June 1, 2018 | **CERTIFICATE OF TRANSMISSION** I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on: January 19, 2021. |
| Docket No.: P006DK.WO.US (87942.0009) | By: / Wendy Nishida / Wendy Nishida |
| Customer No.: 26582 | |

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the Restriction Requirement dated November 18, 2020, please enter the following amendments and remarks:

**Amendments to the Claims** begin on page 2.

**Remarks** begin on page 9.

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 41677226 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Paul M. Schramm/Wendy Nishida |
| **Filer Authorized By:** | Paul M. Schramm |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 19-JAN-2021 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 18:29:38 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

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|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P006Danapak.pdf | 130259<br>fdb5432d8aa26a920bed54d9b16decc84d512cde | yes | 11 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Applicant Arguments/Remarks Made in an Amendment | 9 | 11 |
| | Claims | 2 | 8 |
| | Response to Election / Restriction Filed | 1 | 1 |
| **Warnings:** | | | |
| **Information:** | | | |
| | **Total Files Size (in bytes):** | 130259 | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

## REMARKS

***Status of the Claims***

The Office Action dated November 18, 2020 ("Restriction Requirement") requested restriction of the claims to one of the following groups:

- Group I Claims 1–7, 9–12, 24–28, and 32–35
- Group II Claims 13–20 and 29–31 (including Species A, claims 13–15, and Species B, claims 16–20 and 29–31)
- Group III Claim 21

In response, Applicant provisionally elects Group II, species A, claims 13–15, with traverse. Claims 1, 10, 13, 14, 16, 21, 24, 25, 28, and 29 are amended, and claims 22, 23, and 36 are cancelled. Support for the claim amendments can be found throughout the written disclosure as filed, including at, for example, page 3, lines 23–32, page 7, lines 1–20, and page 13, line 19 to page 15, line 12. Claims 23, 23, and 36 are cancelled without prejudice or disclaimer. Consequently claims 1–22, and 24–35 are pending, and claims 1, 13, 16, 21, 24, and 25 are the independent claims.

***Traversal of Moot Restriction Requirement***

The Office asserts that Groups I–III lack unity of invention because they allegedly do not include a special technical feature that distinguishes over U.S. Patent No. 6,120,860 to Bowen ("Bowen"). Office Action, p. 5, citing Bowen, col. 3, lines 55–59 and col. 5, line 35 to col. 6, line 35.

Without conceding that Restriction is proper in view of Bowen, and solely in the interest of advancing prosecution, Applicant has amended each of the independent claims to further recite that "the contact layer comprises a polymer having a relative energy difference (RED value based on a Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine," and that "the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol," or equivalent language.

These amendments to the independent claims include special technical features that are common to each of the groups identified in the Restriction Requirement, and represent a technical contribution beyond what is discussed in Bowen.

Bowen is directed to a multilayer film structure having a first layer element and a second layer element. Bowen, abstract, col. 3, lines 55–59, and col. 5, line 35 to col. 6, line 35. The first layer element has a flexible barrier material layer and a sealant layer, and the second layer element has a high barrier material layer. *Id.* None of the barrier material layers discussed in Bowen has been shown to have a RED value of greater than 0.8 towards nicotine, rivastigmine, fentanyl, or lidocaine. Additionally, none of the barrier materials of Bown includes a polymer contact layer of cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol.

Consequently, as amended, independent claims 1, 13, 16, 21, 24, and 25 have unity of invention. Thus, the Restriction Requirement is rendered moot and should be withdrawn. *See* MPEP § 818.01, citing 37 CFR §§ 1.111, 1.143. Applicant accordingly requests that the Restriction Requirement be withdrawn, and that substantive examination begin on claims 1–22, and 24–35.

## CONCLUSION

Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is therefore respectfully requested.

The Commissioner is authorized to charge any fees or underpayments that may be due with this response, or credit any overpayments, to Deposit Account No. 08-2623.

If the Examiner believes a telephone conference would expedite prosecution of this Application, please call the undersigned at (303) 473-2700.

Respectfully submitted,

By: / Paul M. Schramm /
Paul M. Schramm
Reg. No. 62,050

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Tel: 303-473-2700
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**Listing of Claims**

1. (Currently Amended) A method for providing a film, said method comprising the steps of:

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer; and,

wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on a Hansen's Solubility parameter (HSP) ~~towards an aggressive chemical~~ of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

2. (Previously Presented) The method according to claim 1, wherein the base layer comprises one or more of a metal foil, a polymer, or fluoro polymers.

3. (Previously Presented) The method according to claim 1, wherein the tie layer is made of 1, 2, 3, 4 or 5 layers.

4. (Previously Presented) The method according to claim 3, wherein all the layers of the tie layer are coextruded with the contact layer.

5. (Previously Presented) The method according to claim 1, wherein the tie layer is constituted of one layer and wherein the layer is a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, wherein the third polymer is a glycidyl methacrylate or a maleic anhydride.

6. (Previously Presented) The method according to claim 5, wherein the tie

layer comprises at least two layers, and wherein the first layer comprises the copolymer and the at least second or more layer(s) comprises one or more of ethylene ethyl acrylate (EEA), polyethylene (PE), ethyl methacrylate (EMA), ethylene acrylic acid (EAA).

7–8. Cancelled.

9. (Previously Presented) The method according to claim 1, wherein the tie layer or plurality of layers constituting the tie layer, comprises a loading in the range of 7 to 20 $g/m^2$ or the contact layer comprises a loading in the range of 4 to 20 $g/m^2$ and the loading of the film is not more than 40 $g/m^2$.

10. (Currently Amended) The method according to claim 1, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, **fentanyl,** or rivastigmine.

11. (Previously Presented) The method according to claim 10, wherein the composition is a patch.

12. (Previously Presented) The method according to claim 10, wherein an amount of the chemical remaining at day 0 after at least 7 days of storage at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

13. (Currently Amended) An aggressive chemical-resistant film, comprising:

at least a base layer that is one or more of water resistant or oxygen resistant;

a coextrusion layer, wherein the co-extrusion layer comprises a tie layer; and

a contact layer, and wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;**

**wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

14. (Currently Amended) The film according to claim 13, wherein the base

layer comprises one or more of a metal foil, polyamide, polyvinylidene chloride, silicium or aluminium oxide coated polyesters, or fluropolymers; or

the tie layer is constituted of one layer and wherein the layer is made of a copolymer, said copolymer comprising a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a third polymer, wherein the third polymer is made of a material selected from glycidyl methacrylate, and maleic anhydride~~; or~~

~~wherein the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol~~.

15. (Previously Presented) The film according to claim 13, wherein the tie layer or plurality of layers constituting the tie layer comprises a loading in the range of 7 to 20 $g/m^2$ or the contact layer comprises a loading in the range of 4 to 20 $g/m^2$ and the loading of the film is not more than 40 $g/m^2$.

16. (Currently Amended) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material; **and**

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, where the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;**

**wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**; and~~, where~~ **wherein** the base layer side of the film is facing a first outer layer.

17. (Previously Presented) The laminate according to claim 16, wherein the laminate further comprises a second outer layer facing the exterior side of the first outer layer, wherein the second outer layer is a paper layer.

18. (Previously Presented) The laminate according to claim 16, wherein the laminate encloses a compound comprising one or more of nicotine, rivastigmine, fentanyl, or

lidocaine.

19. (Previously Presented) The laminate according to claim 16, wherein the laminate is heat sealable.

20. (Previously Presented) The laminate according to claim 16, wherein a maximum of 10% of the active ingredient is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

21. (Currently Amended) An aggressive chemical substance packed in a heat sealable laminate, said heat sealable laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, wherein the base layer side of the film is facing the outer layer; and, wherein the contact layer comprises a polymer having a relative energy difference (RED) value of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine;**

**wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

22–23. Cancelled

24. (Currently Amended) A method for providing an aggressive chemical resistant film said film being resistant against one or more of nicotine, rivastigmine, fentanyl or lidocaine, and wherein said method comprises**:** ~~**the steps of:**~~

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and

wherein the contact layer comprises a polymer having a relative energy difference (RED) value based on a Hansen's Solubility parameter (HSP) ~~towards nicotine, rivastigmine, fentanyl and/or lidocaine~~ of greater than 0.8 **towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

25. (Currently Amended) A method for providing an aggressive chemical resistant film, ~~said film being resistant against one or more of nicotine, rivastigmine, fentanyl and lidocaine, and~~ wherein said method comprises: ~~the steps of:~~

providing a base layer that is one or more of water resistant or oxygen resistant;

coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

coating the coextrusion layer to the base layer;

allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol**, and wherein the polymer of the contact layer has a relative energy difference (RED) value based on Hansen's Solubility parameter (HSP) of greater than 0.8 towards one or more of: nicotine, rivastigmine, fentanyl, or lidocaine; wherein the polymer of the contact layer comprises one or more of: a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol**.

26. (Previously Presented) The method according to claim 25, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, fentanyl, or rivastigmine.

27. (Previously Presented) The method according to claim 26, wherein the composition is a patch.

28. (Previously Presented) The method according to claim 26, wherein an amount of the a~~ggressive~~ chemical ~~substance~~ remaining ~~at day 0~~ after at least 7 days of storage

**wrapped in the film** at 40°C is a maximum of about 10% in comparison to a Barex® patch as index 100.

29. (Currently Amended) A laminate for packing an aggressive chemical substance said laminate comprising:

a first outer layer made of a mechanically wear resistant material;

an aggressive chemical resistant film according to claim 25, said film comprising a base layer that is one or more of water resistant or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer~~, where the contact layer comprises a polymer comprising one or more of a cyclic olefin copolymer, a polyamide, or an ethylene vinyl alcohol~~.

30. (Currently Amended) The laminate according to claim 29, wherein the laminate is wrapped around a composition comprising the aggressive chemical substance and wherein a maximum of 10% w/w of the aggressive chemical substance based on nominal content is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

31. (Currently Amended) The laminate according to claim 30, wherein the aggressive chemical substance is one or more of rivastigmine, **lidocaine,** ~~lidocain,~~ fentanyl, or nicotine.

32. (Previously Presented) The method according to claim 1, wherein the RED value is in the range of 0.8 to 10.

33. (Previously Presented) The method according to claim 1, wherein the RED value is in the range of 0.8 to 5.

34. (Previously Presented) The method according to claim 1, wherein the RED value is in the range of 1 to 2.

35. (Previously Presented) The method according to claim 2, wherein the metal foil is an aluminum foil.

36. Cancelled.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>15/780,999 | Filing Date<br>06/01/2018 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☑ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED - PART I

| FOR | (Column 1)<br>NUMBER FILED | (Column 2)<br>NUMBER EXTRA | | RATE ($) | FEE ($) |
|---|---|---|---|---|---|
| ☐ BASIC FEE<br>(37 CFR 1.16(a), (b), or (c)) | N/A | N/A | | N/A | |
| ☐ SEARCH FEE<br>(37 CFR 1.16(k), (i), or (m)) | N/A | N/A | | N/A | |
| ☐ EXAMINATION FEE<br>(37 CFR 1.16(o), (p), or (q)) | N/A | N/A | | N/A | |
| TOTAL CLAIMS<br>(37 CFR 1.16(i)) | minus 20 = | * | | x $100 = | |
| INDEPENDENT CLAIMS<br>(37 CFR 1.16(h)) | minus 3 = | * | | x $460 = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | | TOTAL | |

## APPLICATION AS AMENDED - PART II

| AMENDMENT | 01/19/2021 | (Column 1)<br>CLAIMS REMAINING AFTER AMENDMENT | | (Column 2)<br>HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3)<br>PRESENT EXTRA | | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|
| | Total<br>(37 CFR 1.16(i)) | * 31 | Minus | ** 35 | = 0 | | x $100 = | 0 |
| | Independent<br>(37 CFR 1.16(h)) | * 6 | Minus | *** 7 | = 0 | | x $480 = | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | 0 |

| AMENDMENT | | (Column 1)<br>CLAIMS REMAINING AFTER AMENDMENT | | (Column 2)<br>HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3)<br>PRESENT EXTRA | | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|
| | Total<br>(37 CFR 1.16(i)) | * | Minus | ** | = | | x $0 = | |
| | Independent<br>(37 CFR 1.16(h)) | * | Minus | *** | = | | x $0 = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | |

| | |
|---|---|
| * If the entry in column 1 is less than the entry in column 2, write "0" in column 3. | SLIE |
| ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". | /TAMMY ACREE/ |
| *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". | |
| The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1. | |

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) | 7187 |

26582 7590 11/18/2020

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| EXAMINER | |
|---|---|
| SHEWAREGED, BETELHEM | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1785 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 11/18/2020 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@hollandhart.com

| Office Action Summary | Application No. 15/780,999 | Applicant(s) Christensen et al. | |
|---|---|---|---|
| | Examiner BETELHEM SHEWAREGED | Art Unit 1785 | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☑ Responsive to communication(s) filed on 06/01/2018.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims***

5) ☑ Claim(s) 1-7 and 9-36 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☐ Claim(s) _____ is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-7 and 9-36 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☑ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☑ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

***Notice of Pre-AIA or AIA Status***

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

***Election/Restriction***

2. REQUIREMENT FOR UNITY OF INVENTION

As provided in 37 CFR 1.475(a), a national stage application shall relate to one invention only or to a group of inventions so linked as to form a single general inventive concept ("requirement of unity of invention"). Where a group of inventions is claimed in a national stage application, the requirement of unity of invention shall be fulfilled only when there is a technical relationship among those inventions involving one or more of the same or corresponding special technical features. The expression "special technical features" shall mean those technical features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art.

The determination whether a group of inventions is so linked as to form a single general inventive concept shall be made without regard to whether the inventions are claimed in separate claims or as alternatives within a single claim. See 37 CFR 1.475(e).

When Claims Are Directed to Multiple Categories of Inventions:

As provided in 37 CFR 1.475 (b), a national stage application containing claims to different categories of invention will be considered to have unity of invention if the claims are drawn only to one of the following combinations of categories:

(1) A product and a process specially adapted for the manufacture of said product; or

(2) A product and a process of use of said product; or

(3) A product, a process specially adapted for the manufacture of the said product, and a use of the said product; or

(4) A process and an apparatus or means specifically designed for carrying out the said process; or

(5) A product, a process specially adapted for the manufacture of the said product, and an apparatus or means specifically designed for carrying out the said process.

Otherwise, unity of invention might not be present. See 37 CFR 1.475 (c).

3. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

**Group I, claim(s) 1-7, 9-12, 24-28 and 32-35, drawn to method of making.**

**Group II, claim(s) 13-20 and 29-31, drawn to film.**

**Group III, claim(s) 21, drawn to aggressive chemical substance.**

**Claims 22, 23 and 36** cannot be classified at this time because the claims are improper use claims. The claims recite use without any active, positive steps delimiting

how this use is actually practiced. The claims will be classified accordingly upon clarification.

4. IN THE EVENT OF ELECTING GROUP II APPLICANT IS ADVISED TO ELECT ONE OF THE FOLLOWING SPECIES.

5. This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

The species are as follows:

**A: Claims 13-15 – aggressive chemical resistance film, and**

**B: Claims 16-20 and 29-31 – laminate.**

6. Applicant is required, in reply to this action, to elect a single species to which the claims shall be restricted if no generic claim is finally held to be allowable. The reply must also identify the claims readable on the elected species, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered non-responsive unless accompanied by an election.

7. Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise require all the limitations of an allowed generic claim. Currently, no claims appear to be generic.

8. The groups of inventions listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

9. Groups I-III lack unity of invention because even though the inventions of these groups require the technical feature of **a method for providing a film, said method**

**comprising the steps of: providing a base layer that is one or more of water resistant or oxygen resistant; coextruding a layer comprising a tie layer and a contact layer; coating the coextrusion layer to the base layer; and allowing the coextrusion layer coated to the base layer to adhere to provide the film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer**, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of **Bowen et al. (US 6,120,860)**. Bowen teaches a multilayer film comprising a high barrier material layer such as aluminum foil, a tie/adhesive layer such as ethylene acrylic acid copolymer, a flexible barrier material layer, and a sealant layer such as ethylene vinyl acetate in the order thereof, wherein the film is formed by extrusion coating (abstract; col. 3, lines 55 and 59; col. 5, line 35; and col. 6, line 35). The high barrier material layer meets the claimed base layer and the sealant layer meets the claimed contact layer.

10. Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

11. The election of an invention or species may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If

claims are added after the election, applicant must indicate which of these claims are readable on the elected invention or species.

12. Should applicant traverse on the ground that the inventions have unity of invention (37 CFR 1.475(a)), applicant must provide reasons in support thereof. Applicant may submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. Where such evidence or admission is provided by applicant, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

13. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be corrected in compliance with 37 CFR 1.48(a) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. A request to correct inventorship under 37 CFR 1.48(a) must be accompanied by an application data sheet in accordance with 37 CFR 1.76 that identifies each inventor by his or her legal name and by the processing fee required under 37 CFR 1.17(i).

## ***Correspondence***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BETELHEM SHEWAREGED whose telephone number is (571)272-1529. The examiner can normally be reached on Monday -Friday 7am-4:30pm.

15. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

16. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

17. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BS
November 14, 2020

/BETELHEM SHEWAREGED/
Primary Examiner
Art Unit 1785

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 15/780,999 | 06/01/2018 | Lars Christensen | P006DK.WO.US (87942.0009) |

**CONFIRMATION NO. 7187**

26582
HOLLAND & HART, LLP
222 South Main Street, Suite 2200
P.O. Box 11583
SALT LAKE CITY, UT 84147

**PUBLICATION NOTICE**

**Title:**METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

**Publication No.**US-2020-0269544-A1
**Publication Date:**08/27/2020

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| U.S. APPLICATION NO. | FIRST NAMED INVENTOR | ATTY. DOCKET NO. |
|---|---|---|
| 15/780,999 | Lars Christensen | P006DK.WO.US (87942.0009) |

26582
HOLLAND & HART, LLP
222 South Main Street, Suite 2200
P.O. Box 11583
SALT LAKE CITY, UT 84147

| INTERNATIONAL APPLICATION NO. | |
|---|---|
| PCT/EP2016/082876 | |
| I.A. FILING DATE | PRIORITY DATE |
| 12/29/2016 | 12/29/2015 |

**CONFIRMATION NO. 7187**
**371 ACCEPTANCE LETTER**

*OC000000118674287*

Date Mailed: 07/24/2020

# NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

06/01/2018
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Copy of the International Application filed on 06/01/2018
- Copy of the International Search Report filed on 06/01/2018
- Preliminary Amendments filed on 06/01/2018
- Information Disclosure Statements filed on 06/01/2018
- Inventor's Oath or Declaration filed on 06/20/2018
- U.S. Basic National Fees filed on 06/01/2018
- Assignee Statement for PGPUB filed on 06/01/2018
- Priority Documents filed on 06/01/2018
- Power of Attorney filed on 06/20/2018
- Authorization to Permit Access filed on 06/01/2018
- Application Data Sheet (37 CFR 1.76) filed on 06/01/2018

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

JOHN L ANDERSON

Telephone: (571) 272-0385

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | 1788 | 5060 | P006DK.WO.US (87942.0009) | 35 | 7 |

**CONFIRMATION NO. 7187**

**UPDATED FILING RECEIPT**

26582
HOLLAND & HART, LLP
222 South Main Street, Suite 2200
P.O. Box 11583
SALT LAKE CITY, UT 84147

OC000000118674288*

Date Mailed: 07/24/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Lars Christensen, Slagelse, DENMARK;
Peter Johansen, Odense C, DENMARK;
Torben Fogtmann, Nyborg, DENMARK;

**Applicant(s)**

Danapak Flexibles A/S, Slagelse, DENMARK;

**Power of Attorney:** The patent practitioners associated with Customer Number 26582

**Domestic Priority data as claimed by applicant**

This application is a 371 of PCT/EP2016/082876 12/29/2016

**Foreign Applications** (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
EUROPEAN PATENT OFFICE (EPO) 15202962.5 12/29/2015

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 05/18/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/780,999**

**Projected Publication Date:** 08/27/2020

**Non-Publication Request:** No

**Early Publication Request:** No

**Title**

METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

**Preliminary Class**

428

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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## *SelectUSA*

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

## PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/780,999

### APPLICATION AS FILED - PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY FEE($) |
|---|---|---|---|---|---|---|---|
| BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | 300 |
| SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | 520 |
| EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | 760 |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 35 minus 20 = | * 15 | | | OR | x 100 = | 1500 |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 7 minus 3 = | * 4 | | | | x 460 = | 1840 |
| APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | 0.00 |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | 0.00 |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | 4920 |

### APPLICATION AS AMENDED - PART II

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT A | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT B | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on July 17, 2020

HOLLAND & HART LLP

By /Wendy Nishida/
Wendy Nishida

PATENT
Attorney Docket No.: P006DK.WO.US (87942.0009)
Client Ref. No.: AWA#139323

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

Christensen et al.

Application No.: 15/780,999

Filed: June 1, 2018

For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

Customer No.: 26582

Confirmation No.: 7187

Examiner: Not yet assigned

Art Unit: Not yet assigned

**RESPONSE TO NOTIFICATION OF INSUFFICIENCY UNDER 37 CFR 1.492 and/or 1.495 (DO/EO/US)**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Notification Of Insufficiency Under 37 CFR 1.492 and/or 1.495 (DO/EO/US) for the above identified application dated May 20, 2020, we are submitting additional claim fees to be due with this paper. The Commissioner is hereby authorized to charge additional fees associated with this paper to Deposit Account No. 08-2623.

Respectfully submitted,

/Paul M. Schramm/
Paul M. Schramm
Reg. No. 62,050

HOLLAND & HART LLP
P.O. Box 11583
Salt Lake City, Utah 80201
Tel: 303-473-2700

PTO/SB/17 (01-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

# FEE TRANSMITTAL

| Complete if known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | June 1, 2018 |
| First Named Inventor | Christensen et al. |
| Examiner Name | To be assigned |
| Art Unit | To be assigned |
| Practitioner Docket No. | P006DK.WO.US (87942.0009) |

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

TOTAL AMOUNT OF PAYMENT ($) 3340

**METHOD OF PAYMENT** (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 08-2623 Deposit Account Name: Holland & Hart LLP

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayment of fee(s)

**WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

**FEE CALCULATION**

**1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)**

| | FILING FEES | | | SEARCH FEES | | | EXAMINATION FEES | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Application Type | U ($) | S ($) | M ($) | U ($) | S ($) | M ($) | U ($) | S ($) | M ($) | Fees Paid ($) |
| Utility | 300 | 150* | 75 | 660 | 330 | 165 | 760 | 380 | 190 | |
| Design | 200 | 100 | 50 | 160 | 80 | 40 | 600 | 300 | 150 | |
| Plant | 200 | 100 | 50 | 420 | 210 | 105 | 620 | 310 | 155 | |
| Reissue | 300 | 150 | 75 | 660 | 330 | 165 | 2,200 | 1,100 | 550 | |
| Provisional | 280 | 140 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | |

* The $150 small entity status filing fee for a utility application is further reduced to $75 for a small entity status applicant who files the application via EFS-Web.

**2. EXCESS CLAIM FEES**

| Fee Description | Undiscounted Fee ($) | Small Entity Fee ($) | Micro Entity Fee ($) |
|---|---|---|---|
| Each claim over 20 (including Reissues) | 100 | 50 | 25 |
| Each independent claim over 3 (including Reissues) | 460 | 230 | 115 |
| Multiple dependent claims | 820 | 410 | 205 |

| Total Claims | | Extra Claims | | Fee ($) | | Fee Paid ($) |
|---|---|---|---|---|---|---|
| 35 | -20 or HP = | 15 | x | 1500 | = | 1500 |

HP = highest number of total claims paid for, if greater than 20.

| Indep. Claims | | Extra Claims | | Fee ($) | | Fee Paid ($) |
|---|---|---|---|---|---|---|
| 7 | -3 or HP = | 4 | x | 1840 | = | 1840 |

HP = highest number of independent claims paid for, if greater than 3.

| Multiple Dependent Claims | |
|---|---|
| Fee ($) | Fee Paid ($) |
| | |

**3. APPLICATION SIZE FEE**

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

| Total Sheets | | Extra Sheets | | Number of each additional 50 or fraction thereof | | Fee ($) | | Fee Paid ($) |
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**4. OTHER FEE(S)**

| | Fees Paid ($) |
|---|---|
| Non-English specification, $130 fee (no small or micro entity discount) | |
| **Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity)** | |
| Other (e.g., late filing surcharge): _____ | |

SUBMITTED BY

| | | | |
|---|---|---|---|
| Signature | /Paul M. Schramm/ | Registration No. (Attorney/Agent) 62,050 | Telephone (303) 473-2700 |
| Name (Print/Type) | Paul M. Schramm | | Date July 17, 2020 |

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# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 15780999 |
| **Filing Date:** | 01-Jun-2018 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Filer:** | Paul M. Schramm/Wendy Nishida |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |

Filed as Large Entity

**Filing Fees for U.S. National Stage under 35 USC 371**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| CLAIMS IN EXCESS OF 20 | 1615 | 15 | 100 | 1500 |
| INDEPENDENT CLAIMS IN EXCESS OF 3 | 1614 | 4 | 460 | 1840 |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **3340** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 40038961 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Paul M. Schramm/Wendy Nishida |
| **Filer Authorized By:** | Paul M. Schramm |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 17-JUL-2020 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 18:22:38 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | DA |
| Payment was successfully received in RAM | $3340 |
| RAM confirmation Number | E20207GI23189707 |
| Deposit Account | 082623 |
| Authorized User | Wendy Nishida |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492 (National application filing, search, and examination fees)

37 CFR 1.492(a) (Basic national fee only)

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P006Danapak.pdf | 445813<br>2f5e01448eb3f9db557ba62e2f03ad86aa6c9904 | yes | 2 |

| Multipart Description/PDF files in .zip description | | |
|---|---|---|
| **Document Description** | **Start** | **End** |
| Transmittal Letter | 1 | 1 |
| Fee Worksheet (SB06) | 2 | 2 |

**Warnings:**

**Information:**

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|---|---|---|---|---|---|
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 32418<br>aa98aa3c13924fca8c9adb76b2a2bf2911883f6e | no | 2 |

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 4

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | - |
| Examiner Name | - |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## U. S. PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 001 | 20160325534-A1 | 11-10-2016 | Hu et al. | |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]–Number[4]–Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 002 | WO-2017114922-A1 | 07-06-2017 | Danapak Flexibles A/S | | ☐ |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

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Sheet 2 of 4

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | - |
| Examiner Name | - |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## NON-PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No.[1] | Include name of the author(in CAPITAL LETTERS),title of the article(when appropriate), title of the item (book,magazine,journal,serial,symposium,catalog,etc.),date,page(s),volume-issue number(s),publisher, city and/or country where published. | T[2] |
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| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | - |
| Examiner Name | - |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

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☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| | | | |
|---|---|---|---|
| Signature | /Paul M. Schramm/ | Date (YYYY-MM-DD) | 2020-06-01 |
| Name/Print | Paul M. Schramm | Registration Number | 62,050 |

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(74) Agent: **AWAPATENT A/S;** Rigensgade 11, Denmark, 13 16 Copenhagen K (DK).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available):* AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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**Declarations under Rule 4.17:**

— *as to applicant's entitlement to applyfor and be granted a patent (Rule 4.1 7(H))*

*[Continued on nextpage]*

(54) Title: A METHOD FOR PROVIDING A CHEMICAL RESISTANT FILM

(57) Abstract: The present invention relates to a method for providing an extreme chemical resistant film whereby a tie layer and a contact layer are coextruded with a base layer, such as a metal foil, as well as films and laminates obtained by the method and uses of the films and laminates to pack aggressive chemical substances such as nicotine, lidocaine, fentanyl and rivastigmine.

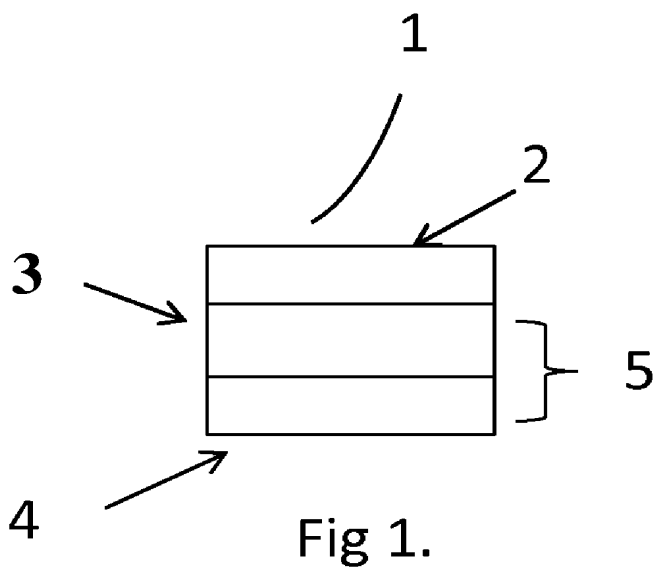


Fig 1.

WO 2017/114922 A1

**Published:**

— *with international search report (Art. 21(3))*

# A METHOD FOR PROVIDING A CHEMICAL RESISTANT FILM

The present invention relates to a method for providing an extreme chemical resistant film whereby a tie layer and a contact layer are coextruded with a base layer, such as a metal foil, as well as films and laminates obtained by the method and uses of the films and laminates to wrap aggressive chemical substances such as nicotine, fentanyl, lidocaine and rivastigmine.

## Background of the invention

In the pharmaceutical industry substances, including highly aggressive substances such as nicotine, fentanyl, rivastigmine and lidocaine, are packed as tablets in inhalers, patches etc. resulting in special requirements for the packing, laminate, or film for sealing these substances in order to ensure that no adverse degradation takes place.

One common example is the problem relating to the packaging of nicotine, in particular as nicotine patches, because nicotine is highly aggressive towards its environment and highly volatile. These properties are problematic for the consumer safety and product durability if not addressed, because it is important that the amount of nicotine in, for example a tablet, gum or a patch is stable and complies with the product specification. Further, it is important to avoid adverse reactions between the packaging and the pharmaceutical substance. Additionally, from a business perspective a long stable shelf time is highly desirable. Thus, the chemical requirements of a packaging, film or laminate are typically:

- Resistance towards highly aggressive substances such as nicotine.
- Inert properties for ensuring that chemical compounds do not migrate from the exterior environment of for example a laminate, through the laminate getting into contact with a sealed substance;
- Possibly ensuring that the packaging is child proof to increase safety of potentially hazardous compounds.

A known polymer that fulfils the requirements of extreme chemical resistance and inert properties is a polyactyllonitrile (PAN) based film, which is sold for example as resins under the trademark Barex®, which is manufactured *i.a.* by the company Ineos. Barex® is widely used and approved for

drugs and food applications and is used because it is a good barrier towards oxygen, nitrogen and carbon dioxide compared to other common polymers, and because it has excellent chemical resistance towards different functional groups such as hydrocarbons, ketones, esters, alcohols, bases and acids and/or pharmaceuticals such as nicotine. Furthermore, extruded Barex® resin is heat stable and therefore weldable at a temperature around 160 - 220°C, which makes it possible to use in flexible packagings. However, Barex® is sold at a high prize due to the difficulties in the production and subsequent extrusion to film resulting in a high loss of material. Furthermore, the water and oxygen resistance of Barex® is not satisfactory for all purposes.

Another solution can be found in WO 00/44559 disclosing a material for packaging nicotine containing products (e.g. patches, tablets, lozenges, nasal spray), wherein the material comprises a polymer based on dimethyl-2,6-naphthalene dicarboxynate and/or 2,6-naphthalene dicarboxylic acid monomers. Further, it is disclosed that a polymeric film is combined with other barrier materials in a laminate to further improve the barrier characteristic of the laminate. The preferred material for a laminate is aluminium due to its good oxygen and water barrier properties.

In addition to the barrier properties, in particular for pharmaceuticals, it is important that the concentration of the substances is stable and reliable, which also poses requirements of the packaging and laminates in terms of inertness and permeability.

Hence, given the increased market and demands for packagings, there is an instant need for finding solutions for packaging, of in particular highly aggressive substances and pharmaceuticals, which fulfil all the requirements while still being economical.

## Summary of the invention

With this background it is an object of the present invention to provide solutions that meet one or more of the needs described above, that is, *i.a.* provide impermeability and inertness to a packaging. Furthermore, it is an object to provide a laminate that is weldable at temperatures suitable for the manufacture of flexible wrappings, such as for use in preparing packagings for patches. It is a further object to provide methods and products that

are cost efficient without compromising the quality of the products.

Accordingly, in a first aspect this is solved by a method for providing, e.g. an aggressive chemical resistant, film, said method comprising the steps of:

i) providing a base layer, which is water and/or oxygen resistant;

ii) coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

iii) coating the coextrusion layer to the base layer;

iv) allowing the coextrusion layer coated to the base layer to adhere to the base layer to provide the, e.g. aggressive chemical resistant, film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a RED value based on Hansens Solubility parameter (HSP) towards an aggressive chemical of > 0.8, more preferred a RED value in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred between 1 to 2.

It has surprisingly been found that when coextruding the tie layer and the contact layer according to the invention, the respective layers can be thinner while maintaining the overall mechanical and chemical robustness of the final film and laminates and wrappings made with the film. The coextrusion also results in a better adherence of the various layers resulting in a homogonous film in which the layers do not separate.

While it was previously believed that usable polymers should be hydrophobic (in order to repel water from the surroundings), the present inventors have found that by providing the film according to the invention where the coextrusion layer comprises a tie layer and a contact layer, and where the contact layer comprises a polymer having a relative energy difference (RED) value in the range 0.8 to 10 relative to the aggressive substance, it has surprisingly turned out that the desired effect of the laminate being inert to aggressive compounds, such as nicotine, rivastigmine and lidocaine, while still providing a barrier to external factors such as water/moist and oxygen, is obtained.

A polymer candidate for use as a contact layer in the present invention is selected by calculating the RED value, which is generally used to predict the solubility of a polymer in a particular solvent, or the compatibility of

two polymers in a blend. In the present invention the RED values for various polymer/solvent systems have been calculated, wherein the polymer is the polymer forming the contact layer, and the solvent is an aggressive chemical substance such as nicotine, rivastigmine, fentanyl and lidocaine etc.

The RED value for the polymer and the aggressive chemical substance is calculated by using the theory of the Hansen solubility Parameters (HSP), which is described in CM. Hansen : "Hansen Solubility Parameters, A User's Handbook", CRC Press, Boca Raton, 1999.

The HSP system between the polymer and the aggressive chemical substance is described by parameters set up in a 3 dimensional coordinate system :

— $\delta_D$ for dispersion cohesion energy
— $\delta\rho$ for dipolar cohesion energy
— $\delta_H$ for hydrogen bonding cohesion energy

The HSP distance, Ra, between polymer and the aggressive chemical substance is given by:

$$Ra^2 = 4(\Delta\ \delta_D)^2 + \Delta\ \delta\rho^2 + \Delta\ \delta_{H^2}$$

The $\Delta$ indicates the difference in the given parameter for the aggressive substance and the polymer.

The relation between the HSP distance, Ra and RED is given as:

$$RED = Ra/Ro$$

Where Ro is the interaction radius, which determines the radius of the sphere in Hansen space, and the center are the three Hansen parameters. All values are calculated or determined with empiric data and it is known to the person skilled in the art how to calculate the values.

The obtained RED value indicates whether or not the polymer is likely to dissolve in the aggressive chemical substance or not:

RED < 1 the polymer and the aggressive chemical substance will dissolve
RED = 1 the polymer and the aggressive chemical substance will partially dissolve
RED > 1 the polymer and the aggressive chemical substance will not dissolve

The resulting RED value is used to give an indication of the likelihood of dissolution or not.

All values can be calculated using the Hansen Solubility Parameter in Practice by (HSPiP) Software, commercially available at http://hansen-solubility.com.

Contact layer polymers according to the invention surprisingly turned out to have a RED value in the range from 0.8 and higher, preferably, 0.8 to 10 and more preferred 0.8 to 5 and most preferred 1 to 2. It is highly unexpected that polymers which in theory range from being soluble to insoluble with an aggressive substance to be packed fulfill the requirements set for films according to the invention as is supported by the examples provided here with.

The base layer, which is water and/or oxygen resistant, is selected from the group consisting of a metal foil, preferably aluminum foil, a polymer, such as a polymer made from polyamide, polyvinylidene chloride, silicium or aluminium oxide coated polyesters, and/or fluro polymers.

According to the invention water and/or oxygen resistance is preferably encompassing materials having an oxygen transfer rate (OTR) equal to or below 1 $cm^3/m^2/24hr/bar$ according to ASTM standard D3985 at 23°C and 0% RH and/or water (or moisture) vapor transfer rate (WVTR) equal to or below 1 $g/m^2/24hr$ according to ASTM standard F1249 at 38°C and 90%RH, preferably both the WVTR and the OTR are below 0.01 $g/m^2/24hr$ or 0.01 $cm^3/m^2/24hr/bar$ respectively.

According to the invention, the base layer of the film is selected to provide a number of properties to the film and a laminate and packaging comprising the film. The base layer may give desired barrier and support properties to the final laminate. Furthermore, the base layer may in one embodiment be a gas and water impermeable base layer, more preferably a water and/or oxygen resistant base layer.

In embodiments where the contact layer is hygroscopic the base layer is preferably made of a metal foil, preferably aluminum.

Aluminum is price competitive, a superior barrier of all gases and moisture and furthermore similar to other metal-like materials aluminium has good dead-fold properties, i.e. it does not unfold once folded, it reflects radiant heat, and gives a decorative appeal to laminates and packages.

According to the invention the tie layer is selected to provide sufficient adhesion between the base layer and the coextrusion layer. The tie lay-

er may give melt strength and support the coextrusion coating of both the tie layer and the contact layer. It is preferred that the melting profile of the tie layer polymers and the contact layer polymers are in the same range to provide optimal films that do not separate. Preferably both layers comprise polymers that melt at the operating temperature of the process of the invention and even more preferred the melting profiles (i.e. melting points) should differ with less than 30°C, preferably with 0-15°C, such as 5-15°C.

In one embodiment the tie layer is made of 1, 2, 3, 4 or 5 layers. In this way, the properties of the film and resulting laminates and packagings may be improved to accommodate the specific chemical and physical properties of the contact layer and/or the base layer.

In a further embodiment all the layers are coextruded with the contact layer for a simplified processing and for ensuring homogeneity of the layers.

In a further embodiment the tie layer is constituted of one layer where the layer is made of a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, which third polymer is preferably a glycidyl methacrylate, and more preferably a maleic anhydride. Most preferably the tie layer has a melting profile similar to that of the contact layer.

According to the invention the contact layer must be chemically resistant to the aggressive substance and excipient if present ultimately to be packed. Further it must show an extreme low absorption of the aggressive substances migrating through the film or laminate. The degree of absorption for a given substances is typically dictated by the manufacturer of the substance but often the accepted values lie in the range of 0 to 1 % (w/w). For some products up to 10 % (W/W) is acceptable typically for products with a low initial API content. The absorption is calculated as the weight of API in packaging relative to the initial weight of the API in the commercial product.

Hence, in the context of the present invention aggressive chemical resistant film means that no more than 1% of the original amount of API to be packaged (or sometimes no more than 10%) is migrated into the packaging material after 24 weeks. Typically, the degree of uptake is complete after 12 weeks or less.

In one preferred embodiment the contact layer comprises a polymer selected from the group consisting of a cyclic olefin copolymer (COC), a polyamide (PA), or, an ethylene vinyl alcohol (EVOH).

In a further embodiment the tie layer and contact layer comprise the same polymer, such as a cyclic olefin copolymer (COC), a polyamide (PA), or, an ethylene vinyl alcohol (EVOH) the latter being particularly preferred.

The HSP and RED Values calculated using http://hansen-solubility.com, mentioned above resulted in the following values for the preferred polymers according to the invention using lidocaine/rivastigmine as solvent (API) :

Table 1: HSP and RED values for preferred polymers according to the invention

| Polymer | D | P | H | RED value (chi) |
|---|---|---|---|---|
| Lidocaine/ Rivastigmine | 18.1 | 8.2 | 6.1 | - |
| PA 66 | 16 | 11 | 24 | 1.72 |
| COC | 18 | 3 | 2 | 1.32 |
| EVOH | 20.5 | 10.5 | 12.3 | 1.12 |

It has surprisingly been shown that when the contact layer comprises any of the polymers from the group above, having a relatively low RED (i.e. between 1 and 2) value a chemical resistant film and also laminate may be obtained even though the mentioned polymers chemically represent different polymer types. Tests have shown that the resistance of laminates in which the film is coated with the preferred polymers shows results unexpectedly superior to those of laminates coated/laminated with Barex®.

EVOH is normally used in laminates due to the superior oxygen barrier properties of EVOH. However, EVOH is known to be very hydrophilic and hydroscopic (i.e. has a high WVTR), hence it is surprising that a EVOH polymer is usable in the context of the present invention where water resistance is a desired property. Also, PA has typically been used in laminates due to the superior mechanical properties like tear strength or as a barrier. As for EVOH it is unexpected that PA may be used as a contact layer and/or co-extrusion layer (i.e tie and contact layer) for providing a chemical resistant film due to the hydrophilic nature of PA.

Because of the hydrophilic nature of PA and EVOH, in a preferred embodiment, the film obtained according to the invention may be tightly packed in a moisture barrier, in particular if it has to be stored. The film or laminate according to the invention may be packed immediately after manufacture of the chemical resistant film or laminate and should be kept safely packed until further use, for example in a packing line.

COC has not previously been recognized as being suitable for extrusion coating and for the production of heat sealable laminates. Without the wish to be bound by any theory this is believed to be due to the stress which the polymer is subjected to during an extrusion process. The stress causes irregular heating and melting within the COC, resulting in the final film or laminate to be unacceptable from a visual point of view for use in various packaging industries. Hence, it is very surprising that the inventors of the present invention have succeeded in providing a coextrusion layer comprising COC as a contact layer for sealing aggressive substances. The inventors have found that an improved processing of COC is obtained when COC is coextruded with a tie layer having a glass transition temperature higher than or equal to that of a COC polymer such as a terpolymer of ethylene, acrylic ester and maleic anhydride. In another embodiment of the invention the tie layer has a melting point that differs from COC with 30°C or less, preferably with 0-15°C, such as 5-15°C.

In a further embodiment, the melting point of the tie layer is at least the same as COC, preferably 5 to 30 °C higher, more preferably 15 to 30 °C higher than COC.

To obtain a satisfactory coextrusion layer it is important that the polymer constituting a contact layer and a copolymer constituting a tie layer are compatible with respect to the melting characteristic of the polymers and the copolymer. As an effect of having been able to process a chemical resistant laminate with a coextrusion layer laminated to a base layer, thin laminates may be obtained, and generally improved process ability during the manufacture of the laminates or wrappings are achieved.

Consequently, in one embodiment the tie layer or plurality of layers constituting the tie layer, has a loading in the range of 7 to 20 g/m2 and/or the contact layer has a loading in the range of 4 to 20 g/m2 and the loading of the laminate is not more than 40 g/m2.

In terms of the invention loading means the amount of polymer left, in the layer when the film has dried.

In a particular embodiment the contact layer of the coextrusion layer is made from a blend of at least two polymers. Using blends can be a means for reducing the costs and for adapting the physical and chemical properties of the co-extrusion process, such as reducing or increasing the melting temperature to comply with the profile of the tie layer(s) and the polarity of the blend to improve the adhesion properties of the layers and hence the robustness of the final product.

In a preferred embodiment the contact layer consists of one polymer type. Experiments showed that using one type of polymer resulted in improved resistance of the film and laminate towards the chemical substance to be packed.

According to an embodiment, in any of the blends or homo layers at least one of or all the polymer(s) forming the contact layer of the coextrusion layer is a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol. Each of the polymers are commercial available for example under the tradenames EVAL® C109B sold by Kuraray, Selar PA 3426 R sold by Dupont®, 6013M-07 sold by Topas®.

In one embodiment the cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol makes up at least 50% w/w of the blend, preferably at least 60% w/w, more preferably at least 80% w/w, most preferably at least 95% w/w.

The adhering of step iv) preferably occurs instantly for example by cooling the co-extrudate in cooling cylinders during the lamination process.

According to the invention a chemical resistant film has various applications. In an embodiment of the invention, the film is used to wrap a composition comprising a chemical selected from nicotine, fentanyl, lidocine and rivastigmine.

In a particular embodiment of the invention, wherein the composition is provided as a patch, the amount of the aggressive chemical substance remaining at day 0 after storage for at least 7 days at 40°C is a maximum +/- 10% in comparison to a Barex® patch as index 100.

In a further aspect of the invention an aggressive chemical resistant film is provided, said film comprising at least a base layer, which is water

and/or oxygen resistant, and a coextrusion layer, wherein the coextrusion layer comprises a tie layer and a contact layer, and whereby the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a RED value of > 0.8, more preferred a RED value in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred 1 to 2. Films according to the invention are resistant to aggressive chemical substances.

the term "aggressive chemical resistant film" means a film which when in contact with an aggressive substance does not allow more than 10 %, such as 5% w/w or 1.5% w/w based on the nomial content of the aggressive chemical to migrate to the packaging material.

In one embodiment the base layer, which is water and/or oxygen resistant, is selected from the group consisting of metal foil, preferably aluminum foil, polymers, polyamide, polyvinylidene chloride, silicium oxide coated polyesters, and/or fluropolymers.

In a further embodiment the tie layer is constituted of one layer and wherein the layer is a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, which third polymer is preferably a glycidyl methacrylate, and more preferably a maleic anhydride.

In a particular embodiment the contact layer comprises or is a polymer selected from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

In yet an embodiment the tie layer and the contact layer is the same material.

In a further embodiment the film is heat sealable. A heat sealable film or laminate is a laminate that is capable of sealing to itself during heat sealing without creating any deformation of films or laminates, which is highly undesired, especially, during the final wrapping of the product. The deformation is undesirable in relation to quality assurance, where any deformation must be noted and explained, which is highly labor intensive. Furthermore, the legislation in many countries is very strict. Hence, film and/or laminates with any deformation are not allowable for packing active ingredients.

In yet another aspect the invention relates to a laminate for packing an aggressive chemical substance said laminate comprising at least

- a first outer layer made of a mechanically wear resistant material;

- an aggressive chemical resistant film as described above comprising a base layer, which is water and/or oxygen resistant and a coextrusion layer said coextrusion layer comprising a tie layer wherein the base layer side of the film is facing the first outer layer.

In one embodiment the first outer layer may be made from a material selected from but not limited to paper, polyethylene or polyamide based sheets, ortho-phthalaldehyde based sheets, or polyester based sheets, or combinations. It is preferred that the first outer layer is a combination of materials when polyester based sheets are used.

In an embodiment the first outer layer and the film are laminated to provide the packaging in one piece. Laminating the first outer layer to the film provides a strong laminate, which is easy to wrap, and, it is ensured that the individual parts of the laminate do not fall apart.

In another embodiment the laminate further comprises a second outer layer facing the exterior side of the first outer layer, preferably the second outer layer is a paper layer. The paper layer is typically printed with the name, color and/or logo of the product and manufacturer of the product. It is also contemplated that the first outer layer is printed.

It is also contemplated that an adhesive agent may be applied between the second and first outer layers. The adhesive layer may be the same or different from the tie layer. Additional suitable adhesives are adhesives approved for use in packaging products for human use and are well known to the skilled person. A suitable adhesive may be selected from but is not limited to polyurethane based adhesives, epoxy based adhesives, or acrylic based adhesives.

The laminate of the present invention must be inert and impermeable to the aggressive chemical substance which the laminate is wrapped around. Hence, in an embodiment of the invention a maximum of 10%, preferably a maximum of 5%, even more preferably a maximum of 1.5%, most preferably a maximum 0.5% of the aggressive chemical is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

In a further embodiment the laminate encloses a compound selected from the group consisting of nicotine, rivastigmine, fentanyl and lidocaine. These compounds are known as aggressive chemicals/compounds and re-

quire specialized packaging.

Hence, the invention also contemplates an aggressive chemical substance packed in a laminate or packaging as explained above and a method for providing the packaging the chemical substance, said method comprising the steps of:

a) providing a base layer

b) coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

c) coating the coextrusion layer to the base layer;

d) allowing the coextrusion layer coated to the base layer to adhere to the base layer to provide a chemical resistant film comprising the tie layer and the contact layer formed as an coextrusion layer coated to the base layer;

e) providing a highly aggressive substance to the contact layer side of the film; and

f) sealing the chemical resistant film, preferably by heat sealing, in such a way to provide a hollow interior space for sealing the highly aggressive substance, said hollow space having an interior side and an exterior side, wherein the interior side of the film is the contact layer of the coextrusion layer and the exterior side of the film is the base layer.

In a preferred embodiment the highly aggressive substance is selected from the group consisting of nicotine, lidocaine, rivastigmine, and fentanyl.

It is also contemplated that a first outer layer may be applied to the film; the first outer layer is made of a mechanically wear resistant material and typically serves to protect from children being able to break the sealed film, laminate or wrapping.

A packaging should preferably comply with International standards such as 16 CFR §1700.20 (for USA) and ISO 8317 (2003) corresponding to DIN EN ISO 8317 (2004) (for Europe).

A "packaging" is in the context of the invention intended to mean a film or laminate used to pack a substance. Packaging may be used interchangeably for film or laminate

It is also contemplated that a second outer layer may be applied to the film and/or laminate; the second outer layer is typically a paper layer.

The paper layer is typically printed with the logo or colors etc. of the supplier of the product. The second outer layer is preferably applied when there is a first outer layer.

It is contemplated that the first and/or second outer layer is laminated to the film before steps e) and f) for example in one combined coextrusion and laminating step.

In yet another aspect, the invention provides the use of a polymer having a RED value of > 0.8, preferably having a RED value in the range of 0.8 to 10, more preferred 0.8 to 5, and most preferred 1 to 2 as a contact layer for providing chemical resistance to a film, wherein the film comprises a base layer which is water and/or oxygen resistant coated to a, optionally co-extruded, layer comprising a tie layer and the contact layer.

In a further embodiment the polymer is selected from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

Specific films according to the invention comprise but are not limited to base layer/tie-layer/contact-layer (the latter two coextruded) EAA/PE/COC, EAA/EMA/COC, EAA/terpolymer/COC, terpolymer/PE/COC, EAA/terpolymer/EVOH, EAA/terpolymer/PA, or EAA/PA.

Specific films according to the invention that are resistant to nicotine comprise but are not limited to base layer/tie-layer/contact layer (the latter two coextruded) Al/EAA/PA, Al/terpolymer of EAE and maleic anhydride/EVOH 60% and PE 40%, Al/terpolymer of EAE and maleic anhydride/EVOH 100%, Al/EVOH/EVOH, AL/EAE and maleic anhydride/COC.

In an embodiment of the invention, wherein the film is resistant to nicotine and the contact layer is COC and the base layer is aluminium, the tie-layer is preferably a terpolymer of ethylene, acrylic ester and maleic anhydride.

In a further embodiment of the invention, wherein the film is resistant to nicotine and the contact layer is PA and the base layer is aluminium, the tie-layer is preferably a copolymer of ethylene and acrylic acid.

In yet another embodiment of the invention, wherein the film is resistant to nicotine and the contact layer is EVOH and the base layer is aluminium, the tie-layer is preferably EVOH and/or a terpolymer of ethylene, acrylic ester and maleic anhydride.

Specific films according to the invention resistant to rivastigmine

comprise but are not limited to base layer/tie-layer/contact layer (the latter two coextruded) Al/EAA/PA, Al/terpolymer of EAE and maleic anhydride/EVOH 60% and PE 40%, Al/terpolymer of EAE and maleic anhydride/EVOH 100%, Al/EVOH/EVOH, AL/EAE and maleic anhydride/COC.

In an embodiment of the invention, wherein the film is resistant to rivagstigmine and the contact layer is COC and the base layer is aluminium, the tie-layer is preferably a terpolymer of ethylene, acrylic ester and maleic anhydride.

In a further embodiment of the invention, wherein the film is resistant to rivagstigmine and the contact layer is PA and the base layer is aluminium, the tie-layer is preferably a copolymer of ethylene and acrylic acid.

In yet another embodiment of the invention, wherein the film is resistant to rivagstigmine and the contact layer is EVOH and the base layer is aluminium, the tie-layer is preferably EVOH and/or a terpolymer of ethylene, acrylic ester and maleic anhydride.

Specific films according to the invention resistant to lidocaine comprise but are not limited to base layer/tie-layer/contact layer (the latter two coextruded) Al/EAA/PA, Al/terpolymer of EAE and maleic anhydride/EVOH 60% and PE 40%, Al/terpolymer of EAE and maleic anhydride/EVOH 100%, Al/EVOH/EVOH, AL/terpolymer of EAE and maleic anhydride/COC.

In an embodiment of the invention, wherein the film is resistant to lidocaine and the contact layer is COC and the base layer is aluminium, the tie-layer is preferably a terpolymer of ethylene, acrylic ester and maleic anhydride

In a further embodiment of the invention, wherein the film is resistant to lidocaine and the contact layer is PA and the base layer is aluminium, the tie-layer is preferably a copolymer of ethylene and acrylic acid.

In yet another embodiment of the invention, wherein the film is resistant to lidocaine and the contact layer is EVOH and the base layer is aluminium, the tie-layer is preferably EVOH and/or a terpolymer of ethylene, acrylic ester and maleic anhydride.

Specific films according to the invention resistant to fentanyl comprise but are not limited to base layer/tie-layer/contact layer (the latter two coextruded) Al/EAA/PA, Al/terpolymer of EAE and maleic anhydride/EVOH 60% and PE 40%, Al/terpolymer of EAE and maleic anhydride/EVOH 100%,

Al/EVOH/EVOH, AL/terpolymer of EAE and maleic anhydride/COC.

In an embodiment of the invention, wherein the film is resistant to fentanyl and the contact layer is COC and the base layer is aluminium, the tie-layer is preferably a terpolymer of ethylene, acrylic ester and maleic anhydride

In a further embodiment of the invention, wherein the film is resistant to fentanyl and the contact layer is PA and the base layer is aluminium, the tie-layer is preferably a copolymer of ethylene and acrylic acid.

In yet another embodiment of the invention, wherein the film is resistant to fentanyl and the contact layer is EVOH and the base layer is aluminium, the tie-layer is preferably EVOH and/or a terpolymer of ethylene, acrylic ester and maleic anhydride.

The invention should not be restricted to the above combinations. Further combinations are within the scope of the invention.

In another aspect of the invention is provided a method for providing an aggressive chemical resistant film said film being resistant to nicotine, rivastigmine and/or and lidocaine, and wherein said method comprises the steps of:

i) providing a base layer, which is water and/or oxygen resistant;

ii) coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

iii) coating the coextrusion layer to the base layer;

iv) allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a RED value based on Hansens Solubility parameter (HSP) towards nicotine, rivastigmine and/or lidocaine of > 0.8, more preferred a RED value in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred 1 to 2.

It has surprisingly been shown that films provided from polymers having a red value between 0.8 and 10 relative to rivastigmine, lidocaine and/or nicotine and coextruded as stipulated above have superior resistance to said chemical substances.

In a further aspect of the invention is provided a method for provid-

ing an aggressive chemical resistant film against nicotine, rivastigmine and/or and lidocaine, said method comprising the steps of:

i) providing a base layer, which is water and/or oxygen resistant;

ii) coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

iii) coating the coextrusion layer to the base layer;

iv) allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

It has surprisingly been shown that polymers of cyclic olefin copolymer, polyamide and ethylene vinyl alcohol, when coextruded, provide a resistant film, which performs at least as well as films known in the prior art for packaging compunds such as nicotine, lidocaine and rivastigmine.

Conveniently, the polymers used in the present invention have the advantage of being easy accessible thereby providing a more cost efficient production.

**Figures**

Figures 1 is a cross section of an embodiment of a chemical resistant film according to the invention

Figure 2 is a cross section of another embodiment of a chemical resistant film according to the invention.

Figure **3** is a cross section of a laminate according to the invention.

Figure 4 shows the results of an absorption study of rivastigmine as API wrapped in laminates according to the invention as compared to a commercial available laminate with the commercial available polymer film Barex® after storing for 2, 4, 8 and 12 weeks at 40°C.

Figure **5** shows the amount of licodaine remaining in a patch after **7** days at 40°C for embodiments of the laminate according to the invention and in comparison, with a commercial available Barex® laminate.

**Detailed description**

The invention will now be described in greater details. Each specific

embodiment and variation of features applies equally to each aspect of the invention unless specifically stated otherwise.

The film, laminate and packaging according to the present invention is intended to be used in packaging highly aggressive substances such as nicotine, rivastigmine, fentanyl or lidocaine, however, the invention should not be limited to these specific substances.

The term "film" according to the invention contemplates a product comprising a base layer coated with a coextrusion layer comprising a tie layer and a contact layer or a base layer laminated with a tie layer and a contact layer.

Where the contact layer is laminated, for example using an EVOH film, the contact layer and tie layer may be either coextruded, or, the contact film layer may be laminated to the base layer optionally with an intermediate tie layer or the tie and contact layers may be the same material.

The term "laminate" according to the invention contemplates the film to which a further layer is laminated, such as a first outer layer.

A "packaging" is in the context of the invention intended to mean a film or laminate used to pack a substance. Packaging may be used interchangeably for film or laminate.

The term "highly aggressive substance" should be understood as a substance which is both very reactive with metals, acids, bases or functional groups such as ketones, alcohols, hydro carbons and/or esters, and/or, volatile but also easily migrates through barriers. Similarly, the term "aggressive chemical resistant film" means a film which when in contact with an aggressive substance does not allow more than 1.5 % w/w of nominal content to migrate to the packaging material or that 90-110% w/w of the aggressive chemical substance remains in the product when compared to Barex® as index 100.

Therefore, the films, laminates or packagings applicable for packing highly aggressive substances should have both chemical-resistant properties but also limit the migration of the aggressive substance through the film, laminate or packaging. The aggressive substance according to the invention is also or alternatively susceptible to degradation when exposed to ambient conditions, such as oxygen and water, it is volatile and able to migrate or a combination. Specifically, the aggressive substance is selected from but not

limited to nicotine, oils, such as spearmint and peppermint oil, licodaine, fentanyl or rivastigmine.

The term "oxygen and water resistant" as used in the context of the present invention contemplates material for which the oxygen transfer rate (OTR) and/or water vapor transfer rate (WVTR) is no more than 1 preferably no more than 0.1 as also indicated above. The term WVTR may also be referred to as the moisture vapor transfer rate (MVTR). WVTR and MVTR are equivalent.

The term "mechanically wear resistant layer" as used for the first outer layer in the context of the present invention should be a material which is suitable for the manufacture of a flexible packaging. The mechanically wear resistant layer may be chosen from materials such as polyethylene or polyamide based sheets, ortho-phthalaldehyde based sheets, or polyester based sheets or combinations.

Further, the mechanically wear resistant material can be provided as a film that is biaxially oriented to give the film higher seal strength. The term "biaxial oriented" should be understood such that the provided polymer film has been stretched in both a longitudinal and a transverse direction during manufacturing.

The term "exterior side" should be understood in its broadest term. The term exterior environment is used for defining the direction opposite of the side that is facing the highly aggressive substance to be sealed by a laminate or packaging of the present invention. This means that the term exterior environment is independent on whether additional layers are coated, laminated or otherwise attached to the film. Thus, the word is used for specifying which direction a side of a layer is facing.

The various embodiments of the invention will now be illustrated with references to the figures and examples.

With reference to figure 1 a film of the invention will now be described in greater detail. The extreme chemical resistant film, 1, is obtained by providing a base layer, 2. A coextrusion layer, 5, comprising a tie layer, 3, and a contact layer, 4, is coated to one side of the base layer, 2, according to the method of the invention and is allowed to adhere. The base layer, 2, and the coextrusion layer, 5, define the film according to all the aspects of the invention. Consequently, the film is provided with a base layer side, 2, and a

coextrusion layer side 5, wherein the base layer side, 2, is intended for facing the exterior environment and the coextrusion layer side, 5, is intended for facing the highly aggressive substance to be sealed.

The coextrusion layer may be coated to the aluminium layer by a co-extrusion system generally known in the art to provide the coextrusion layer coated on the first side of the aluminum layer. The coextrusion layer may be applied in an amount of 7-40 g/m3. After coating of the aluminium layer and subsequently cooling, the coextrusion layer is adhered to the side of the tie layer facing away from the aggressive chemical substance.

The coextrusion is preferably performed at a temperature of 240-330°C, more preferred 270 - 300°C and the speed of the application/coating is in the range of 150 to 600 m/min. The equipment suitable for extruding and laminating films and laminates according to the invention may be obtained from Bobst.

When using coextrusion, it is possible to obtain a multi layer which is thinner than multilayer layers provided by sequential film application techniques without compromising the extreme chemical resistance properties of the first laminate. Hence, the present invention does not only provide an extreme chemical resistance laminate, and packaging comprising the same but at the same time the manufacturing process is more cost effective since less polymer, forming the contact layer, has to be used.

Another embodiment of a film in which the tie layer comprises two layers is illustrated in figure 2. The extreme chemical resistant film, 1, is obtained by providing a base layer, 2. The coextrusion layer, 5, comprises a tie layer, 3, comprising a first layer, 3a, and a second layer, 3b, and a contact layer 4. The coextrusion layer is coated onto one side of the base layer, 2, according to the method of the invention and is allowed to dry.

In the embodiment illustrated, the tie layer, 3, comprises two layers. These layers may be made of EAA as the first layer, 3a, and polyethylene (PE) as the second layer, 3b, where the first layer of EAA faces the base layer and second layer of the PE faces the contact layer, 4.

The extreme chemical resistant film according to the invention is intended for use as a component of a packaging suitable for sealing a highly aggressive substance. The film may constitute the packing itself.

To further improve the mechanical wear resistance of the film a first

outer layer may be laminated to the base layer side of the film or simply be wrapped around the film to provide a laminate. Hence, in figure 3 is illustrated a cross section of an embodiment of a laminate according to the invention, 12, comprising a first outer layer, 21, a base layer, 22, and a coextrusion layer, 25. The first outer layer, 21 and the base layer side, 22, may be laminated together before, during or after the coextrusion layer 25 is applied/coated to the base layer.

The first outer layer, 21, is a mechanically wear resistant layer which adds safety properties to the wrapping ensuring that the wrapping is not inadvertently opened. Hence, the outer layer can also be seen as a child proof layer meaning that the layer is made of a material and is sealable in such a way that it is difficult for children to open. Additionally, the outer layer may be provided with a second outer layer, 20.

The second outer layer, 20, is typically a paper layer, wherein the paper layer is facing the exterior environment; the exterior facing side of the second layer may be printed as desired. The second outer layer, such as the paper layer is added to improve the stiffness of the packaging in addition to providing a printing platform.

Furthermore, it is within the inventive concept of the present invention that an adhesive agent is applied between the first outer layer and the base layer and/or between the first outer layer and the second outer layer. The obtained packaging may then be assembled in such a way that the various layers do not part during handling, printing and/or packaging of the substance to be packed.

After production, the film, laminate or packaging may be stored as rolls ready for use in further lamination or packaging of the aggressive substance to be packed.

In use, the packaging is sealed around the substance to be packed so that the contact layer of the coextrusion layer faces the interior side and the substance, and, the base layer, first outer layer or second outer layer, as applicable, face the exterior side, so as to create a hollow interior for containing the, substance, such as the aggressive substance.

The sealing of the packaging is achieved in such way that the contact layer of the coextrusion layer is facing the aggressive substance so that the remaining part of the package is protected by the contact layer of the coex-

trusion layer. In this way, the aggressive substance is encompassed by the inner side of packaging and will therefore only have direct contact with the contact layer of the coextrusion layer.

In general, the order in which the different layers of the packaging according to the invention are applied to the base layer is flexible. Hence, the first outer layer may be applied before the coextrusion layer and the other way around. The order depends on which production line is suitable in a specific situation.

In more details the packaging according to the present invention may in one embodiment be manufactured by obtaining a film comprising a base layer, such as an aluminum layer and a coextrusion layer comprising a biopolymer of ethylene and acrylic acid as a tie layer and EVOH as the contact layer coated to the aluminium as described above. The base layer side of the film may then be provided with an adhesive agent and subsequently laminated to a biaxial orientated PET-film which is the first outer layer, i.e. the mechanically wear resistant layer. The PET-film is further provided with an adhesive agent on the exterior side of the mechanically wear resistant layer and is subsequently laminated to a paper layer for providing the final packaging.

An aggressive substance, such as but not limited to lidocaine, is placed on the contact layer side of the laminate which is welded around the substance, such as to form a pouch with an inner side and an outer side. Accordingly, the interior of the pouch consists of the coextrusion layer, where the contact layer of EVOH facing the aggressive substance thereby protects the rest of the provided packaging and the exterior side is the paper layer.

In general, the lamination procedure for laminating the mechanically wear resistant or paper layer to each other or to the base layer is routine procedure for the person skilled in the art.

According to all aspects of the invention the base layer may be selected from but not limited to a metal foil, preferably aluminum foil, a polymer, such as a polymer made from polyamide, polyvinylidene chloride, silicium or aluminium oxide coated polyesters, and/or fluro polymers, such as commercial Alu foil from e.g. Hydro, or AlOx coated PET films obtainable from e.g. Toray Films Europe, or SiOx coated PET films obtainable from e.g. Celplast under the tradename Ceramis.

According to all aspects of the invention the tie layer may be made of a material selected from but not limited to a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and meth-acrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, which third polymer is preferably a glycidyl methacrylate, and more preferably a maleic anhydride, such as the commercial product Lotader® 3410 sold by Arkema or Nucrel® 0609HSA sold by Dupont®

According to all aspects of the invention the contact layer may be made of a material selected from cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol or mixtures thereof, such as the commercial products EVAL® C109B sold by Kuraray, Selar PA 3426 R sold by Dupont® or COC 6013M-07, COC 8007F-600, or 9506F500 sold by Topas® or EVOH obtainable from Nippon Gohsei under the tradename Soarnel.

According to all aspects of the invention the first outer layer may be made of a material selected from paper, polyethylene or polyamide based sheets, ortho-phthalaldehyde based sheets, or polyester based sheets, or combinations, such as the commercial product F-PAP sold by Flexpet.

The invention will now be illustrated in more details with reference to the following non limiting examples.

RED Calculation

Determination of the HSP values and interaction radius for nicotine, rivastigmine, fentanyl and lidocaine requires that the solubility of the drug is evaluated against at least 16 solvents having a range of polar and hydrogen bonding properties. The methodology of determining HSP values, interaction radius and RED values are described in CM. Hansen : "Hansen Solubility Parameters, A User's Handbook", CRC Press, 2007, Second Edition and exemplified in EP 2 895 531.

Typical solvents used to determine the HSP may be but is not limited to the solvents present in table 2.

*Table 2: Typical solvents used to determine the HSP of a polymer or substance of interest.*

| **Typical solvents used in Determining of HSP of rivagstigmine, lidocaine, fentanyl and nicotine** | |
|---|---|
| Chemical name | Trade Designation or Alternate Name |
| Acetonitrile | Acetonitrile |
| Ethylene glycol n-Butyl Ether | Butyl CELLOSOLVE™ Glycol Ether |
| Dibutyl Ether | Dibutyl Ether |
| Dimethyl Formamide | Dimethyl Formamide |
| Dimethyl Sulfoxide | Dimethyl Sulfoxide |
| Methanol | Methyl alcohol |
| 2-Butanone | Methyl Ethyl Ketone |
| 4-Methyl-2-pentanone | Methyl Isobutyl Ketone |
| n-Butyl Acetate | n-Butyl Acetate |
| n-Heptane | n-Heptane |
| 1-Propanol | n-Propyl Alcohol |
| o-Dichlorobenzene | 1,2-Dichlorobenzene |
| Tetrahydrofuran | Tetrahydrofuran |
| Toluene | Methylbenzene |
| Propylene Carbonate | Propylene Carbonate |
| Water | Water |

For assessing the solubility of Rivastigmine, Lidocaine, fentanyl and nicotine in the solvents an experimental measurement is performed. The solubility is assesed based on the visual observation of 0.5 g of the chemical substance in a vial with 5 $cm^3$ solvent at room temperature. The vial is capped with a polyethylene-lined lid and labeled with the solvent loaded. The vials are placed in a vial shaker at low speed at room temperature. After 24 hours, the samples are removed from the vial shaker, and allowed to sit for 30 min before they are visually rated. The rating is performed by giving each solvent a score being 0 for insoluble and 1 for soluble. The numerical ratings are then entered into the HSPiP software program to obtain the HSP (Hansen solubility parameters). R (radius) values for the compound of relevance, e.g. nicotine, rivastigmine, fentanyl and/or lidocaine is inserted, and a report is

generated. The report lists the final parameters and R values calculated for nicotine, rivastigmine, fentanyl and/or lidocaine. The report also lists the solvents used in the evaluation, their HSP values (taken from a database), the rating of the visual observations, and their RED values with a specific polymer of interest.

Example 1- performance of a laminate according to the invention compared to a commercially used laminate

A study was conducted to evaluate the performance of four laminates according to the present invention as compared to a commercially available laminate product comprising Barex® as the contact layer.

The wrappings according to the invention were compared to the performance of a Barex® laminate currently used in the field.

The test is a resistance test, wherein the migration of rivastigmine to the laminates is evaluated.

Table 3: The composition of the 6 wrappings was a follows, laminates 1 to 5 are laminates according to the invention

| | Adhesive/Polymer layer Coextrusion layer | Base layer | First outer layer | Second Outer layer |
|---|---|---|---|---|
| Commercially used Barex® laminate (prior art) | Adhesive/ Barex® film | Al | PET | Paper |
| Laminate 1 | Tie layer: Bipolymer of ethylene and acrylic acid (Nucrel 0609 HAS) Contact layer: PA (Selar PA 3426R) | Al | PET | |
| Laminate 2 | Tie layer: Terpolymer of ethylene, acrylic ester and maleic anhydride (Lotader 3410) Contact layer: EVOH 60% (EVAL C109B) and PE 40% | Al | PET | |
| Laminate 3 | Tie and contact layer: EvOH film (EVAL C109B) | Al | PET | |
| Laminate 4 | Tie layer: Terpolymer of ethylene, acrylic ester and maleic anhydride (Lotader 3410) Contact layer: EVOH 100% (EVAL C109B) | Al | PE | PET |
| Laminate 5 | Tie layer: Terpolymer of ethylene, acrylic ester and maleic anhydride (Lotader 3410) Contact layer: COC | Al | PE | PET |

*Between the paper/PET, PET/Al, and Al/EVOH film layers an adhesive was applied.

Laminates 1 to 5 were obtained according to the method of the invention. For laminates 1, 2, 4 and 5 a coextrusion layer was coated to the base layer and in laminate 3 the combined tie and contact layer was laminated to the base layer. For the co-extrusion layers, the loading of the tie layers was between 4-18 g/m$^2$ and the loading of the contact layer was 8-12 g/m$^2$.

The resulting laminates were wrapped around a patch containing rivastigmine as API and the migration of the API to the packaging material/wrapping was measured after 2, 4, 8 and 12 weeks at 40 °C. The API in the wrapping was measured by extracting the packaging and analysing the amount of API therein using Mass spectrometry.

The Rivastigmine patches tested were commercially available patches originally containing 9.5 mg API/patch.

The results are shown in figure 4 illustrating the resulting migration of rivastigmine (weight API extracted from the laminate) to the laminate in percentage of the content of the original patches of 9.5 mg.

The columns are denoted 1, 2, 3 and 4 respectively to the order they are shown from left to right in figure 4. Hence column 1 (furthest to the left) for each contact layer polymer used shows the results for the 6 laminates after two weeks. Column 2 shows the results for the 6 laminates after four weeks. Column 3 shows the results for the 6 laminates after 8 weeks, and column 4 shows the results for the 6 laminates after 12 weeks.

The Barex® laminate is a reference known for applicability in the art and comparison were made for evaluating the properties of the laminates according to present invention.

From the figure it is clear that the results for laminates according to the invention obtained by coextrusion of either of EVOH, PA, or COC as well as laminating EVOH provides for an improved chemical resistant laminate compared to the commercially used Barex® laminate, meaning that less migration occurs.

Also, a contact layer, illustrated as laminate 2, of a blend of EVOH and PE was prepared and tested. Though the properties of this blend with rivastigmine as API resulted in a higher migration of the API than Barex®, the rate is still below the limit demanded in the industry and hence, it illustrates that blends as provided in laminate 2 are usable alternatives to

Barex® as well. Surprisingly though the tie/contact layer made of 100% EVOH was markedly superior to the blend.

Also, a contact layer, illustrated as laminate 3, a film of EVOH laminated to aluminum was prepared and tested. Surprisingly, it was shown that the use of EVOH in the form of a film laminated to aluminum provided a chemical resistant laminate.

Example 2 - stability test of a chemical substance wrapped in laminates according to the invention and wrapped in a prior art product using Barex®

Similar to the test described in example 1, laminates according to the invention were prepared as outlined in table 4 below. A lidocaine patch containing 40 mg lidocaine was wrapped in the pouch, packaged and stored at 40°C for seven days.

Table 4: Packagings for lidocaine stability test.

| | Barex Commercially used Barex® laminate (prior art) | COC coex same as laminate 5 of example 1 | Coex EVOH same as laminate 4 of example 1 |
|---|---|---|---|

Stability of the API is important to ensure that the dose indicated on the packaging is correct. A value of 90% - 110% of the original dose after one week when stored at 40°C using Barex® as index 100 is considered acceptable. Figure 5 illustrates the results of the test where the y-axis indicates the weight decrease of the two laminates according to the invention using Barex as index 100.

As can be seen from figure 5, both inventive laminates have a lower value than the index 100 Barex® comparative product, however with a value within the acceptable limits. The lower %value of the laminates according to the invention indicates that more lidocaine has disappeared from the patch.

C L A I M S

1. A method for providing a, e.g. aggressive chemical resistant, film, said method comprising the steps of:

i) providing a base layer, which is water and/or oxygen resistant;

ii) coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

iii) coating the coextrusion layer to the base layer;

iv) allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer; and,

wherein the contact layer comprises a polymer having a RED value based on Hansens Solubility parameter (HSP) towards an aggressive chemical of > 0.8, more preferred a RED value in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred 1 to 2.

2. A method according to claim 1, wherein the base layer, which is water and/or oxygen resistant, is selected from the group consisting of a metal foil, preferably aluminum foil, a polymer, such as a polymer made from polyamide, polyvinylidene chloride, silicium or aluminium oxide coated polyesters, and/or fluro polymers.

3. A method according to any one of the claims 1 to 2, wherein the tie layer is made of 1, 2, 3, 4 or 5 layers.

4. A method according to claim 3, wherein all the layers of the tie layer are coextruded with the contact layer.

5. A method according any one of the preceding claims, wherein the tie layer is constituted of one layer and wherein the layer is a copolymer made of a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a terpolymer comprising ethylene, acrylic ester and a third polymer, which third polymer is preferably a glycidyl methacrylate, and more preferably a maleic anhydride.

6. A method according to any one of the claims 1 to 4, wherein the tie layer comprises at least two layers, and wherein the first layer comprises a copolymer according to claim 5 and the at least second or more layer(s) comprises a material selected from EEA, PE, EMA, EAA or a combination.

7. A method according to any one of the preceding claims, wherein

the contact layer comprises a polymer selected from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

8. A method according to anyone of the preceding claims wherein the contact layer is a polymer selected from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

9. A method according to anyone of the preceding claims, wherein the tie layer or plurality of layers constituting the tie layer, has a loading in the range of 7 to 20 g/m $^2$ and/or the contact layer has a loading in the range of 4 to 20 g/m $^2$ and the loading of the film is not more than 40 g/m $^2$.

10. A method according to any of the preceding claims, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocine and rivastigmine

11. A method according to claim 10, wherein the composition is a patch.

12. A method according to claim 10 or 11, the amount of the aggressive chemical substance remaining at day 0 after storage for at least 7 days at 40°C is a maximum +/-10% in comparison to a Barex® patch as index 100.

13. An aggressive chemical resistant film comprising at least a base layer, which is water and/or oxygen resistant, and a coextrusion layer, wherein the coextrusion layer comprises a tie layer and a contact layer, and wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a RED value based on Hansens Solubility parameter (HSP) of > 0.8, more preferred a RED value in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred 1 to 2.

14. A film according to claim 13, wherein the base layer, which is water and/or oxygen resistant, is selected from the group consisting of metal foil, preferably aluminum foil, polymers, such as polyamide, polyvinylidene chloride, silicium or aluminium oxide coated polyesters, and/or fluropolymers; and/or

the tie layer is constituted of one layer and wherein the layer is made of a copolymer, said copolymer comprising a material selected from a copolymer of ethylene and acrylic acid, ethylene and methacrylic acid and a third polymer, which third polymer is preferably made of a material selected from glycidyl methacrylate, and more preferably maleic anhydride; and/or

wherein the contact layer comprises or is a polymer selected from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

15. A film according to claims 13 or 14, wherein the tie layer or plurality of layers constituting the tie layer, has a loading in the range of 7 to 20 g/m$^2$ and/or the contact layer has a loading in the range of 4 to 20 g/m$^2$ and the loading of the film is not more than 40 g/m$^2$.

16. A laminate for packing an aggressive chemical substance said laminate comprising at least

- a first outer layer made of a mechanically wear resistant material;

- an aggressive chemical resistant film according to any of claims 13 to 15, said film comprising a base layer, which is water and/or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, where the contact layer comprises a polymer having a RED value of > 0.8, more preferred a RED value based on Hansens Solubility parameter (HSP) in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred 1 to 2; and, where the base layer side of the film is facing the first outer layer.

17. A laminate according to claim 16, wherein the laminate further comprises a second outer layer facing the exterior side of the outer layer, preferably the second outer layer is a paper layer.

18. A laminate according to any of the claims 16 to 17, wherein the laminate encloses a compound selected from the group consisting of nicotine, rivastigmine, fentanyl and lidocaine.

19. A laminate according to claim 16, 17, and 18, wherein the laminate is heat sealable.

20. A laminate according to claim 16 to 19, wherein a maximum of 10%, preferably a maximum of 5%, even more preferably a maximum of 2% of the active ingredient is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

21. An aggressive chemical substance packed in a heat sealable laminate, said heat sealable laminate comprising

- a first outer layer made of a mechanically wear resistant material;

- an aggressive chemical resistant film comprising a base layer, which is water and/or oxygen resistant and a coextrusion layer, said coextru-

sion layer comprising a tie layer and a contact layer, wherein the base layer side of the film is facing the outer layer; and, wherein the contact layer comprises a polymer having a RED value of > 0.8, more preferred a RED value based on Hansens Solubility parameter (HSP) in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred 1 to 2.

22. Use of a polymer having a RED value based on Hansens Solubility parameter (HSP) of > 0.8, preferably having a RED value in the range of 0.8 to 10, more preferred 0.8 to 5, and most preferred 1 to 2 as a contact layer for providing chemical resistance to a film, wherein the film comprises a base layer which is water and/or oxygen resistant, said film is coated to a, optionally coextruded, layer comprising a tie layer and the contact layer.

23. Use according to claim 22, wherein the polymer is selected from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

24. A method for providing an aggressive chemical resistant film said film being resistant against nicotine, rivastigmine, fentanyl and/or lidocaine, and wherein said method comprises the steps of:

i) providing a base layer, which is water and/or oxygen resistant;

ii) coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

iii) coating the coextrusion layer to the base layer;

iv) allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer having a RED value based on Hansens Solubility parameter (HSP) towards nicotine, rivastigmine, fentanyl and/or lidocaine of > 0.8, more preferred a RED value in the range of 0.8 to 10, even more preferred 0.8 to 5, and most preferred 1 to 2.

25. A method for providing an aggressive chemical resistant film said film being resistant against nicotine, rivastigmine, fentanyl and/or and lidocaine, and wherein said method comprises the steps of:

i) providing a base layer, which is water and/or oxygen resistant;

ii) coextruding a layer comprising a tie layer and a contact layer to provide a coextrusion layer;

iii) coating the coextrusion layer to the base layer;

iv) allowing the coextrusion layer coated to the base layer to adhere to provide the aggressive chemical resistant film comprising the tie layer and the contact layer formed as a coextrusion layer coated to the base layer, wherein the tie layer comprises at least one layer and wherein the contact layer comprises a polymer from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

26. A method according to claim 25, wherein the film is used to wrap a composition comprising a chemical selected from nicotine, lidocaine, fentanyl and rivastigmine

27. A method according to claim 26, wherein the composition is a patch.

28. A method according to claim 26 and 27, the amount of the aggressive chemical substance remaining at day 0 after storage for at least 7 days at 40°C is a maximum +/-10% in comparison to a Barex® patch as index 100.

29 A laminate for packing an aggressive chemical substance said laminate comprising at least

- a first outer layer made of a mechanically wear resistant material;
- an aggressive chemical resistant film according to claim 25, said film comprising a base layer, which is water and/or oxygen resistant and a coextrusion layer, said coextrusion layer comprising a tie layer and a contact layer, where the contact layer comprises a polymer from the group consisting of a cyclic olefin copolymer, a polyamide, or, an ethylene vinyl alcohol.

30. A laminate according to claim 29, wherein the laminate is wrapped around a composition comprising the aggressive chemical substance and wherein a maximum of 10% w/w, preferably a maximum of 5% w/w, even more preferably a maximum of 1.5% w/w, most preferably a maximum of 0.5% w/w of the aggressive chemical substance based on nominal content is migrated into the laminate at day 0 after 12 weeks of storage at 40 °C.

31. A laminate according to claim 30, wherein the aggressive chemical substance is selected from the group consisting of rivastigmine, lidocain, fentanyl and nicotine.

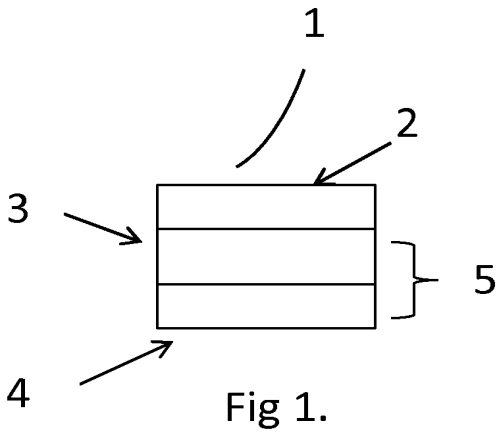


Fig 1.

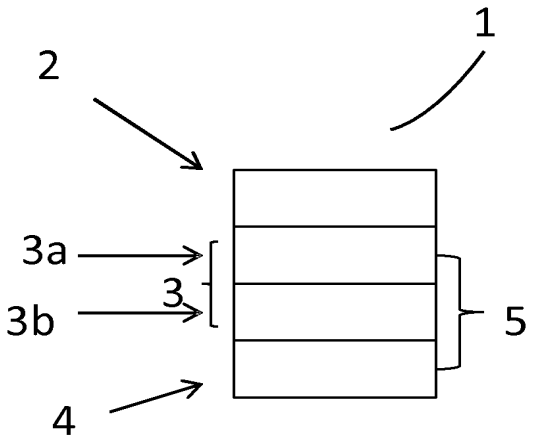


Fig. 2

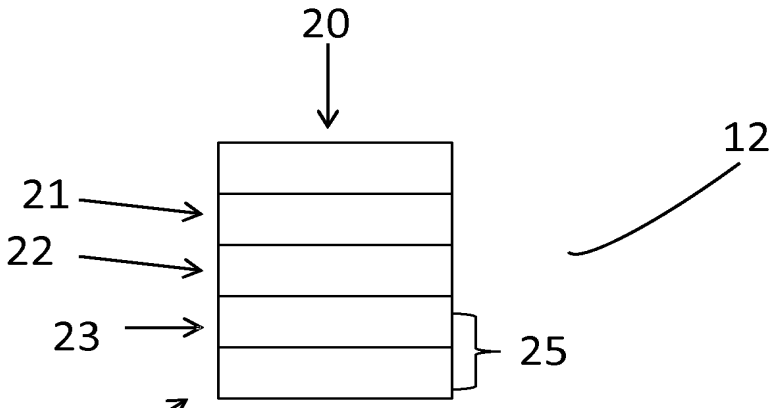


Fig. 3

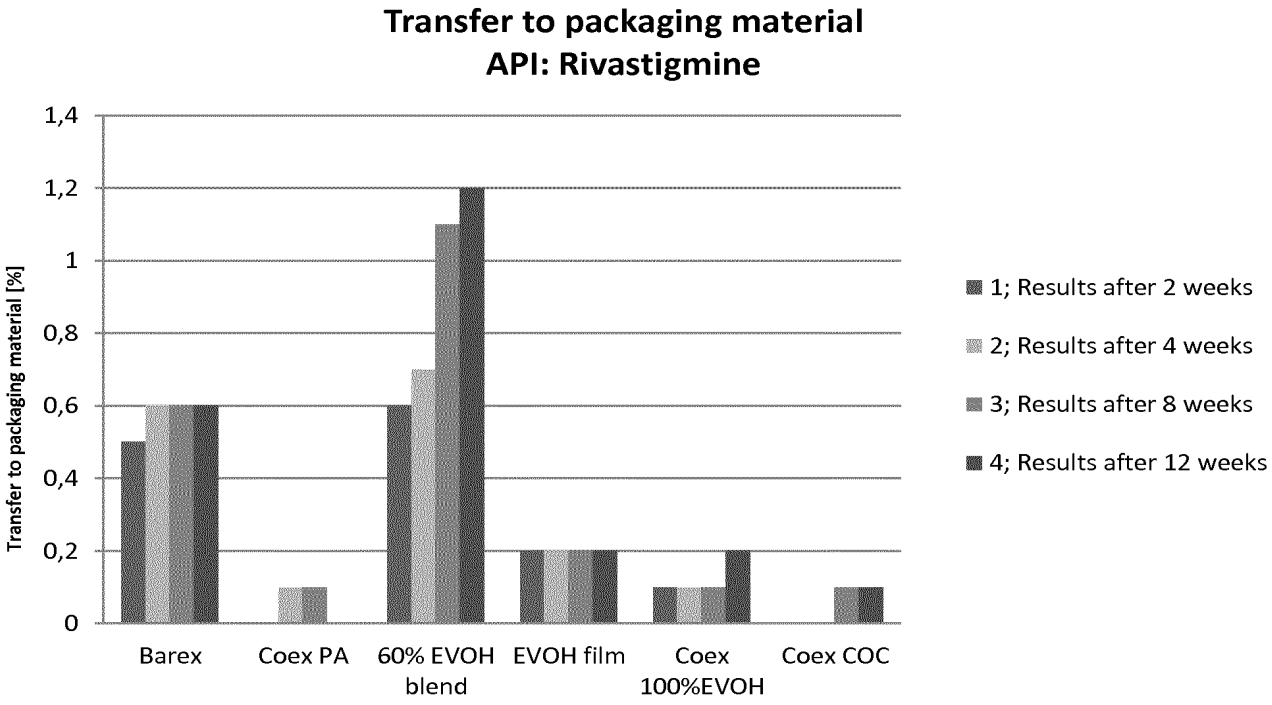
Transfer to packaging material
API: Rivastigmine
Transfer to packaging material [%]
1,4
1,2
1
0,8
0,6
0,4
0,2
0
Barex
Coex PA
60% EVOH blend
EVOH film
Coex 100%EVOH
Coex COC
1; Results after 2 weeks
2; Results after 4 weeks
3; Results after 8 weeks
4; Results after 12 weeks

Fig. 4

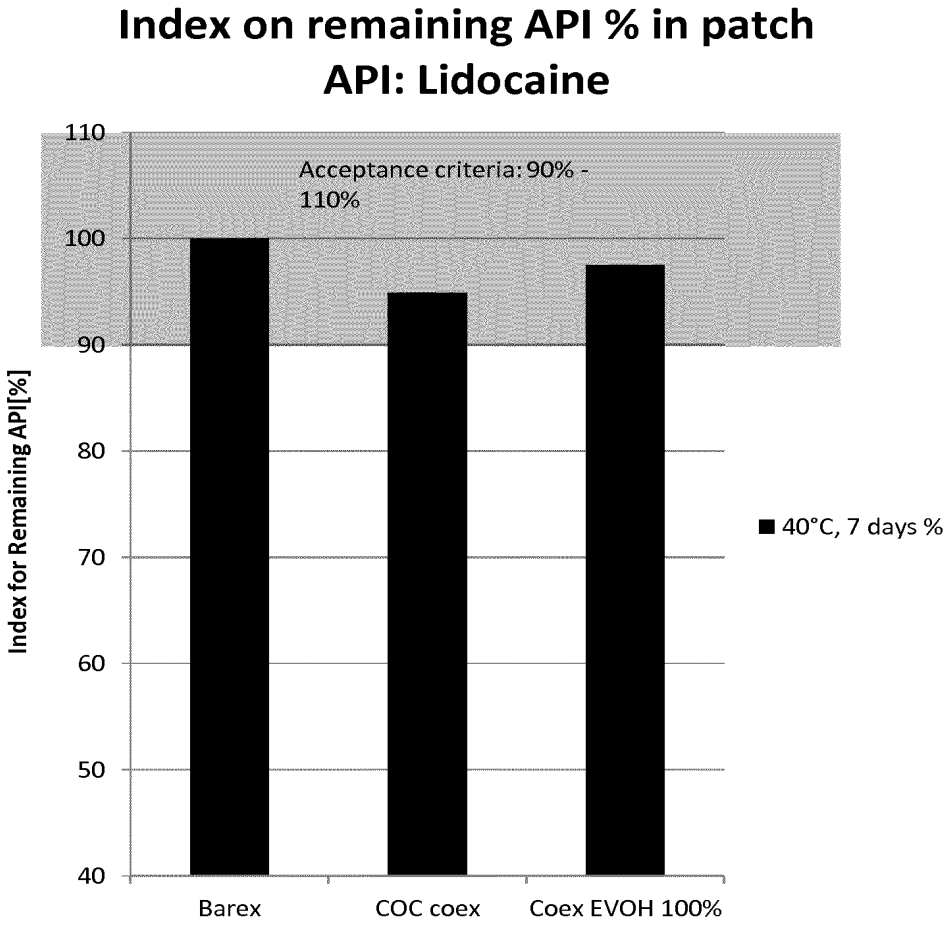
Index on remaining API % in patch
API: Lidocaine
Acceptance criteria: 90% - 110%
Index for Remaining API[%]
110
100
90
80
70
60
50
40
Barex
COC coex
Coex EVOH 100%
40°C, 7 days %

Fig. 5

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/082876

A. CLASSIFICATION OF SUBJECT MATTER
INV. B32B7/12 B32B15/08 B32B15/082 B32B15/085 B32B15/20
B32B27/08 B32B27/30 B32B27/32 B32B27/36
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 6 120 860 A (BOWEN WILLIAM E [US] ET AL) 19 September 2000 (2000-09-19)<br>column 2, line 24 - column 3, line 8<br>page 3, line 30 - page 5, line 14<br>page 5, line 33 - line 44<br>page 6, line 27 - line 40; claims<br>----- | 1-31 |
| X | US 2005/037162 A1 (ADAMS JOHN PETER [US] )<br>17 February 2005 (2005-02-17)<br>figures<br>paragraphs [0028] , [0045]<br>sample E;<br>page 3; table<br>claim<br>----- | 1-31 |

-/- .

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" documentwhich may throw doubts on priority claim(s) orwhich is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 21 March 2017 | 30/03/2017 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Mazet, Jean-Frangois |

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2016/082876

| Patent document cited in search report | Publication date | Patent family member(s) | | | Publication date |
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# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 39589791 |
| **Application Number:** | 15780999 |
| **International Application Number:** | |
| **Confirmation Number:** | 7187 |
| **Title of Invention:** | METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM |
| **First Named Inventor/Applicant Name:** | Lars Christensen |
| **Customer Number:** | 26582 |
| **Filer:** | Paul M. Schramm/Sherry Soares |
| **Filer Authorized By:** | Paul M. Schramm |
| **Attorney Docket Number:** | P006DK.WO.US (87942.0009) |
| **Receipt Date:** | 01-JUN-2020 |
| **Filing Date:** | 01-JUN-2018 |
| **Time Stamp:** | 17:42:29 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P006DKWOUS_15780999_IDS.pdf | 247145<br>47f90a4f4cb036688d9f43e158a8af921240a2b2 | yes | 6 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Transmittal Letter | 1 | 2 |
| | Information Disclosure Statement (IDS) Form (SB08) | 3 | 6 |
| **Warnings:** | | | |
| **Information:** | | | |

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|---|---|
| **Warnings:** | |
| **Information:** | |
| **Total Files Size (in bytes):** | 834785 |

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**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of:<br>Christensen et al.<br>Application No.: 15/780,999<br>Filed: June 1, 2018<br>For: A METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM<br>Docket No.: P006DK.WO.US (87942.0009)<br>Customer No.: 26582 | Confirmation No.: 7187<br>Examiner: not yet assigned<br>Art Unit: not yet assigned<br>**INFORMATION DISCLOSURE STATEMENT**<br>**CERTIFICATE OF TRANSMISSION**<br>I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on June 1, 2020.<br>By: /Sherry Soares/<br>Sherry Soares |

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Pursuant to the duty of disclosure set forth at 37 CFR §1.56 and the requirements for filing an Information Disclosure Statement set forth at 37 CFR §§1.97-1.98, enclosed is Form PTO/SB/08 (hereinafter "the Form") with a list of all items being submitted for consideration by the Office. A legible copy of each item listed in the Form that is not a U.S. patent or a published U.S. patent application, and not identified as being cumulative, is enclosed.

The disclosure of the remaining documents identified on the Form is not to be construed as an admission that any of the documents, alone or in any combination, is considered to be material to patentability as defined in 37 CFR §1.56(b). Moreover, the disclosure of these documents is not to be construed as an admission that any of the documents are prior art as to the above-identified application.

Applicants believe that no fee is required for submission of this statement. However, if a fee is required, the Commissioner is authorized to deduct such a fee from the undersigned's Deposit Account No. 08-2623. Please deduct any additional fees from, or credit any overpayment to, the above-noted Deposit Account.

Respectfully submitted,

/Paul M. Schramm/

Paul M. Schramm
Reg. No. 62,050

HOLLAND AND HART LLP
P.O. Box 11583
Salt Lake City, UT 84147
Tel: 303-473-2700
Fax: 303-473-2720

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| U.S. APPLICATION NO. | FIRST NAMED INVENTOR | ATTY. DOCKET NO. |
|---|---|---|
| 15/780,999 | Lars Christensen | P006DK.WO.US (87942.0009) |

26582
HOLLAND & HART, LLP
222 South Main Street, Suite 2200
P.O. Box 11583
SALT LAKE CITY, UT 84147

| INTERNATIONAL APPLICATION NO. | |
|---|---|
| PCT/EP2016/082876 | |
| I.A. FILING DATE | PRIORITY DATE |
| 12/29/2016 | 12/29/2015 |

**CONFIRMATION NO. 7187**
**371 FORMALITIES LETTER**

*OC000000117061682*

Date Mailed: 05/20/2020

## Notification of Insufficiency Under 37 CFR 1.492 and/or 1.495 (DO/EO/US)

The following items have been submitted by the applicant or the International Bureau to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Priority Document
- Copy of the International Application filed on 06/01/2018
- Copy of the International Search Report filed on 06/01/2018
- Preliminary Amendments filed on 06/01/2018
- Information Disclosure Statements filed on 06/01/2018
- Inventor's Oath or Declaration filed on 06/20/2018
- U.S. Basic National Fees filed on 06/01/2018
- Assignee Statement for PGPUB filed on 06/01/2018
- Priority Documents filed on 06/01/2018
- Power of Attorney filed on 06/20/2018
- Authorization to Permit Access filed on 06/01/2018
- Application Data Sheet (37 CFR 1.76) filed on 06/01/2018

The following items **MUST** be furnished within the period set forth below:

- Additional claim fees of $**3340** as a undiscounted entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

Total additional fees required for this application is $**3340** for an Undiscounted Entity:

- Total additional claim fee(s) for this application is $**3340**
  - $**1840** for **4** independent claims over 3.
  - $**1500** for **15** total claims over 20.

**ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.**

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

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JOHN L ANDERSON

Telephone: (571) 272-0385

# MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

| Application Number | Filing Date |
|---|---|
| 15780999 | |

Applicant(s) Lars Christensen

* May be used for additional claims or amendments

| CLAIMS | AS FILED | | AFTER FIRST AMENDMENT | | AFTER SECOND AMENDMENT | |
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| | Indep | Depend | Indep | Depend | Indep | Depend |
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| Total Indep | 7 | | 7 | | 0 | |
| Total Depend | 27 | ↵ | 28 | ↵ | 0 | ↵ |
| Total Claims | 34 | | 35 | | 0 | |

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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 15/780,999 | 06/01/2018 | | 1720 | P006DK.WO.US (87942.0009) | 35 | 7 |

**CONFIRMATION NO. 7187**

**FILING RECEIPT**

26582
HOLLAND & HART, LLP
222 South Main Street, Suite 2200
P.O. Box 11583
SALT LAKE CITY, UT 84147

OC000000117081681

Date Mailed: 05/20/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Lars Christensen, Slagelse, DENMARK;
Peter Johansen, Odense C, DENMARK;
Torben Fogtmann, Nyborg, DENMARK;

**Applicant(s)**

Danapak Flexibles A/S, Slagelse, DENMARK;

**Power of Attorney:** The patent practitioners associated with Customer Number 26582

**Domestic Priority data as claimed by applicant**

This application is a 371 of PCT/EP2016/082876 12/29/2016

**Foreign Applications** (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
EUROPEAN PATENT OFFICE (EPO) 15202962.5 12/29/2015

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** No

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**If Required, Foreign Filing License Granted:** 05/18/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/780,999**

**Projected Publication Date:** 08/27/2020

**Non-Publication Request:** No

**Early Publication Request:** No
**Title**

METHOD FOR PROVIDING AN EXTREME CHEMICAL RESISTANT FILM, A FILM AND LAMINATE OBTAINABLE THEREFROM

**Preliminary Class**

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

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**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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## PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/780,999

### APPLICATION AS FILED - PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY FEE($) |
|---|---|---|---|---|---|---|---|
| BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | 300 |
| SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | 520 |
| EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | 760 |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 35 minus 20 = | * 15 | | | OR | x 100 = | 1500 |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 7 minus 3 = | * 4 | | | | x 460 = | 1840 |
| APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | 0.00 |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | 0.00 |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | 4920 |

### APPLICATION AS AMENDED - PART II

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT A | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT B | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## U. S. PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | 001 | 20090208685-A1 | 08-20-2009 | Rivers et al. | |
| | 002 | 20110158564-A1 | 06-30-2011 | Krumme | |
| | 003 | 20150225151-A1 | 08-13-2015 | Osborn et al. | |
| | 004 | 20170158400-A1 | 06-08-2017 | Priscal et al. | |
| | 005 | 5613958-A | 03-25-1997 | Kochinke et al. | |
| | 006 | 6670423-B2 | 12-30-2003 | Hausmann | |
| | 007 | 6891018-B2 | 05-10-2005 | Murakami et al. | |
| | 008 | 6921563-B2 | 07-26-2005 | Goerlitz et al. | |
| | 009 | 8703283-B2 | 04-22-2014 | Goerlitz et al. | |
| | 010 | 8722164-B2 | 05-13-2014 | Bekele et al. | |
| | 011 | 9452593-B2 | 09-27-2016 | Tatarka et al. | |
| | 012 | 9487918-B2 | 08-25-2016 | Geerdinck et al. | |
| | 013 | 9663281-B2 | 05-30-2017 | Hall et al. | |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]–Number[4]–Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 014 | BR-102015012729-A2 | 01-17-2017 | Bemis Co. Inc. | | ☒ |
| | 015 | DE-102012113026-A1 | 06-26-2014 | SCHOTT AG | | ☒ |
| | 016 | DE-102013113718 A1 | 06-11-2015 | Buergofol GmbH | | ☒ |
| | 017 | DE-202008017320-U1 | 05-28-2009 | Alcan Technology & Management AG | | ☐ |
| | 018 | EP-1364777-B1 | 08-03-2005 | Ticona GmbH | | ☐ |
| | 019 | EP-1475228-B1 | 07-26-2017 | Mitsubishi Polyester Film GmbH | | ☒ |
| | 020 | EP-1525092-B1 | 05-23-2007 | Cryovac, Inc. | | ☐ |
| | 021 | EP-1769908-A1 | 04-04-2007 | Safta S.p.A | | ☐ |
| | 022 | EP-1775122-B1 | 09-03-2014 | Curwood, Inc. | | ☐ |
| | 023 | EP-2349867-B1 | 10-11-2017 | Cryovac, Inc. | | ☐ |
| | 024 | EP-2907769-B1 | 09-27-2017 | BPI.FORMIPAC | | ☐ |
| | 025 | EP-2939667-A1 | 11-04-2015 | NIPRO Patch Co., Ltd. | | ☐ |
| | 026 | EP-2986450-B1 | 01-30-2019 | Goglio S.p.A. | | ☐ |
| | 027 | EP-3000750-A1 | 03-30-2016 | Fujimori Kogyo Co., Ltd. | | ☐ |
| | 028 | EP-3112384-B1 | 07-18-2018 | SABIC Global Technologies B.V. | | ☐ |
| | 029 | EP-3144127-B1 | 01-31-2018 | SCHOTT Schweiz AG | | ☒ |
| | 030 | EP-3210907-B1 | 07-17-2019 | Kyodo Printing Co., Ltd. | | ☐ |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]–Number[4]–Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 031 | EP-3360530-A1 | 08-15-2018 | Mitsubishi Gas Chemical Company, Inc. | | ☐ |
| | 032 | WO-1995007816-A1 | 03-23-1995 | The Dow Chemical Company | | ☐ |
| | 033 | WO-2001064786-A1 | 09-07-2001 | Ticona GmbH | | ☒ |
| | 034 | WO-2005097486-A1 | 10-20-2005 | Curwood, Inc. | | ☐ |
| | 035 | WO-2010047906-A1 | 04-29-2010 | ExxonMobil Oil Company | | ☐ |
| | 036 | WO-2010075946-A1 | 07-08-2010 | Huhtamaki Forcchheim | | ☒ |
| | 037 | WO-20121192271A1 | 09-13-2012 | Surface Medical Inc. | | ☐ |
| | 038 | WO-2013028398-A1 | 02-28-2013 | Avery Dennison Corporation | | ☐ |
| | 039 | WO-2013034273-A1 | 03-14-2013 | Siegfried Ltd. | | ☐ |
| | 040 | WO-2013116445-A1 | 08-08-2013 | E.I. Dupont de Nemours and Company | | ☐ |
| | 041 | WO-2014023995-A1 | 02-13-2014 | Probiotical S.p.A. | | ☐ |
| | 042 | WO-2015097208-A1 | 07-02-2015 | Solvay Specialty Polymers Italy S.p.A. | | ☐ |
| | 043 | WO-2015118215-A1 | 08-13-2015 | Tampereen Patenttitoimisto Oy | | ☐ |
| | 044 | WO-2015123211-A1 | 08-20-2015 | Bemis Company, Inc. | | ☐ |
| | 045 | WO-2015187173-A1 | 12-10-2015 | Perfecseal, Inc. | | ☐ |
| | 046 | WO-2015187174-A1 | 12-10-2015 | Perfecseal, Inc. | | ☐ |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 4 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3]–Number[4]–Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | 047 | WO-2015199637-A1 | 12-30-2015 | Perfecseal, Inc. | | ☐ |
| | 048 | WO-2016076844-A1 | 05-19-2016 | Bemis Company, Inc. | | ☐ |
| | 049 | WO-2016164794-A1 | 10-13-2016 | PolyOne Corporation | | ☐ |
| | 050 | WO-2016190081-A1 | 12-01-2016 | Dexerials Corporation | | ☒ |
| | 051 | WO-2016194555-A1 | 12-08-2016 | Polyplastics Co., Ltd. | | ☒ |
| | 052 | WO-2016200363-A1 | 12-15-2016 | Bemis Company, Inc. | | ☐ |
| | 053 | WO-2017034560-A1 | 03-02-2017 | Bemis Company, Inc. | | ☐ |
| | 054 | WO-2017063087-A1 | 04-20-2017 | Macro Technology Inc. | | ☐ |
| | 055 | WO-2017087032-A1 | 05-26-2017 | SiO2 Medical Products, Inc. | | ☐ |
| | 056 | WO-2017100182-A1 | 06-15-2017 | Bemis Company, Inc. | | ☐ |
| | 057 | WO-2017100358-A1 | 06-15-2017 | Bemis Company, Inc. | | ☐ |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 5 of 7

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## NON-PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No.[1] | Include name of the author(in CAPITAL LETTERS),title of the article(when appropriate), title of the item (book,magazine,journal,serial,symposium,catalog,etc.),date,page(s),volume-issue number(s),publisher, city and/or country where published. | T[2] |
|---|---|---|---|
| | | | ☐ |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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| Sheet | 6 | of | 7 |
|---|---|---|---|

| Complete if Known | |
|---|---|
| Application Number | 15/780,999 |
| Filing Date | 06-01-2018 |
| First Named Inventor | Christensen et al. |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | P006DK.WO.US (87942.0009) |

## CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

## SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Paul M. Schramm/ | Date (YYYY-MM-DD) | 2019-11-15 |
|---|---|---|---|
| Name/Print | Paul M. Schramm | Registration Number | 62,050 |

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## ABSTRACT BR102015012729

abstract method of manufacturing a highly moisture resistant paperboard structure, paperboard substrate and its uses. The present invention relates to a method of manufacturing a highly moisture-resistant paperboard structure (100) by the steps of (a) applying a bonding layer (20) to the paperboard (10), (b) applying a cyclolefin (coc) copolymer coating solution (30) dissolved in solvents and optionally (c) performing oxidation (40) of the substrate surface for further printing and / or varnishing. The present invention further relates to a paperboard structure (100) made by this method of manufacture, a paperboard structure (100) containing: (i) a paperboard substrate (10), (ii) a first layer of bond (20) and (iii) a coating solvent of (coc) (30). furthermore, the patent application provides a cardboard substrate (100) containing: (i) a first olefin styrene copolymer bonding layer (20) dissolved in methyl ethyl ketone, (ii) a second layer of a cyclolefin copolymer coating (coc) (30), in particular, ethylene norbornene copolymer dissolved in solvents, preferably cyclohexane and / or toluene and optionally (iii) a layer of printing ink (50) overlaid with varnish (60) on which said paperboard structure (100) provides advantageous barriers to moisture permeabilility. The invention further relates to the use of the paperboard structure 100 in the manufacture of packaging intended for the packaging of hygroscopic products.

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**(54) Título:** MÉTODO DE FABRICAÇÃO DE UMA ESTRUTURA DE PAPEL CARTÃO ALTAMENTE RESISTENTE A UMIDADE, SUBSTRATO DE PAPEL CARTÃO E SEUS USOS

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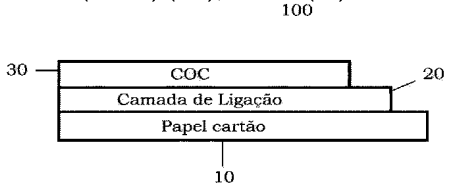
**(57) Resumo:** RESUMO MÉTODO DE FABRICAÇÃO DE UMA ESTRUTURA DE PAPEL CARTÃO ALTAMENTE RESISTENTE A UMIDADE, SUBSTRATO DE PAPEL CARTÃO E SEUS USOS. A presente invenção refere-se a um método de fabricação de uma estrutura de papel cartão (100) altamente resistente a umidade através das etapas de (a) aplicação de uma camada de ligação (20) ao papel cartão (10), (b) aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) (30) dissolvida em solventes e, opcionalmente, (c) realização de oxidação (40) da superfície do substrato para posterior impressão e/ou envernizamento. A presente invenção ainda se relaciona a uma estrutura de papel cartão (100) feita por este método de fabricação, estrutura de papel cartão (100) contendo: (i) um substrato de papel cartão (10), (ii) uma primeira camada de ligação (20) e (iii) um solvente de revestimento de (COC) (30). Adicionalmente, o pedido de patente provê um substrato de papel cartão (100) contendo: (i) uma primeira camada de ligação (20) de copolímero de estireno olefínico dissolvida em metiletilcetona, (ii) uma segunda camada de um revestimento de copolímero de ciclolefina (COC) (30), em es(...)



**MÉTODO DE FABRICAÇÃO DE UMA ESTRUTURA DE PAPEL CARTÃO ALTAMENTE RESISTENTE A UMIDADE, SUBSTRATO DE PAPEL CARTÃO E SEUS USOS.**

[001] **CAMPO DA INVENÇÃO**

[002] A presente invenção refere-se a um método de fabricação de uma estrutura de papel cartão (100) altamente resistente a umidade compreendendo as etapas de (a) aplicação de uma camada de ligação (20) ao substrato de papel cartão (10), (b) aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) dissolvida em solventes (30). Em algumas realizações exemplificativas, o método de fabricação ainda compreende a etapa de (c) realização de oxidação da superfície do substrato (40) para posterior impressão e/ou envernizamento.

[003] A presente invenção ainda se relaciona a uma estrutura de papel cartão (100), estrutura de papel cartão (100) contendo: (i) um substrato de papel cartão (10), (ii) uma primeira camada de ligação (20) e (iii) um solvente de revestimento de (COC) (30). De acordo com algumas realizações exemplificativas, a estrutura de papel cartão (100) compreende (i) uma primeira camada de ligação de copolímero de estireno olefínico dissolvida em metiletilcetona (20), (ii) uma segunda camada de um revestimento solvente de copolímero de ciclolefina (COC), em especial, copolímero de etileno norborneno dissolvida em solventes, preferencialmente, em cicloexano e/ou tolueno (30) e, opcionalmente, (iii) uma camada de tinta de impressão (50) sobreposta por verniz (60), na qual dita estrutura de papel cartão (100) proporciona vantajosas barreiras a permeabilidade de umidade.

[004] A invenção ainda trata do uso da estrutura de papel cartão (100) na fabricação de embalagens destinadas ao

acondicionamento de produtos cuja barreira à umidade é importante, em particular, produtos higroscópicos.

[005] **ANTECEDENTES DA INVENÇÃO**

[006] Produtos higroscópicos exigem recipientes com altas barreiras de vapor de água. A qualidade da maioria destes produtos, durante longos períodos de armazenamento, é vulnerável ao alto teor de umidade. Se este tipo de produto adsorver altos níveis de vapor de água, não será possível garantir a sua qualidade, pelo fato do nível de aglomeração do produto aumentar drasticamente. Por exemplo, empresas que processam materiais em pó devem selecionar um material de embalagem adequado, a fim de lidar com as consequências adversas decorrentes da umidade.

[007] Particularmente, para pós higroscópicos existem muitos materiais que podem ser utilizados para a fabricação de recipientes, tais como, embalagens flexíveis e caixas dobráveis. Existem basicamente quatro tipos diferentes de estruturas utilizadas para caixas dobráveis: papel cartão, papel laminado, papel coextrusado e papel revestido.

[008] O papel cartão geralmente não proporciona elevada barreira de vapor de água e apenas pode ser utilizado como material para a confecção de embalagem com baixa barreira de umidade, por exemplo, macarrão, no entanto, seu processo de fabricação é muito simples, pois é apenas impresso, sem a necessidade de inserção de camadas adicionais.

[009] O papel cartão laminado é a combinação entre o papel cartão e um adesivo e/ou um filme. Diferentes filmes podem ser usados, tal como o polietileno (PE), polietileno tereftalato (PET),

polipropileno orientado (OPP). Um material de alta barreira é obtido, a barreira pode variar de acordo com o filme utilizado. No entanto, o tempo de espera para obter este produto é maior, por causa do processo de laminação ser realizado separadamente do processo de impressão e também pela necessidade de um período de cura do adesivo.

[010] O papel coextrusado é usado como material de embalagem com moderada barreira à umidade. Normalmente, a coextrusão é disposta na parte interna do substrato, por um processo fora de linha. O polímero é extrusado numa cortina fundida que é aplicada ao papel cartão deslocando-se continuamente.

[011] O papel cartão revestido da presente invenção é obtido após a aplicação de diferentes camadas de uma solução de revestimento através de processos de rotogravura ou flexografia, na qual ocorre concomitantemente com o processo de impressão. A barreira deste material depende da espessura do revestimento aplicado, sendo possível obter barreiras semelhantes aos filmes laminados ou coextrusados. No entanto, a relação entre as quantidades de polímero aplicado sobre o cartão é inferior à dos demais materiais.

[012] Há atualmente uma tendência na indústria de produtos de consumo para o feitio de embalagens confeccionadas de materiais que podem ser recicláveis e que reduzam o impacto ambiental durante o seu ciclo de vida. A caixa dobrável revestida é um exemplo de embalagem que possui estas propriedades desejáveis. Neste caso, a barreira é proporcionada por uma combinação entre diferentes soluções de polímeros e um verniz.

[013] O pedido de patente norte-americano US 20040033379 trata de um filme protetor que compreende um filme

revestido com pelo menos uma solução aquosa e uma solução orgânica, opcionalmente, com o acréscimo de um revestimento de cloreto de polivinila (PVC), e meios para aprimorar pelo menos uma propriedade de barreira a umidade e ao oxigênio, tais meios representados por um grupo composto de copolímeros à base de PVOH, terpolímeros à base de PVOH revestido por uma camada de ligação, copolímeros à base de álcool de etileno vinil e materiais que contém grupos funcionais hidrofílicos.

[014] O pedido de patente norte-americano US 20070264453 revela um método para a fabricação de um material de embalagem selável a quente, em que as camadas de revestimento poliméricas sobrepostas são extrudadas em uma base de fibra. As camadas estando na seguinte ordem: uma camada externa polimérica selável a quente; uma camada polimérica de barreira ao vapor d'água; uma camada de ligação; e uma camada polimérica interna de barreira ao oxigênio. É ainda característica do dito método de fabricação a incorporação de copolímero de ciclolefina (COC), de forma direta, ou seja, sem solubilização. As camadas de barreira são produzidas por a extrusão resultando numa camada amorfa sem a ocorrência de pós-cristalização no polímero. Ainda, o pedido de patente reivindica o dito material de embalagem selável a quente compreendendo uma base de fibra e uma combinação de camadas de revestimento poliméricas sobrepostas e coextrudadas.

[015] O pedido de patente norte-americano US 20140004336 pleiteia um método para a fabricação de um filme laminado e dito filme laminado que compreende uma camada de núcleo com pelo menos 50% em peso de poliolefina; uma primeira camada externa contendo uma mistura de uma poliolefina polar modificada e

uma ou duas camadas de copolímero etileno-propileno ou polipropileno mini randomizado; uma camada de papel ou cartão; e uma camada adesiva para aderir a primeira camada externa à camada de papel ou cartão. Tal método refere-se a um processo de colagem clássica de "*hot melt*" das estruturas multicamadas.

[016] A patente norte-americana US 8.329.309 exibe um material de cobertura para uma embalagem compreendendo uma primeira camada de papel e uma segunda camada de um copolímero de ciclolefina; e uma camada selante (contendo polietileno, polipropileno, copolímero acrilato etileno ou modificado, copolímero acetato etileno ou modificado, ionômero e/ou suas combinações) adjacente à segunda camada, onde o material de cobertura é caracterizado pelo fato do teste de resistência ao estouro (Mullen) ser menor do que cerca de 30 psi e o teste de resistência ao rasgo ser menor do que 50 g/pol, e uma taxa de transmissão de umidade de menos do que cerca de 0,3 g/100 $pol^2$ por dia.

[017] A patente norte-americana US 7.344.759 apresenta um método para a fabricação de um material de embalagem selável por calor, em que as camadas de revestimento poliméricas sobrepostas são extrudadas em cima de um substrato de fibra, as ditas camadas compreendendo uma camada externa polimérica selável por calor e pelo menos uma camada de barreira polimérica interna de penetração do vapor d'água a qual é menor do que a camada de selagem térmica, onde o copolímero de ciclolefina (COC) é incorporado na camada de barreira polimérica interna, de modo que a extrusão produza uma camada amorfa sem a ocorrência de pós-cristalização no polímero e onde a camada de barreira polimérica interna é aderida diretamente à base de

fibra sem o uso de um agente de ligação entre a camada de barreira polimérica interna contendo COC e a base de fibra.

[018] A publicação internacional WO 2012/028530 descreve um revestimento de barreira, onde uma camada polimérica apresentando uma espessura de pelo menos 1µm é aplicada ao substrato suporte selecionado entre filmes poliméricos, papel e papel cartão e a camada polimérica é composta de um copolímero que pode ser produzido por uma polimerização via metátese por abertura de anel de (a) ao menos um monômero de olefina selecionados do grupo consistindo entre monômeros de olefinas monocíclicos metálicos tendo uma ou duas duplas ligações carbono-carbono e monômeros de olefina bi cíclicos com uma dupla ligação carbono-carbono endocíclica e (b) ao menos um monômeros de olefina policíclicos tendo pelo menos duas duplas ligações C-C, como, por exemplo, copolímero de cicloocteno e diciclopentadieno.

[019] O pedido de patente norte-americano US 20110168771 trata de um método para a fabricação de um recipiente de papel cartão hermeticamente selado e o dito recipiente de papel cartão hermeticamente selado com os desempenhos de selagem e de proteção melhorados. O recipiente é formado a partir de um papel em branco compreendendo um papel cartão (201) tendo uma superfície revestida com uma primeira camada selante (202), contendo LDPE, HDPE, EVA, EMA, polímeros de ionômeros e suas combinações, e a segunda superfície do papel cartão revestida com uma camada de barreira (203), por exemplo, materiais derivados de revestimentos de barreira à base de água, polímeros de nylon, copolímeros de etileno vinil álcool (EVOH), polietileno tereftalato (PET), cloridrato de polivinilideno,

copolímeros de ciclolefinas e suas combinações e uma segunda camada selante (204) aplicada sobre a camada de barreira (203).

[020] Diante de todo o exposto, a Depositante desenvolveu um método para proporcionar uma estrutura de papel cartão apresentando elevada barreira à umidade. O referido substrato de papel cartão sendo composto basicamente pelo revestimento de uma primeira camada de ligação e uma segunda camada em solução de copolímero de ciclolefina (COC).

[021] **DESCRIÇÃO DAS FIGURAS**

[022] A figura 1 mostra uma vista em corte transversal esquemática de uma realização da presente invenção.

[023] A figura 2 mostra uma vista em corte transversal de uma realização da presente invenção com adição do processo de impressão por rotogravura.

[024] **DESCRIÇÃO DA INVENÇÃO**

[025] A presente invenção refere-se a um método de fabricação de uma estrutura de papel cartão (100) altamente resistente a umidade compreendendo as etapas de (a) aplicação de uma camada de ligação (20) ao papel cartão (10), (b) aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) (30) dissolvida em solventes. De acordo com algumas realizações exemplificativas, o método de fabricação compreende ainda a etapa de (c) realização de oxidação (40) da superfície do substrato para posterior impressão e/ou envernizamento.

[026] A presente invenção ainda se relaciona a uma estrutura de papel cartão (100), estrutura de papel cartão (100) compreendendo: (i) um substrato de papel cartão (10), (ii) uma primeira

camada de ligação (20), e (iii) um solvente de revestimento de copolímero de ciclolefina (COC) (30). De acordo com algumas realizações exemplificativas, a estrutura de papel cartão (100) compreende (i) uma primeira camada de ligação de copolímero de estireno olefínico dissolvida em metiletilcetona (20) (ii) uma segunda camada de um revestimento solvente de copolímero de ciclolefina (COC) (30), em especial, copolímero de etileno norborneno dissolvido em solventes, preferencialmente, em cicloexano e/ou tolueno e, opcionalmente, (iii) uma camada de tinta de impressão (50) sobreposta por verniz (60), na qual dita estrutura de papel cartão (100) proporciona vantajosas barreiras a permeabilidade de umidade.

[027] A invenção, ainda, trata do uso da estrutura de papel cartão (100) na fabricação de embalagens destinadas ao acondicionamento de produtos nos quais a barreira à umidade é importante, em particular, produtos higroscópicos.

[028] Em uma primeira realização, a invenção destina-se ao método de fabricação de uma estrutura de papel cartão (100) altamente resistente a umidade, onde as camadas de ligação (20) e de solução de revestimento de copolímero de ciclolefina (COC) (30) dissolvida em solventes são revestidas sobre o papel cartão (10), de forma sequencial e/ou simultânea.

[029] Adicionalmente, posteriormente a realização da etapa (a) de aplicação da camada de ligação (20) ao papel cartão (10), a referida camada de ligação (20) é seca.

[030] Na etapa (b) de aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) (30) ao substrato, o dito

copolímero de ciclolefina (COC) (30) é dissolvido em solventes, preferencialmente, ciclohexano e/ou tolueno.

[031] Particularmente, as etapas de (a) aplicação da camada de ligação (20) contendo copolímero de estireno olefínico dissolvida em metiletilcetona e (b) aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) (30) ao dito substrato podem ser realizadas através dos processos de rotogravura e/ou flexografia.

[032] Preferencialmente, na etapa (c) do presente método, a realização de oxidação (40) da superfície do substrato ocorre pelo tratamento por descarga elétrica, tais como, tratamento Corona ou feixe de elétrons ou pelo tratamento por chama, entre outros.

[033] Em uma segunda realização, o pedido de patente trata de uma estrutura de papel cartão (100) contendo: (i) uma primeira camada de ligação (20) de copolímero de estireno olefínico dissolvida em metiletilcetona, (ii) uma segunda camada de um revestimento solvente de copolímero de ciclolefina (COC) (30), em especial, copolímero de etileno norborneno dissolvida em solventes, preferencialmente, em cicloexano e/ou tolueno e, opcionalmente, (iii) uma camada de tinta de impressão (50) sobreposta por verniz (60).

[034] A primeira camada de ligação (i) (20) contém de cerca de 20 a 30% de uma solução de copolímero de estireno olefínico, preferencialmente, apresentando grupos carboxilas funcionais e cerca de 70 a 80% de metiletilcetona.

[035] A segunda camada (ii) (30) contém cerca de 5 a 20% de pelo menos um revestimento solvente de copolímero de ciclolefina (COC), em particular, copolímero de etileno norborneno

dissolvido em cerca de 80 a 95% de solventes, preferencialmente, em cicloexano e/ou tolueno.

[036] Na camada de tintas de impressão (50) utilizadas no atual pedido de patente as tintas podem ser à base de nitrocelulose, poliuretano, vinilas, acrílicos, poliéster e/ou suas combinações.

[037] As camadas de verniz (60) os referidos vernizes podem ser apresentados como soluções poliméricas tendo ceras especiais, tais como: nitrocelulose, poliuretano, vinilas, acrílicos e acrilatos modificados, base de poliéster, parafinas, ceras de polietileno, ceras de carnaúba e/ou suas combinações.

[038] De forma geral, a estrutura de papel cartão (100) utilizado na presente invenção apresenta gramatura de cerca de 295 a 370 gramas/$m^2$. Já a camada de ligação (20) aplicada ao dito papel cartão (10) contém 1,0 a 2,0 gramas/$m^2$. Enquanto que a camada de solução de revestimento de copolímero de ciclolefina (COC) (30) exibe uma gramatura de 2,0 a 5,0 gramas/$m^2$. Opcionalmente, a gramatura da camada de tintas de impressão (50) pode ser de 0,5 a 1,0 gramas/$m^2$ e a camada de verniz (60) contém cerca de 0,5 a 2,0 gramas/$m^2$ de gramatura.

[039] Particularmente, a estrutura de papel cartão (100) da invenção compreendendo as camadas (i), (ii) e, opcionalmente, (iii) proporciona uma elevada barreira a permeabilidade de umidade com uma faixa de transmissão de vapor d'água (WVTR) menor do que 20 g/$m^2$.dia, preferencialmente, menor do que 15 g/$m^2$.dia.

[040] A estrutura de papel cartão (100) da presente invenção apresenta uma adesão substancialmente melhorada em relação à aplicação de copolímero de ciclolefina (COC) (30) diretamente

no papel cartão (10). Em exemplos de realização, verificou-se que até 100% de adesão é possível, o que não ocorre quando a aplicação direta de copolímero de ciclolefina (COC) no papel cartão.

[041] Em uma terceira realização, a presente invenção provê o uso de uma estrutura de papel cartão (100), conforme acima descrito, na fabricação de embalagens destinadas ao acondicionamento de produtos higroscópicos, por exemplo, pós alimentícios, farinhas, massas, pós não-alimentícios, detergentes em pós, entre outros.

**REIVINDICAÇÕES**

1. MÉTODO DE FABRICAÇÃO DE UMA ESTRUTURA DE PAPEL CARTÃO ALTAMENTE RESISTENTE A UMIDADE, caracterizado pelo fato de compreender as etapas de (a) aplicação de uma camada de ligação (20) ao substrato de papel cartão (10), (b) aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) (30) dissolvida em solventes.

2. MÉTODO, conforme reivindicação 1, caracterizado pelo fato de compreender opcionalmente, (c) realização de oxidação (40) da superfície do substrato para posterior impressão e/ou envernizamento.

3. MÉTODO, de acordo com a reivindicação 1, caracterizado pelo fato das camadas de ligação (20) e de solução de revestimento de copolímero de ciclolefina (COC) (30) dissolvida em solventes serem revestidas sobre o substrato de papel cartão (10), de forma sequencial e/ou simultânea.

4. MÉTODO, de acordo com a reivindicação 3, caracterizado pelo fato de que posteriormente à etapa (a) de aplicação da camada de ligação (20) ao papel cartão (10), a dita camada de ligação (20) ser seca.

5. MÉTODO, de acordo com as reivindicações 1 a 4, caracterizado pelo fato de que na etapa (b) de aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) (30) ao substrato, o dito copolímero de ciclolefina (COC) (30) ser dissolvido em solventes, preferencialmente, ciclohexano e/ou tolueno.

6. MÉTODO, de acordo com as reivindicações 1 a 5, caracterizado pelo fato de as etapas de (a) aplicação da camada de ligação (20) contendo copolímero de estireno olefínico dissolvido em metiletilcetona e (b) aplicação de uma solução de revestimento de

copolímero de ciclolefina (COC) (30) ao dito substrato serem realizadas através dos processos de rotogravura e/ou flexografia.

7. MÉTODO, de acordo com as reivindicações 1 a 6, caracterizado pelo fato de que na etapa (c), a realização de oxidação (40) da superfície do substrato ocorrer através do tratamento por descarga elétrica, tais como, tratamento Corona ou feixe de elétrons e/ou pelo tratamento por chama, entre outros.

8. ESTRUTURA DE PAPEL CARTÃO, caracterizado pelo fato de compreender:

(i) uma primeira camada de ligação (20) de uma solução de copolímero de estireno olefínico em metiletilcetona;

(ii) uma segunda camada de um revestimento solvente de copolímero de ciclolefina (COC) (30), em especial, copolímero de ETILENO norborneno dissolvido em solventes, preferencialmente, em cicloexano e/ou tolueno e,

9. ESTRUTURA, conforme reivindicação 8, caracterizada pelo fato de compreender opcionalmente,(iii) uma camada de tinta de impressão (50) sobreposta por verniz (60).

10. ESTRUTURA, de acordo com a reivindicação 8, caracterizado pelo fato da primeira camada de ligação (i) (20) compreender cerca de 20 a 30% de uma solução de copolímero de estireno olefínico, preferencialmente, apresentando grupos carboxilas funcionais e cerca de 70 a 80% de metiletilcetona.

11. ESTRUTURA, de acordo com a reivindicação 8, caracterizado pelo fato da segunda camada (ii) (30) compreender cerca de 5 a 20% de pelo menos um revestimento solvente de copolímero de ciclolefina (COC), em particular, copolímero de etileno norborneno dissolvido em cerca de 80 a 95% de solventes, preferencialmente, em cicloexano e/ou tolueno.

12. ESTRUTURA, de acordo com a reivindicação 8, caracterizado pelo fato da camada de tinta de impressão (50) compreenderem composições à base de nitrocelulose, poliuretano, vinilas, acrílicos, poliéster e/ou suas combinações.

13. ESTRUTURA, de acordo com a reivindicação 8, caracterizado pelo fato da camada de verniz (60) compreenderem soluções poliméricas tendo ceras especiais, tais como: nitrocelulose, poliuretano, vinilas, acríclicos e acrilatos modificados, base de poliéster, parafinas, ceras de polietileno, ceras de carnaúba e/ou suas combinações.

14. ESTRUTURA, de acordo com a reivindicação 8, caracterizado pelo fato do substrato de papel cartão (100) compreender gramatura de cerca de 295 a 370 gramas/$m^2$.

15. ESTRUTURA, de acordo com a reivindicação 10, caracterizado pelo fato da camada de ligação (20) aplicada ao dito papel cartão (10) compreender 1,0 a 2,0 gramas/$m^2$.

16. ESTRUTURA, de acordo com a reivindicação 11, caracterizado pelo fato da camada de solução de revestimento de copolímero de ciclolefina (COC) (30) compreender uma gramatura de 2,0 a 5,0 gramas/$m^2$.

17. ESTRUTURA, de acordo com a reivindicação 12, caracterizado pelo fato de a camada de tintas de impressão (50) compreender gramatura de 0,5 a 1,0 gramas/$m^2$.

18. ESTRUTURA, de acordo com a reivindicação 13, caracterizado pelo fato de a camada de verniz (60) compreender cerca de 0,5 a 2,0 gramas/$m^2$ de gramatura.

19. ESTRUTURA, de acordo com as reivindicações 8 a 18, caracterizado pelo fato de compreender uma elevada barreira a permeabilidade de umidade com uma faixa de transmissão de vapor

d'água (WVTR) menor do que 20 g/m$^2$.dia, preferencialmente, menor do que 15 g/m$^2$.dia.

20. ESTRUTURA, de acordo com a reivindicação 19, caracterizado pelo fato de a estrutura de papel cartão (100) compreender uma adesão de 100%.

21. USO DA ESTRUTURA, conforme descrito nas reivindicações 8 a 20, caracterizado pelo fato de compreender a aplicação na fabricação de embalagens destinadas ao acondicionamento de produtos cuja barreira à umidade é importante.

22. USO, de acordo com a reivindicação 21, caracterizado pelo fato dos produtos higroscópicos compreenderem, em especial, pós alimentícios, farinhas, massas, pós não-alimentícios, detergentes em pós, entre outros.

**RESUMO**

**MÉTODO DE FABRICAÇÃO DE UMA ESTRUTURA DE PAPEL CARTÃO ALTAMENTE RESISTENTE A UMIDADE, SUBSTRATO DE PAPEL CARTÃO E SEUS USOS.**

A presente invenção refere-se a um método de fabricação de uma estrutura de papel cartão (100) altamente resistente a umidade através das etapas de (a) aplicação de uma camada de ligação (20) ao papel cartão (10), (b) aplicação de uma solução de revestimento de copolímero de ciclolefina (COC) (30) dissolvida em solventes e, opcionalmente, (c) realização de oxidação (40) da superfície do substrato para posterior impressão e/ou envernizamento. A presente invenção ainda se relaciona a uma estrutura de papel cartão (100) feita por este método de fabricação, estrutura de papel cartão (100) contendo: (i) um substrato de papel cartão (10), (ii) uma primeira camada de ligação (20) e (iii) um solvente de revestimento de (COC) (30). Adicionalmente, o pedido de patente provê um substrato de papel cartão (100) contendo: (i) uma primeira camada de ligação (20) de copolímero de estireno olefínico dissolvida em metiletilcetona, (ii) uma segunda camada de um revestimento de copolímero de ciclolefina (COC) (30), em especial, copolímero de etileno norborneno dissolvida em solventes, preferencialmente, em cicloexano e/ou tolueno e, opcionalmente, (iii) uma camada de tinta de impressão (50) sobreposta por verniz (60), na qual dita estrutura de papel cartão (100) proporciona vantajosas barreiras a permeabilidade de umidade. A invenção, ainda, trata do uso da estrutura de papel cartão (100) na fabricação de embalagens destinadas ao acondicionamento de produtos higroscópicos.

**FIGURA 1**

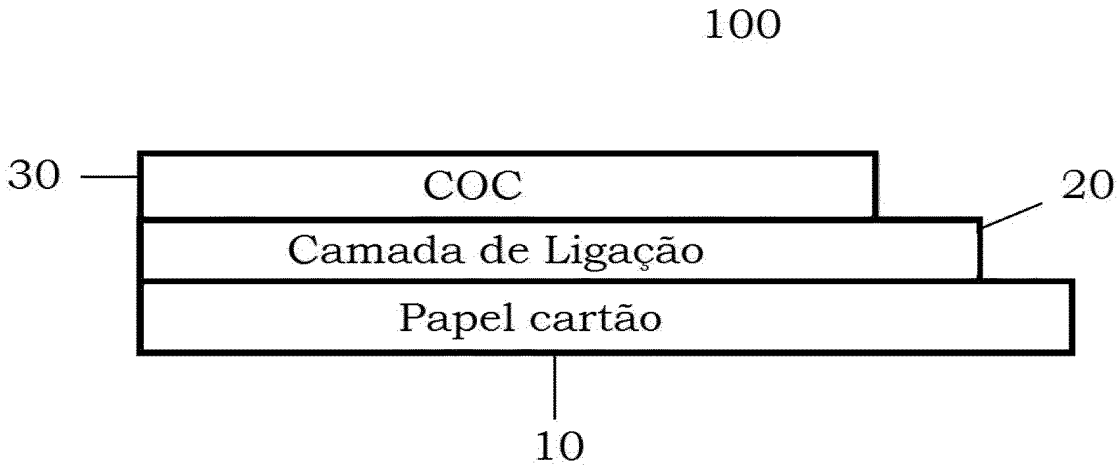
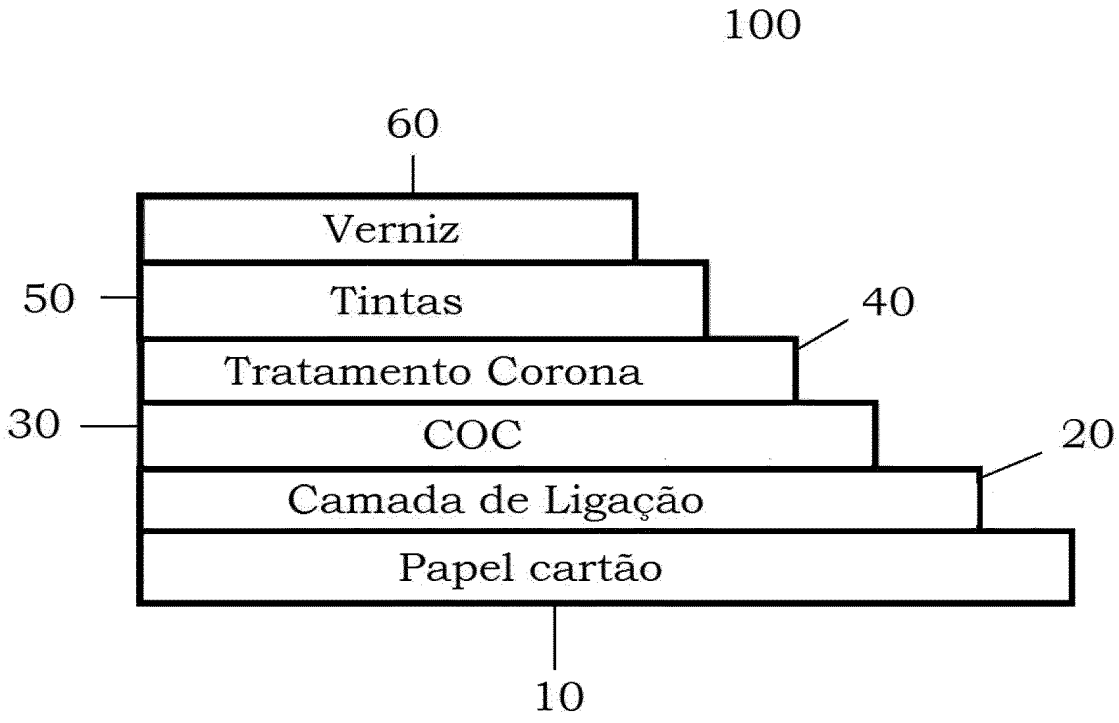


**FIGURA 2**


100
60
Verniz
50
Tintas
40
Tratamento Corona
30
COC
20
Camada de Ligação
Papel cartão
10

Espacenet

## Bibliographic data: DE102012113026 (A1) — 2014-06-26

# Laminate of a transparent substrate, which is coated with at least one organic transparent coating comprising a crosslinked polymer comprising elements of carbon, hydrogen and oxygen

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**Applicant(s):** SCHOTT AG [DE] ± (SCHOTT AG)

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**- cooperative:** **B05D1/62 (EP); C03C17/32 (EP); C08J7/042 (EP);** C03C2218/153 (EP); C08J2471/00 (EP)

**Application number:** DE201210113026 20121221

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**Also published as:** DE102012113026 (B4)

**Abstract of DE102012113026 (A1)**

Laminate of a transparent substrate, which is coated with at least one organic transparent coating, is claimed, where: the coating comprises a crosslinked polymer comprising elements of carbon, hydrogen and oxygen; the ratio of atomic concentration (alpha) between oxygen and carbon is 0.2-1 and the ratio of atomic concentration (beta) between hydrogen and oxygen is 0.5-10; and the coating has infrared-active hydroxy (HO)-oscillations at wave number of 4800-5300 cm -> 1> and 3600-3200 cm -> 1> and a refractive index of 1.2-2. Laminate of a transparent substrate, which is coated with at least one organic transparent coating, is claimed, where: the coating comprises a crosslinked polymer comprising elements of carbon, hydrogen and oxygen; the ratio of atomic concentration (alpha) between oxygen and carbon is 0.2-1 and the ratio of atomic concentration (beta) between hydrogen and oxygen is 0.5-10;

the coating has infrared-active hydroxy (HO)-oscillations at wave number of 4800-5300 cm -> 1> and 3600-3200 cm -> 1>, a refractive index of 1.2-2, a transmission of greater than 80%, an extinction coefficient of = 0.1 and a contact angle for water of = 80[deg] ; and the polymer comprises alkyleneoxy structural units of formula (-CH 2-O-CH 2-), (-CH 2-CH 2-O-) or (-O-CH 2-) and repulsive interactions with polar macromolecular compounds. An independent claim is included for a method for producing a laminate of the substrate, which is coated on the organic transparent coating using pulsed plasma-enhanced chemical vapor deposition by plasma polymerization, comprising fragmentation of a polyether as a precursor in plasma and recombination of the reactive fragments on the substrate surface of the polymer, where the repulsive interaction of the polymer is adjusted with polar macromolecules having a pulse power of greater than 100 W, the ratio of the pulse interval to gas exchange time is greater than 0.0015 to less than 100 and average power density of 0.0001-500 W/cm 3>.

(19) Deutsches Patent- und Markenamt

(10) **DE 10 2012 113 026 A1** 2014.06.26

(12) # Offenlegungsschrift

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***C03C 17/32*** (2006.01)
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***B65D 65/42*** (2006.01)

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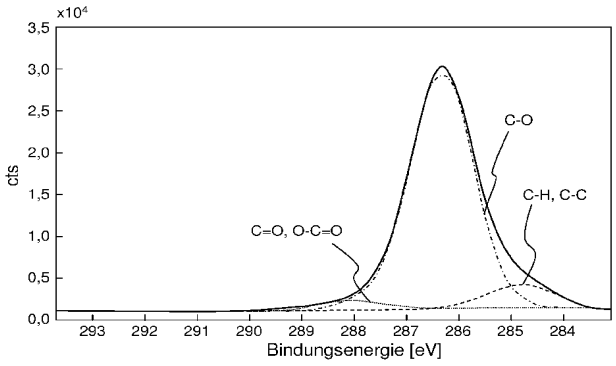
(56) Ermittelter Stand der Technik:
**EP 1 810 758 A1**

Prüfungsantrag gemäß § 44 PatG ist gestellt.

**Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen**

(54) Bezeichnung: **Biokompatible Laminate mit maßgeschneiderten optischen Eigenschaften**

(57) Zusammenfassung: Die Erfindung beschreibt ein Laminat aus einem Substrat und einem organischen dünnen Film, das optische Eigenschaften und biokompatible Funktionalitäten vereint, sowie ein Verfahren zur Herstellung dieses Laminats mittels einer gepulsten Plasmapolymerisation.
Dabei werden durch das Laminat alle für die optischen und die biokompatiblen Oberflächenfunktionalitäten benötigten Eigenschaften durch die Verwendung nur eines Precursors und eines Schichttyps erreicht.
Die organische Schicht des Laminats besteht aus den Elementen C, H und O, wobei das Verhältnis der atomaren Konzentrationen von Sauerstoff zu Kohlenstoff α mit α = c(O)/c (C) im Bereich 0,2 bis 1,0 liegt und das Verhältnis der atomaren Konzentrationen von Wasserstoff zu Sauerstoff β mit β = c(H)/(C) im Bereich 0,5 bis 10 liegt.
Ferner ist die organische Schicht transparent mit einer Transmission τ > 80% und einem Extinktionkoeffizienten ε ≤ 0.1 and zweigt einen Kontaktwinkel für Wasser ≤ 80° sowie repulsive Wechselwirkungen mit makromolekularen Verbindungen.



## Beschreibung

### Gebiet der Erfindung

**[0001]** Die Erfindung betrifft ein Verfahren zur Herstellung von biokompatiblen Laminaten durch Beschichtung von Glas- oder Polymersubstraten mittels eines PCVD-Verfahren sowie entsprechende Laminate im Allgemeinen und ein Verfahren zur Herstellung von biokompatiblen Beschichtungen auf Glas- oder Polymersubstraten mit maßgeschneiderten optischen Eigenschaften sowie entsprechend beschichtete Substrate im Besonderen.

### Hintergrund der Erfindung

**[0002]** Aus dem Stand der Technik sind Laminate bekannt, deren Beschichtungen als Barriereschicht wirken, beispielsweise bei Lebensmittelverpackungen. Unter Barriereschichten werden solche Beschichtungen verstanden, die Wechselwirkungen des Substrates mit seiner Umgebung vermindern. Anwendungen auf dem Gebiet der Implantationstechnik, der pharmazeutischen Industrie oder in Biosensoren erfordern zusätzlich biokompatible Barriereschichten. Insbesondere sind in diesem Bereich solche Beschichtungen von Interesse, die eine definierte Adsorption von Molekülen auf dem Substrat gewährleisten. So wird bei Pharmaverpackungen eine möglichst geringe Adsorption der Wirkstoffe angestrebt, während im Bereich der Biosensorik eine definierte Adsorption spezieller Biomakromoleküle erwünscht sein kann.

**[0003]** Wechselwirkungen polarer Biomakromoleküle mit polaren Oberflächen können auf Grund starker, teils elektrostatischer Wechselwirkungen zu einer irreversiblen Adsorption oder Denaturierung der Biomakromoleküle führen. Eine Denaturierung führt zu einem Verlust der ursprünglichen Sekundär- und/oder Tertiärstruktur der Biomakromoleküle. Diese Strukturänderung können dabei mit einem Verlust der Wirksamkeit des Biomakromoleküls einher gehen. Dies kann insbesondere bei glasartigen Substraten beobachtet werden.

**[0004]** Um dieses Problem zu lösen, sind aus dem Stand der Technik Beschichtungen auf Basis von Silikonölen bekannt. Nachteiligerweise sind hierbei relativ dicke Schichten nötig. Dadurch ist eine relativ hohe Ablösewahrscheinlichkeit gegeben, was zu einer unerwünschten Kontamination führen kann.

**[0005]** Bei Verwendung von fluorhaltigen Beschichtungen kann insbesondere das Problem der Kontamination vermieden werden. Jedoch können fluorhaltige Beschichtungen auf Grund starker repulsiver Wechselwirkungen für die jeweilige Verwendung ungeeignet sein. Des weiteren können sich die Eigenschaften der Schicht wie beispielsweise der Kontaktwinkel von Wasser, beim Autoklavieren, einem gängigen Verfahren bei Pharmaverpackungen, verändern. Dies kann nachteiligerweise zu Qualitätsschwankungen führen.

**[0006]** Im Bereich der optischen Beschichtungen werden anorganische Beschichtungen, beispielsweise solche Beschichtungen, die $SiO_2$ oder $TiO_2$ enthalten, zur Einstellung optischer Eigenschaften wie des Brechungsindexes oder zur Filterung spezieller Wellenlängen eingesetzt. Diese sind jedoch in der Regel nicht biokompatibel. Starke elektrostatische Wechselwirkungen der anorganischen Beschichtungen mit den polaren Biomakromolekülen können jedoch zu einer unerwünscht starken Adsorption der Biomakromoleküle und/oder deren Denaturierung führen.

**[0007]** Mit steigender Bedeutung von Biomakromolekülen als Wirkstoffe in der pharmazeutischen Industrie werden entsprechend kompatible Verpackungsmaterialien benötigt. Neben einer entsprechenden Biokompabilität sollen die entsprechenden Materialien bestimmte optische Eigenschaften erfüllen. So sollen der Inhalt vor UV-Strahlung geschützt werden, gleichzeitig soll er jedoch beispielsweise einer optischen Qualitätskontrolle zugänglich sein. Ähnliche Anforderungen werden an Materialien zur Bereitstellung von künstlichen Intraokularlinsen gestellt.

**[0008]** Die EP 1 810 758 A1 der Anmelderin offenbart ein Verfahren zur Herstellung von beschichteten Substraten für pharmazeutische Verpackungen. Die abgeschiedene Beschichtung ist derart beschaffen, dass eine Adsorption von Makromolekülen gegenüber nicht beschichteten Substraten verringert wird. Das offenbarte Verfahren ermöglicht keine Auswahl der optischen Eigenschaften des Laminats.

**[0009]** Die in der Offenlegungsschrift DE 10 2009 029 792 A1 der Anmelderin beschriebene Beschichtungen zeichnen sich zum einen durch eine niedrige Adsorption von Makromolekülen und zum anderen durch eine hohe Transmission des Lichts im VIS-Bereich aus.

**[0010]** Der Erfindung liegt daher die Aufgabe zu Grunde, Laminate mit verbesserten, funktionellen Beschichtungen bereitzustellen, die maßgeschneiderte optische Eigenschaften, insbesondere Transmission und Brechungsindex, mit einer Biokompatibilität sowie einer definierten Adsorption von Biomakromolekülen vereinen. Unter Biomakromolekülen werden insbesondere Biopolymere wie Proteine, Polynucleinsäuren sowie entsprechende Überstrukturen verstanden. Eine weitere Aufgabe liegt in der Bereitstellung eines entsprechenden Herstellungsverfahrens. Diese Aufgaben werden bereits in höchst überraschend einfacher Weise durch den Gegenstand der unabhängigen Ansprüche gelöst. Vorteilhafte Ausgestaltungen und Weiterbildungen sind in den jeweiligen Unteransprüchen angegeben.

**[0011]** Demgemäß sieht die Erfindung ein Laminat aus einem transparenten Substrat und zumindest einer darauf abgeschiedenen organischen und transparenten Schicht vor. Die Beschichtung enthält ein vernetztes Polymer mit den Elementen C, H und O, dessen Verhältnis der atomaren Konzentrationen von Sauerstoff zu Kohlenstoff α mit $\alpha = c(O)/c(C)$ mit $0{,}2 \leq \alpha \leq 1{,}0$ und dessen Verhältnis der atomaren Konzentrationen von Wasserstoff zu Kohlenstoff β mit $\beta = c(H)/c(C)$ mit $0{,}5 \leq \beta \leq 10$ beträgt. Eventuell enthaltene übrige Elemente wie Fluor, sind prozess- und/oder rohstoffbedingt und lediglich in Spuren, insbesondere im ppm-Bereich, enthalten. Die Verhältnisse α und β wurden durch XPS-Messungen (Röntgen-Photoelektronenspektroskopie) bestimmt.

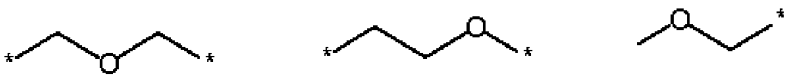
**[0012]** Die Zusammensetzung des Polymers wirkt sich dabei in höchst überraschender Weise auf die dielektrischen Eigenschaften der Beschichtung aus. So sind optische Eigenschaften wie der Brechungsindex $n_B$ abhängig von der Zusammensetzung und Struktur des Polymers. Der Brechungsindex $n_B$ der Beschichtung liegt, je nach Sauerstoffgehalt bzw. α, im Bereich von 1,2 bis 2,0. Der Sauerstoffgehalt der Beschichtung ist abhängig von der verwendeten Leistung und dem damit zusammenhängenden Fragmentierungsgrad. Der Fragmentierungsgrad bestimmt maßgeblich den Vernetzungsgrad des abgeschiedenen Polymerisats.

**[0013]** Je nach Zusammensetzung der Beschichtung kann es sich dabei um eine reflektierende Beschichtung oder um eine anti-Reflexbeschichtung handeln. Dies wirkt sich besonders vorteilhaft bei der Verwendung des Laminats in Verpackungen für lichtempfindliche Stoffe wie Biomakromoleküle aus. Zudem liegen bei den erfindungsgemäßen Beschichtugnen keine problematischen Interaktionen mit Biomakromolekülen vor. Im Gegensatz dazu können der bisher im Stand der Technik beschriebener Einbau von Übergangsmetallzentren in Substrate zu einer Kontamination des Verpackungsinhaltes und im Fall von Biomakromolekülen zu einer Denaturierung führen.

**[0014]** Die Transmission τ der Beschichtung ist > 80% und weist einen Extinktionskoeffizienten $\varepsilon \leq 0{,}1$ auf. Dies ist insbesondere vorteilhaft bei der Verwendung des beschichteten Laminats in Bereichen, bei denen eine Transparenz des Laminats, beispielsweise zur optischen Qualitätskontrolle, benötigt wird. Bevorzugt ist die Transmission des Laminats daher > 90%.

**[0015]** Die erfindungsgemäße chemische Zusammensetzung des Polymers ist zudem vorteilhaft, da dieses sehr stabil ist. So kann das Laminat harschen Bedingungen wie hohen Temperaturen und/oder Drücken, beispielsweise beim Autoklavieren, ausgesetzt werden, ohne dass sich dessen Eigenschaften signifikant ändern. Dies ist insbesondere für die Verwendung des erfindungsgemäßen Laminats als Pharmapackmittel von Bedeutung.

**[0016]** Das vernetzte Polymer der Beschichtung umfasst insbesondere folgende strukturelle Einheiten I, II und III.



I II III

**[0017]** Innerhalb der erfindungsgemäßen chemischen und strukturellen Zusammensetzung der Beschichtung kann die Polarität der Beschichtung eingestellt werden. Somit ist es insbesondere möglich, spezifische Adsorptionsraten für spezielle Biomakromoleküle einzustellen. Dies ist insbesondere im Bereich der Biosensoren vorteilhaft.

**[0018]** Insbesondere auf Grund der strukturellen Einheiten I, II und III zeigt die Beschichtung Wechselwirkungen mit Biomakromolekülen, ohne dass diese denaturiert werden. Die am Adsorptionsprozess beteiligten inter-


288/300

molekularen Wechselwirkungen beruhen dabei erfindungsgemäß nicht auf fluorophoben Wechselwirkungen. Die Beschichtung zeigt einen Kontaktwinkel δ für Wasser von $\delta \leq 80°$.

**[0019]** Die Beschichtung zeigt zudem infrarot-aktive Schwingungen bei Wellenzahlenbereichen von 4800 $cm^{-1}$ bis 5300 $cm^{-1}$ sowie im Bereich von 3600 $cm^{-1}$ bis 3200 $cm^{-1}$. Diese Schwingungsübergänge liegen energetisch im Bereich der Deformations- und Valenzschwingungen von Wasser. Es kann vermutet werden, dass die Beschichtung eingeschlossenes Wasser enthält, welches die Eigenschaften der Beschichtung vorteilhaft beeinflusst.

**[0020]** Durch die Wahl der Zusammensetzung des Polymers sowie seiner strukturellen Einheiten, zeigt das erfindungsgemäße Laminat sowohl maßgeschneiderte optische Eigenschaften als auch eine Biokompatibilität bei einer guten Stabilität der Beschichtung. Somit vereint die erfindungsgemäße Beschichtung auf höchst vorteilhafte Weise die optischen Eigenschaften einer anorganischen mit der Biokompatibilität einer organischen Beschichtung.

**[0021]** In einer vorteilhaften Ausgestaltung der Erfindung weist das in der Beschichtung enthaltene Polymer eine Zusammensetzung mit dem Verhältnis $\alpha = c(O)/c(C)$ von $0{,}3 \leq \alpha \leq 0{,}8$, bevorzugt von $0{,}4 \leq \alpha \leq 0{,}65$ und/oder mit dem Verhältnis $\beta = c(H)/c(C)$ von $1 \leq \beta \leq 5$, bevorzugt $1{,}8 \leq \beta \leq 2{,}6$ auf. Es hat sich gezeigt, dass diese Bereiche besonders vorteilhaft in Bezug auf die optischen Eigenschaften wie auch der Polarität der Beschichtung sind.

**[0022]** Bevorzugt zeigt das XPS-Spektrum der Beschichtung für Cis ein charakteristisches C-O-Signal bei 286.3 eV. Das Verhältnis

$$\gamma = A_{C\text{-}O}/A_{total}$$

mit $A_{C\text{-}O}$ als Integral des entfalteten C-O-Signals und $A_{total}$ als Gesamtintegral des C1s Spektrums im Intervall zwischen 280 eV und 291 eV, ist dabei vorzugsweise $0{,}4 \leq \gamma \leq 1{,}0$. Gemäß einer besonders vorteilhaften Ausführungsform ist das Verhältnis γ $0{,}6 \leq \gamma \leq 1{,}0$, vorzugsweise $0{,}7 \leq \gamma \leq 1{,}0$.

**[0023]** In einer Ausführung weist die Beschichtung des Laminats eine Dichte ρ im Bereich von $0{,}3\ g/cm^3 \leq \rho \leq 5\ g/cm^3$, bevorzugt im Bereich $0{,}6\ g/cm^3 \leq \rho \leq 3\ g/cm^3$ und besonders bevorzugt $0{,}8\ g/cm^3 \leq \rho \leq 2\ g/cm^3$ auf. Diese Bereiche haben sich als besonders vorteilhaft in Bezug auf den Brechungsindex und die Transmission herausgestellt. Beschichtungen mit Dichten in den oben aufgeführten Bereichen zeigen dabei in überraschend vorteilhafter Weise erfindungsgemäße Brechungsindizes in Kombination mit hohen Transmissionswerten. Dies ist umso überraschender, als dass der Brechungsindex proportional zur Dichte, die Transmission einer Schicht dagegen antiproportional zur Dichte ist.

**[0024]** Es hat sich herausgestellt, dass insbesondere Beschichtungen mit Schichtdicken von 0,5 bis 1000 nm, bevorzugt 1 bis 200 nm und besonders bevorzugt 2 bis 100 nm vorteilhaft sind. Die Beschichtung fungiert zum einen als Barriereschicht zwischen Substrat und Makromolekül und verhindert so die Adsorption von Biomakromolekülen auf dem Substrat. Die Ausprägung der Barrierewirkung ist insbesondere von der Schichtdicke abhängig. Mit zunehmender Schichtdicke sinkt jedoch die Transmission der jeweiligen Schicht. Des Weiteren steigt der yellowness Index $Y_I$ als Maß für die Stärke der Vergilbung, mit steigender Schichtdicke. In den oben aufgeführten Schichtdickenbereichen erfüllt die Beschichtung die Barrierewirkung bei gleichzeitiger erfindungsgemäßer Transmission des Laminats.

**[0025]** Eine Ausführungsform sieht ein Laminat mit einem Extinktionskoeffizienten ε mit $\varepsilon \leq 0{,}05$, bevorzugt $\varepsilon \leq 0{,}03$ vor. Es ist zudem günstig, wenn der yellowness Index $Y_I$, gemessen gemäß ASTM D 1925-70, des Laminats $0 \leq Y_I \leq 4$, bevorzugt $0 \leq Y_I \leq 2$ und besonders bevorzugt $0 \leq Y_I \leq 1$ beträgt. Laminate mit entsprechenden yellowness Indizes $Y_I$ zeigen eine geringe Vergilbung und/oder eine gute Farbstabilität.

**[0026]** In einer vorteilhaften Weiterbildung der Erfindung zeigt das Laminat auf Grund der Polarität seiner Beschichtung einen Kontaktwinkel δ für Wasser von $10° \leq \delta \leq 70°$, bevorzugt von $20° \leq \delta \leq 60°$. Die entsprechenden Beschichtungen sind vorzugsweise polar genug, um eine Adsorption der Biomakromoleküle, wie sie etwa bei Biosensoren erwünscht ist, zu gewährleisten ohne jedoch durch zu starke polare Wechselwirkungen mit den Biomakromolekülen zu deren Denaturierung zu führen.

**[0027]** Bevorzugt handelt es sich bei dem Substrat um Glas, insbesondere um Borsilikatglas. Die Verwendung eines glasartigen Substrats ist sowohl auf Grund dessen optischer Eigenschaften wie auch der einfachen Zugänglichkeit und Prozesskompatibilität und aus ökonomischen Gesichtspunkten vorteilhaft.

**[0028]** In einer vorteilhaften Weiterbildung der Erfindung handelt es sich bei dem Substrat um ein Polymer, wobei es sich sowohl um Thermoplasten als auch um Elastomere handeln kann. Insbesondere sind Polymere wie COC, COP, PET, PP, PC, HDPE, LDPE, IIR oder BIIR geeignet. Die Verwendung von Polymeren als Substrat ermöglicht die Bereitstellung elastischer Laminate, die beispielsweise im Implantationsbereich benötigt werden. Zudem können die optischen Eigenschaften des Laminats zusätzlich durch Wahl eines Polymers mit einem entsprechenden Brechungsindex beeinflusst werden. So sind je nach Substrat und Beschichtung sowohl reflektierende Laminate als auch Laminate mit einer anti-Reflex-Funktion zugänglich, deren Adsorptionsverhalten zudem an die jeweiligen Anforderungen angepasst werden können. Es können zudem solche Laminate bereitgestellt werden, die als optische Filter fungieren. So kann das Laminat beispielsweise derartig ausgestaltet werden, dass vorzugsweise Wellenlängen im UV-Bereich reflektiert werden. Dies ist besonders vorteilhaft, da beispielsweise der Inhalt eines entsprechend beschichteten Vials vor UV-Strahlung ohne Verlust der optischen Transparenz geschützt ist. Dies ist insbesondere bei einer optischen Qualitätskontrolle von Bedeutung.

**[0029]** In einer Ausführungsform der Erfindung beträgt die Differenz zwischen den Brechungsindizes des Substrates $n_s$ und der Beschichtung $n_B|n_s - n_B| < 0{,}25$, bevorzugt $|n_s - n_B| < 0{,}20$ und ganz besonders bevorzugt $|n_s - n_B| < 0{,}15$. Es hat sich herausgestellt, dass sich die oben angegebenen Differenzen der Brechungsindizes $n_S$ und $n_B$ sowohl für den Aufbau von reflektierenden Laminaten als auch von Laminaten mit anti-Reflexbeschichtungen besonders vorteilhaft auswirken.

**[0030]** In einer vorteilhaften Weiterbildung der Erfindung handelt es sich bei der Beschichtung um eine mehrlagige Beschichtung mit zumindest zwei organischen Schichten B1 und B2. Durch einen mehrlagigen Aufbau der Beschichtung können insbesondere die optischen Eigenschaften in höchst vorteilhafter Weise präzise eingestellt werden. Insbesondere können durch interferenzoptische Schichten je nach Aufbau und Abfolge sowohl reflektierende Beschichtungen als auch anti-Reflexbeschichtungen erhalten werden. Auch ein Schichtaufbau mit mehr als zwei Schichten ist möglich. Ebenfalls können durch interferenzoptische Schichten optische Filter mit definierten Wellenlängenbereichen realisiert werden. Es hat sich gezeigt, dass es günstig ist, wenn die beiden Schichten B1 und B2 unterschiedliche Brechungsindizes $n_{B1}$ und $n_{B2}$ aufweisen und die Beziehungen $|n_{B1} - n_{B2}|/n_{B1} > 0{,}005$, bevorzugt $|n_{B1} - n_{B2}|/n_{B1} > 0{,}01$ und besonders bevorzugt $|n_{B1} - n_{B2}|/n_{B1} > 0{,}02$ gelten.

**[0031]** In einer Weiterbildung der Erfindung handelt es sich bei dem Substrat um ein Pharmapackmittel, wobei das Substrat innenseitig beschichtet ist. Das Pharmapackmittel kann insbesondere eine Kanüle, ein Spritzenkörper, eine Ampulle, ein Vial, eine Karpule, elastomerbeschichtete Dichtungsflächen oder eine entsprechende Verpackung sein.

**[0032]** Ein Verfahren zur Herstellung eines Laminats umfassend ein Substrat und zumindest eine darauf abgeschiedene, transparente organische Beschichtung sieht ein gepulstes PCVD-Verfahren zur Plasmapolymerisation mit zumindest den folgenden Verfahrensparametern vor:

i) einer Pulsleistung $P_{Puls} > 100$ W,

ii) einem Verhältnis der Pulspause $t_{pp}$ Gasaustauschzeit von 0,0015 bis 100 und einer mittleren Leistungsdichte π von 0,0001 W/cm$^3$ bis 500 W/cm$^3$.

**[0033]** Die Plasmapolymerisation erfolgt mit den Schritten i) Fragmentation des Precursors, vorzugsweise eines Polyethers, im Plasma und ii) nachfolgender Rekombination der reaktiven Fragmente auf der Substratoberfläche. Durch Variation der erfindungsgemäßen Verfahrensparameter können über den Fragmentationsgrad des Precursors und die Rekombinationsgeschwindigkeit der gebildeten Fragmente in höchst überraschender Weise Zusammensetzung, Dichte und Vernetzungsgrad der Beschichtung und die dadurch bedingten dielektrischen Eigenschaften wie auch die Polarität der Oberfläche eingestellt werden.

**[0034]** Bevorzugt werden Pulsdauer und Pulspause durch eine kontrollierte Plasmazündung, beispielsweise durch Verwendung eines Separatorelements, eingestellt. Dabei gewährleistet das Separatorelement eine konstante Plasmadichte, in dem die elektromagnetischen Wellen reflektiert werden, wohingegen das Precursorgas durchgelassen werden. So kann in vorteilhafter Weise der Fragmentierungsgrad, der von den Prozessparametern Pulsdauer, Pulspause und Pulsleistung abhängig ist, durch Variation zweier der Parameter eingestellt und somit die Eigenschaften der abgeschiedenen Schicht kontrolliert werden.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**[0035]** Die bei Plasmapolymerisationen erfolgende Fragmentierung führt zur Bildung von Radikalen, welche durch Rekombination auf der Substratoberfläche ein Polymerisat bilden. Der Vernetzungsgrad dieses Polymerisats ist vom Fragmentationsgrad abhängig. Die Dichte des Polymerisats wird durch dessen Vernetzungsgrad bestimmt. Dabei gilt, dass ein stark vernetztes Polymerisat eine höhere Dichte aufweist als ein vergleichbares Polymerisat mit einem geringeren Vernetzungsgrad. Über die Verknüpfung der dielektrischen Eigenschafen wie beispielsweise dem Brechungsindex mit der Dichte können diese Eigenschaften durch den Fragmentierungsgrad eingestellt werden.

**[0036]** Durch das erfindungsgemäße Verfahren wird auf der Substratoberfläche ein Polymerisats bestehend aus den Elementen C, H und O mit einem Verhältnis $\alpha = c(O)/c(C)$ mit $0{,}2 \leq \alpha \leq 1{,}0$ und einem Verhältnis $\beta = c(H)/c(C)$ mit $0{,}5 \leq \beta \leq 10$ abgeschieden. Zusammensetzung, Vernetzungsgrad und Verteilung der strukturellen Einheiten des Polymerisats,

dessen optische Eigenschaften wie einen Brechungsindex $n_B$ im Bereich von 1,2 bis 2,0, eine Transmission $\tau$ mit $\tau > 80\%$ und einen Extinktionskoeffizienten $\varepsilon$ mit $\varepsilon \leq 0{,}1$, sowie dessen Kontaktwinkel $\delta$ für Wasser von $\delta \leq 80°$ werden dabei durch die erfindungsgemäßen Prozessparameter mittlere Pulsleistung <P>, das Verhältnis der Pulspause t Gasaustauschzeit $t_G$ und die mittlere Leistungsdichte $\pi$ eingestellt. Zur kontrollierten Plasmazündung wird vorzugsweise eine gepulste Mikrowellenquelle verwendet.

**[0037]** In einer vorteilhaften Ausgestaltung des Herstellungsverfahrens werden die Verfahrensparameter Massenfluss, Depositionstemperatur $T_{Dep}$ sowie Druck p während des Abscheideprozesses konstant gehalten. Dadurch kann eine Schicht mit besonders einheitlicher Zusammensetzung erzielt werden. Insbesondere die Gasaustasuchzeit $t_G$ wird durch die oben genannten Parameter beeinflusst. Es gilt

$$t_G = V_{Plasma}/(dV/dt)$$

mit dem Volumenstrom (dV/dt), der wiederum vom Massenfluss, der Temperatur und dem Druck abhängig ist. Konstante Werte für die entsprechenden Parameter führen demgemäß auch zu einer konstanten Gasaustauschzeit $t_G$. Die unter diesen Bedingungen abgeschiedene Schicht zeigt eine besonders homogene Zusammensetzung. Die Gasaustauschzeit ist dabei abhängig vom Volumen des Plasmazone. Beispielsweise beträgt die Gasaustauschzeit $t_G = 23$ ms für eine Plasmazone mit einem Volumen von 20 ml.

**[0038]** In einer bevorzugten Ausführungsform erfolgen die Reaktionsschritte Deposition und Vernetzung simultan in einem Schritt während des Abscheideprozess auf dem Substrat. Unter simultan werden dabei sowohl konzertierte Prozesse als auch solche Prozesse, bei denen Deposition und Vernetzung zeitnah zueinander erfolgen, verstanden. In der bevorzugten Ausführungsform erfolgen Deposition und Vernetzung in einem Schritt, d. h. zumindest im selben Reaktor, ohne dass eine Veränderung der Prozessparameter vorgenommen werden muss. Dies ist sowohl unter prozesstechnischen als auch aus ökonomischen Gesichtspunkten vorteilhaft.

**[0039]** Bevorzugt werden als Precursor lineare Polyether, besonders bevorzugt lineare Polyether mit Ethylenglycol-Monomereinheiten und insbesondere Tetraethylenglycoldimethylether (”Tetraglyme”) verwendet.

**[0040]** Gemäß einer weiteren vorteilhaften Ausgestaltung des Herstellungsverfahrens werden Zusammensetzung, Verteilung der strukturellen Einheiten, Vernetzungsgrad und Dichte $\delta$ des abgeschiedenen Polymerisats durch Variation maximal zwei der erfindungsgemäßen Parameter, bevorzugt durch Variation nur eines Parameters, eingestellt. Dies ist insbesondere aus verfahrenstechnischen Gesichtspunkten vorteilhaft, da hierdurch in kurzer Zeit Beschichtungen mit unterschiedlichen Zusammensetzungen und Eigenschaften in einem Reaktor und unter Verwendung des gleichen Precursors bereitgestellt werden können. Es ist vorteilhaft, wenn die übrigen Parameter möglichst konstant gehalten werden um so eine homogene Zusammensetzung der abgeschiedenen Beschichtung sowie eine einheitliche Schichtdicke zu gewährleisten. Ein konstanter Massefluss kann insbesondere durch Verwendung eines zusätzlichen Trägergases, bevorzugt eines Edelgases wie beispielsweise Argon, erhalten werden.

**[0041]** Bevorzugt wird die <P> größer als 500 W, besonders bevorzugt größer als 1000 W, und ganz besonders bevorzugt größer als 1200 W eingestellt. Dies wirkt sich günstig auf die Zusammensetzung der Schicht und deren Homogenität aus. In einer ganz speziellen Ausführungsform der Erfindung liegt die mittlere Leistungsdichte $\pi$ vorzugsweise in einem Bereich von 0,001 W/cm$^3$ bis 4 W/cm$^3$, besonders bevorzugt in einem

Bereich von 0,005 W/cm$^3$ bis 3 W/cm$^3$ und ganz besonders bevorzugt in einem Bereich von 0,01 W/cm$^3$ bis 2 W/cm$^3$.

**[0042]** Es hat sich herausgestellt, dass es vorteilhaft ist, wenn die Abscheiderate $k_{Dep}$ 0,001 nm/s bis 100 nm/s, bevorzugt 0,02 nm/s bis 30 nm/s und besonders bevorzugt 0,04 nm/s bis 5 nm/s beträgt. Die Abscheiderate beeinflusst den Rekombinationsprozess, insbesondere dessen Geschwindigkeit, und somit die Zusammensetzung der abgeschiedenen Schicht. Eine stabile Abscheiderate ist weiterhin vorteilhaft, um eine homogene Schichtdicke zu erhalten.

**[0043]** Eine Weiterbildung der Erfindung sieht ein Herstellungsverfahren vor, bei dem die Temperatur, bei der die Beschichtung abgeschieden wird, mindestens 10°C unter der Glastemperatur $T_g$ des Substrats liegt. Insbesondere bei Verwendung von polymeren Substraten, die niedrige Glastemperaturen $T_g$ aufweisen, ist dies vorteilhaft, da diese Substrate unter Strukturerhalt verwendet werden können. Bevorzugt wird ein positiver Temperaturgradient angelegt, wobei die Temperatur vom Gaseinlass bis zur Substratoberfläche zunimmt. Dadurch kann eine besonders stabile Abscheiderate erreicht werden.

**[0044]** Es ist vorteilhaft, das Substrat vor dem Abscheideprozess für einen Zeitraum von 10 bis 100 s einer Plasmabehandlung zu unterziehen. Hierdurch wird die Oberfläche des Substrats geglättet und damit auch die Rauhigkeit der abgeschiedenen Beschichtung verringert.

**[0045]** In einer weiteren bevorzugten Ausführungsform wird das Substrat dabei über eine derartige Plasmabehandlung aufgeheizt. Besonders günstig ist dabei die Verwendung einer mittleren Leistung im Bereich von 1 W bis 5000 W. Dabei erweist sich die Verwendung eines gepulsten Plasmas als vorteilhaft, insbesondere mit einer Pulsleistung von wenigstens 500 W.

**[0046]** Nachfolgend sind mögliche vorteilhafte Eigenschaften von erfindungsgemäß herstellbaren Laminaten nochmals aufgelistet:

i) modifizierte Adsorption von Makromolekülen
ii) Veränderung der Reibung, vorzugsweise Erniedrigung der Reibung
iii) geringe Gaspermeabilität
iv) Wirkung als Barriereschicht gegen Auslaugung oder Extraktion des Substrates
v) Wirkung als thermische Barriere
vi) anti-fouling Wirkung
vii) anti-mikrobakterielle Wirkung
viii) haftverbessernde Eigenschaften
ix) Veränderung der Oberflächenrauhigkeit, insbesondere Reduktion der Oberflächenrauhigkeit
x) erhöhte chemische Inertheit
xi) Schutz gegen Verkratzen
xii) optische Funktionen wie reflektierende Wirkung, antireflektierende Wirkung, Semitransparenz, Transparenz, dekorative Effekte

## Kurzbeschreibung der Figuren

**[0047]** **Fig.** 1 zeigt einen Ausschnitt des XPS-Spektrums des ersten Ausführungsbeispiels.

**[0048]** **Fig.** 2 zeigt den yellowness Index $Y_I$ in Abhängigkeit zur Schichtdicke anhand des ersten Ausführungsbeispiels

**[0049]** **Fig.** 3 zeigt den yellowness Index $Y_I$ in Abhängigkeit zur Dauer der Plasmavorbehandlung des Substrates Die Figuren werden anhand des Ausführungsbeispiels näher erläutert.

## Beschreibung des Ausführungsbeispiels

**[0050]** In einem ersten Ausführungsbeispiel werden zwei Probengläser aus Borosilikatglas (Fiolax) mit einem Volumen von jeweils 10 mL als Substrat in einem Doppelkammer-Plasmareaktor auf einen Druck < 0,1 mbar evakuiert. Anschließend wird das Substrat mit Argon geflutet, wobei der Massenfluss 50 sscm bei einem Druck 0,2 mbar. Dabei wird der Gesamtmassenfluss gleichmäßig auf beide Reaktionskammern aufgeteilt. Die Energie einer gepulsten Mikrowellenquelle mit einer Frequenz von 2,45 GHz und einer mittleren Leistung von 500 W wird in die beiden getrennten Kammern eingespeist. In den beiden Kammern erfolgt die Zündung eines gepulsten Mikrowellenplasmas und die beiden Substrate werden bei einer Temperatur von 120°C einer Plas-

mavorbehandlung unterzogen. Innerhalb der Gaswechselzeit wird eine Mischung aus gasförmigen Tetraglyme und Argon mit einem Druck von 0,2 mbar in die beiden Reaktionskammern geleitet, wobei das Tetraglyme als Precursor und Argon als Trägergas fungiert. Nach Beenden des Gaswechsels wird wiederum die Energie einer gepulsten Mikrowellenquelle mit einer Frequenz von 2,45 GHz in die beiden Reaktionskammern gespeist und ein gepulstes Mikrowellenplasma erzeugt.

**[0051]** Der Kontaktwinkel der unter diesen Bedingungen abgeschiedenen Schicht beträgt 50° ± 2°. Die Beschichtung ist hydrophil. Für den Vergleich der Adsorption von Biomolekülen an der abgeschiedenen Schicht mit der Adsorption auf einem unbeschichteten Substrat wurde das Biomakromolekül Fibrinogen verwendet und jeweils dessen Adsorption an der Oberfläche des Laminats bzw. des unbeschichteten Substrates bestimmt. Es konnte hierbei gezeigt werden, dass die Absorption im Falle des beschichteten Substrates um mehr als den Faktor 2 gesenkt wurde.

**[0052]** Die Zusammensetzung der abgeschiedenen Schicht wurde mittels XPS-Analyse bestimmt. **Fig.** 1 zeigt das charakteristische Signal für Ether bei 286,3 eV. Der C-O Anteil an C1s liegt bei 87,7%, das Verhältnis von Sauerstoff zu Kohlenstoff C/O beträgt 0,58. Insgesamt enthält die Schicht 63,1 ± 0,6 at-% Kohlenstoff und 36, 6 ± 0,4 at-% Sauerstoff.

**[0053]** Das Ausführungsbeispiel zeigt nachfolgend durch Variation der Prozessparameter mittlere Leistung und Abscheidedauer deren Auswirkung auf die Eigenschaften der erfindungsgemäß abgeschiedenen Schicht. Die übrigen Parameter wurden konstant gehalten.

**[0054]** In einem ersten Experiment wurde die mittlere Leistung in einem Bereich von 5 W bis 100 W variiert. Anschließend wurde der Brechungsindex der unter diesen Bedingungen beschichteten Substrate bestimmt. Tabelle 1 zeigt den Brechungsindex $n_B$ der Proben 1 bis 3 sowie des unbeschichteten Substrates $n_s$ bei einer Wellenlänge von 550 nm.

| Probe | Mittlere Leistung [W] | n @550 nm | ε @550 nm | |
|---|---|---|---|---|
| 1 | 5 | 1,49 | | $n_B < n_S$ |
| 2 | 10 | 1,5 | | $n_B < n_S$ |
| 3 | 100 | 1,6 | 0,024 | $n_B > n_S$ |
| Substrat | - | 1,55 | | |

**[0055]** Es wird deutlich, dass der Brechungsindex mit steigender mittleren Leistung während der Plasmapolymerisation und damit mit steigendem Fragmentationsgrad erhöht wird. Während die Proben 1 und 2 einen niedrigeren Brechungsindex als das unbeschichtete Substrat aufweisen, ist der Brechungsindex der Probe 3 größer als der des Substrates. Dieser Effekt wurde auch durch Reflexionsmessungen bestätigt. Zudem zeigt Probe 3 eine leichte Absorption bei 550 nm. Dieser Effekt kann ebenfalls auf den höheren Fragmentierungsgrad durch eine höhere mittlere Leistung während der Plasmapolymerisation bei Probe 3 zurückgeführt werden. Der hohe Fragmentierungsgrad bedingt einen hohen Vernetzungsgrad, was sich in der Schichtdichte und somit in der Absorption und im Brechungsindex widerspiegelt. Das Ausführungsbeispiel zeigt, dass mit dem erfindungsgemäßen Verfahren Beschichtungen mit maßgeschneiderten optischen Eigenschaften auf überraschend einfache Weise zugänglich sind.

**[0056]** In einem zweiten Experiment wurde die Schichtdicke des abgeschiedenen Polymerisats variiert. **Fig.** 2 zeigt die Korrelation von Schichtdicke und yellowness Index $Y_I$. Hierbei wurden auf zwei Substraten unter gleichen Bedingungen Tetraglyme-Schichten abgeschiedenen, wobei die Schichtdicke der ersten Probe 50 nm und die Schichtdicke der zweiten Probe 200 nm beträgt. Zusätzlich ist in **Fig.** 2 als Referenz der yellowness Index $Y_I$ des unbeschichteten Substrates angegeben. Der yellowness Index $Y_I$ wurde dabei gemäß ASTM D 1925-70 bestimmt. In **Fig.** 2 ist deutlich die Abhängigkeit des yellowness Indexes $Y_I$ von der Schichtdicke zu erkennen. Während der yellowness Index $Y_I$ bei einem Laminat mit einer Schichtdicke von 50 nm bei 0,8 liegt und damit im wesentlichen mit dem $Y_I$ der Referenzprobe von 0,7 vergleichbar ist, führt eine Erhöhung der Schichtdicke auf 200 nm zu einem $Y_I$ um 3,0.

**[0057]** In einem dritten Experiment wurde die Dauer der Plasmavorbehandlung variiert. **Fig.** 3 zeigt den yellowness Index $Y_I$ eines unbeschichteten Substrates aus Borosilikatglas in Abhängigkeit zur Vorbehandlungs-


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zeit sowie als Referenz ein unbehandeltes Substrat. Hier steigt der yellowness Index $Y_I$ merklich mit der Dauer der Plasmavorbehandlung.

**[0058]** In einem zweiten Ausführungsbeispiel erfolgt eine erfindungsgemäße Beschichtung eines polymeren Substrates zur Herstellung von Pharmaverpackungen. Hierzu werden zwei Kunstoffbehälter aus COC (cyclic olefinic copolymer), hier Topas 6013, mit einem Füllvolumen von 10 mL wie im ersten Ausführungsbeispiel beschrieben beschichtet. Im Unterschied zum ersten Ausführungsbeispiel wird jedoch bei einer Temperatur unterhalb der Glastemperatur $T_g$ von Topas von 130°C abgeschieden, um eine Deformation des Substrates zu vermeiden. Die abgeschiedene Schicht zeigt dabei mit dem ersten Ausführungsbeispiel vergleichbare Eigenschaften wie eine entsprechend auf einem Glassubstrat abgeschiedene Beschichtung, insbesondere vergleichbare optische Eigenschaften wie Brechungsindex, Transparenz oder yellowness Index $Y_I$. In einer weiteren Ausgestaltung des zweiten Ausführungsbeispiels wird ein Spritzenkörper aus Topas 6013 mit einem Volumen von 1 mL innenseitig beschichtet. Die Beschichtung mittels PICVD erfolgt analog zur oben beschriebenen Beschichtung des Kunststoffbehälters, wobei hier die Plasmapolymerisation in einem Reaktor mit nur einer Kammer durchgeführt wird. Die Eigenschaften der abgeschiedenen Schicht entsprechen denen der Beschichtung des Kunststoffbehälters.

**[0059]** Es ist dem Fachmann ersichtlich, dass die vorstehend beschriebenen Ausführungsformen beispielhaft zu verstehen sind, und die Erfindung nicht auf diese beschränkt ist, sondern in vielfältiger Weise variiert werden kann, ohne die Erfindung zu verlassen. Ferner ist ersichtlich, dass die Merkmale unabhängig davon, ob sie in der Beschreibung, den Ansprüchen, den Figuren oder anderweitig offenbart sind auch einzelnen wesentliche Bestandteile der Erfindung definieren, selbst wenn sie zusammen mit anderen Merkmalen gemeinsam beschrieben sind.

**ZITATE ENTHALTEN IN DER BESCHREIBUNG**

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**Zitierte Patentliteratur**

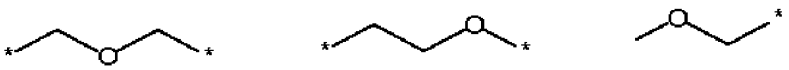

- EP 1810758 A1 [0008]
- DE 102009029792 A1 [0009]


**Zitierte Nicht-Patentliteratur**


- ASTM D 1925-70 [0025]
- ASTM D 1925-70 [0056]

**Patentansprüche**

1. Laminat aus einem transparenten Substrat und zumindest einer darauf abgeschiedenen organischen, transparenten Beschichtung gekennzeichnet dadurch, dass die Beschichtung
ein vernetztes Polymer bestehend aus den Elementen C, H und 0 und einem Verhältnis der atomaren Konzentrationen von Sauerstoff zu Kohlenstoff α mit $\alpha = c(O)/c(C)$ mit $0{,}2 \leq \alpha \leq 1{,}0$ und einem Verhältnis der atomaren Konzentrationen von Wasserstoff zu Sauerstoff β mit $\beta = c(H)/c(C)$ mit $0{,}5 \leq \beta \leq 10$ enthält,
infrarot-aktive H-O-Schwingungen bei Wellenzahlenbereichen von 4800 $cm^{-1}$ bis 5300 $cm^{-1}$ und von 3600 $cm^{-1}$ bis 3200 $cm^{-1}$,
einen Brechungsindex $n_B$ im Bereich von 1,2 bis 2,0,
eine Transmission $\tau > 80\%$,
einen Extinktionskoeffizienten $\varepsilon \leq 0{,}1$,
einen Kontaktwinkel δ für Wasser von $\delta \leq 80°$ aufweist, und das Polymer folgende strukturelle Einheiten umfasst,



sowie repulsive Wechselwirkungen mit polaren makromolekularen Verbindungen zeigt.

2. Laminat gemäß einem der vorherigen Ansprüche, wobei das in der Beschichtung enthaltene Polymer ein Verhältnis $\alpha = c(O)/c(C)$ von $0{,}3 \leq \alpha \leq 0{,}8$, bevorzugt von $0{,}4 \leq \alpha \leq 0{,}65$ aufweist.

3. Laminat gemäß einem der vorherigen Ansprüche, wobei das in der Beschichtung enthaltene Polymer ein Verhältnis $\beta = c(H)/c(C)$ von $1 \leq \beta \leq 5$, bevorzugt von $1{,}8 \leq \beta \leq 2{,}6$ aufweist.

4. Laminat gemäß einem der vorherigen Ansprüche, wobei die Beschichtung eine Dichte ρ im Bereich von $0{,}3\ g/cm^3 \leq \rho \leq 5\ g/cm^3$, bevorzugt im Bereich $0{,}6\ g/cm^3 \leq \rho \leq 3\ g/cm^3$ und besonders bevorzugt $0{,}8\ g/cm^3 \leq \rho \leq 2\ g/cm^3$ aufweist.

5. Laminat gemäß einem der vorherigen Ansprüche, wobei die Schichtdicke der Beschichtung 0,5 bis 1000 nm, bevorzugt 1 bis 200 nm und besonders bevorzugt 2 bis 100 nm beträgt.

6. Laminat gemäß einem der vorherigen Ansprüche, wobei das Laminat einen Extinktionskoeffizienten $\varepsilon \leq 0{,}05$, bevorzugt $\varepsilon \leq 0{,}03$ und/oder eine Transmission größer als 90% aufweist.

7. Laminat gemäß einem der vorherigen Ansprüche, wobei für den yellowness Index $Y_I$ $0 \leq Y_I \leq 4$, bevorzugt $0 \leq Y_I \leq 2$ und besonders bevorzugt $0 \leq Y_I \leq 1$ gilt.

8. Laminat gemäß einem der vorherigen Ansprüche, wobei das Laminat einem Kontaktwinkel δ für Wasser von $10° \leq \delta \leq 70°$, bevorzugt von $20° \leq \delta \leq 60°$ zeigt.

9. Laminat gemäß einem der vorherigen Ansprüche, wobei es sich bei dem Substrat um Glas, insbesondere um Borsilikatglas handelt.

10. Laminat gemäß einem der vorherigen Ansprüche, wobei es sich bei dem Substrat um ein Polymer wie COC, COP, PET, PP, PC, HDPE, LDPE, IIR oder BIIR handelt.

11. Laminat gemäß einem der vorherigen Ansprüche, wobei für die Differenz zwischen den Brechungsindizes des Substrates $n_S$ und der Beschichtung $n_B$ $|n_s - n_B| < 0{,}25$, bevorzugt $|n_s - n_B| < 0{,}20$ und ganz besonders bevorzugt $|n_s - n_B| < 0{,}15$ gilt.

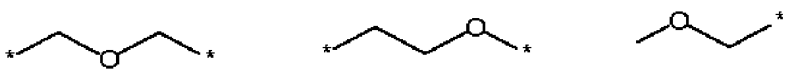
12. Laminat gemäß einem der vorherigen Ansprüche, wobei es sich bei dem Substrat um ein Pharmapackmittel handelt und das Substrat innenseitig mit der Beschichtung versehen ist.

13. Laminat gemäß einem der vorherigen Ansprüche, wobei die Beschichtung eine mehrlagige Beschichtung mit zumindest einer organischen Schicht B1 und einer weiteren organischen Schicht B2 ist.

14. Laminat gemäß einem der vorherigen Ansprüche, wobei es sich um eine mehrlagige Beschichtung mit zumindest einer organischen Schicht B1 und einer weiteren organischen Schicht B2 handelt, wobei diese

Schichten unterschiedliche Brechungsindizes $n_{B1}$ und $n_{B2}$ aufweisen und die Beziehungen $|n_{B1} - n_{B2}|/n_{B1} > 0$, 005, bevorzugt $|n_{B1} - n_{B2}|/n_{B1} > 0{,}01$ und besonders bevorzugt $|n_{B1} - n_{B2}|/n_{B1} > 0{,}02$ gelten.

15. Verfahren zur Herstellung eines Laminats aus einem Substrat und zumindest einer darauf abgeschiedenen organischen, transparenten Beschichtung mittels gepulstem PCVD, gekennzeichnet dadurch,
dass mittels einer Plasmapolymerisation mit den Schritten Fragmentation eines Polyethers als Precursor im Plasma und Rekombination der reaktiven Fragmente auf der Substratoberfläche ein Polymerisat bestehend aus den Elementen C, H und O mit einem Verhältnis $\alpha = c(O)/c(C)$ mit $0{,}2 \leq \alpha \leq 1{,}0$ und einem Verhältnis $\beta = c(H)/c(C)$ mit $0{,}5 \leq \beta \leq 10$ abgeschieden wird,
wobei Zusammensetzung, Vernetzungsgrad und Verteilung der strukturellen Einheiten des Polymers



sowie Brechungsindizes $n_B$ im Bereich von 1,2 bis 2,0, Transmissionswerte $\tau$ mit $\tau > 80\%$, Extinktionskoeffizienten $\varepsilon$ mit $\varepsilon \leq 0{,}1$, infrarot-aktive H-O-Schwingungen in Wellenzahlenbereichen von 4800 $cm^{-1}$ bis 5300 $cm^{-1}$, von 3600 $cm^{-1}$ bis 3200 $cm^{-1}$ und Kontaktwinkel $\delta$ für Wasser von $\delta \leq 80°$ sowie repulsive Wechselwirkungen des Polymerisats mit polaren Makromolekülen eingestellt werden, indem Werte
für die Pulsleistung $P_{Puls} > 100$ W,
für das Verhältnis der Pulspause $t_{pp}$ Gasaustauschzeit $t_G$
$0{,}0015 < t_{pp}/t_G < 100$
und für die mittlere Leistungsdichte $\pi$
$0{,}0001$ W/cm$^3 \leq \pi \leq 500$ W/cm$^3$
gewählt werden.

16. Verfahren gemäß dem vorherigen Anspruch, wobei zur Plasmaerzeugung eine gepulste Mikrowellenquelle verwendet wird.

17. Verfahren gemäß einem der vorherigen Ansprüche, wobei die Verfahrensparameter Massenfluss, Depositionstemperatur $T_{Dep}$ sowie Druck p während des Abscheideprozesses konstant sind.

18. Verfahren gemäß einem der vorherigen Ansprüche, wobei Deposition und Vernetzung simultan in einem Schritt während der Abscheidung erfolgen.

19. Verfahren gemäß einem der vorherigen Ansprüche, wobei als Precursor lineare Polyether, bevorzugt lineare Polyether mit Ethylenglycol-Monomereinheiten, besonders bevorzugt Tetraethylenglycoldimethylether verwendet werden.

20. Verfahren gemäß einem der vorherigen Ansprüche, wobei Zusammensetzung, Verteilung der strukturellen Einheiten, Vernetzungsgrad und Dichte $\delta$ des abgeschiedenen Polymerisats durch Variation maximal zweier Parameter, bevorzugt durch Variation eines Parameters eingestellt werden.

21. Verfahren gemäß einem der vorherigen Ansprüche, wobei die Pulsleistung größer als 500 W, bevorzugt größer als 1000 W, besonders bevorzugt größer als 1200 W ist.

22. Verfahren gemäß einem der vorherigen Ansprüche, wobei die Abscheiderate $k_{Dep}$ 0,001 nm/s bis 100 nm/s, bevorzugt 0,02 nm/s bis 30 nm/s und besonders bevorzugt 0,04 nm/s bis 5 nm/s beträgt.

23. Verfahren gemäß einem der vorherigen Ansprüche, wobei die Beschichtung bei einer Temperatur abgeschieden wird, die mindestens 10°C unter der Glastemperatur $T_g$ des Substrats liegt und/oder ein positiver Temperaturgradient angelegt wird, bei dem die Temperatur vom Gaseinlass bis zur Substratoberfläche zunimmt.

24. Verfahren gemäß einem der vorherigen Ansprüche, wobei das Substrat vor dem Abscheideprozess für einen Zeitraum von 10 bis 100 s einer Plasmabehandlung unterzogen wird.

25. Verfahren gemäß einem der vorherigen Ansprüche, wobei das Verhältnis $t_{pp}/t_G$ der Pulspause $t_{pp}$ Gasaustauschzeit $t_G$ 0,04 bis 4 beträgt.

Es folgen 2 Seiten Zeichnungen

**Anhängende Zeichnungen**

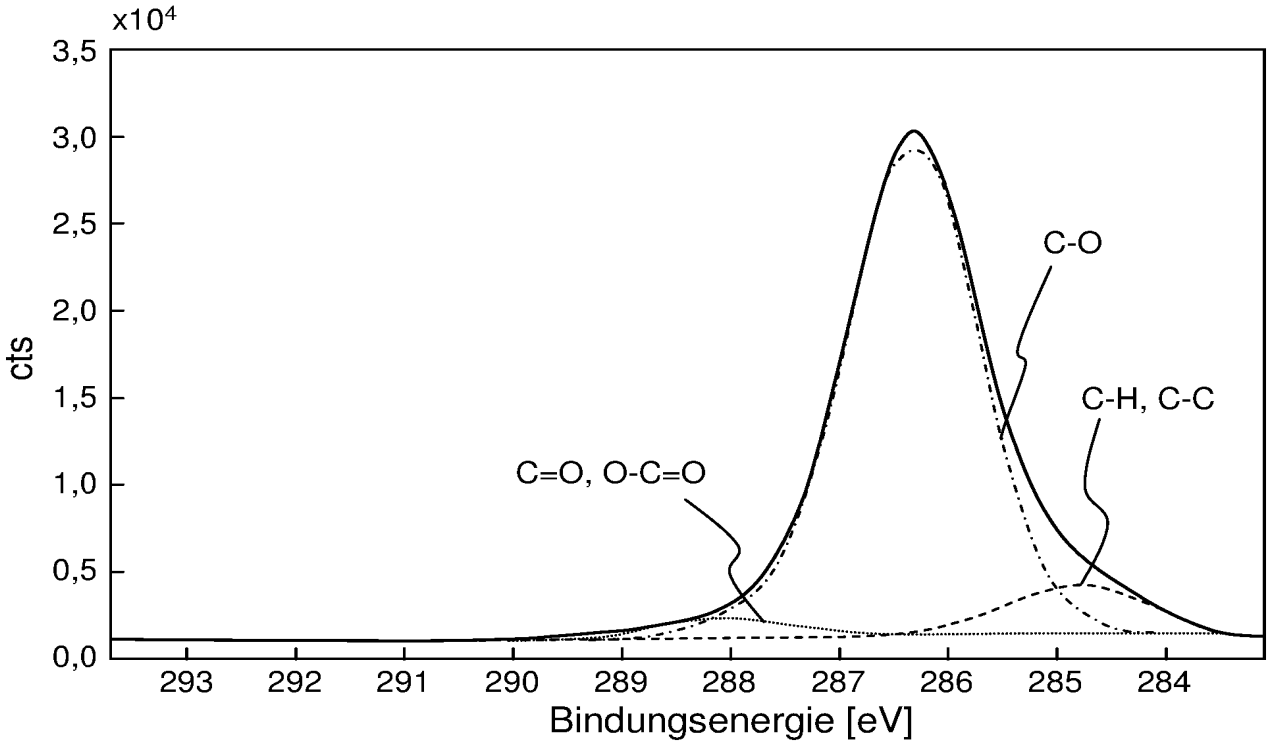



Fig. 1

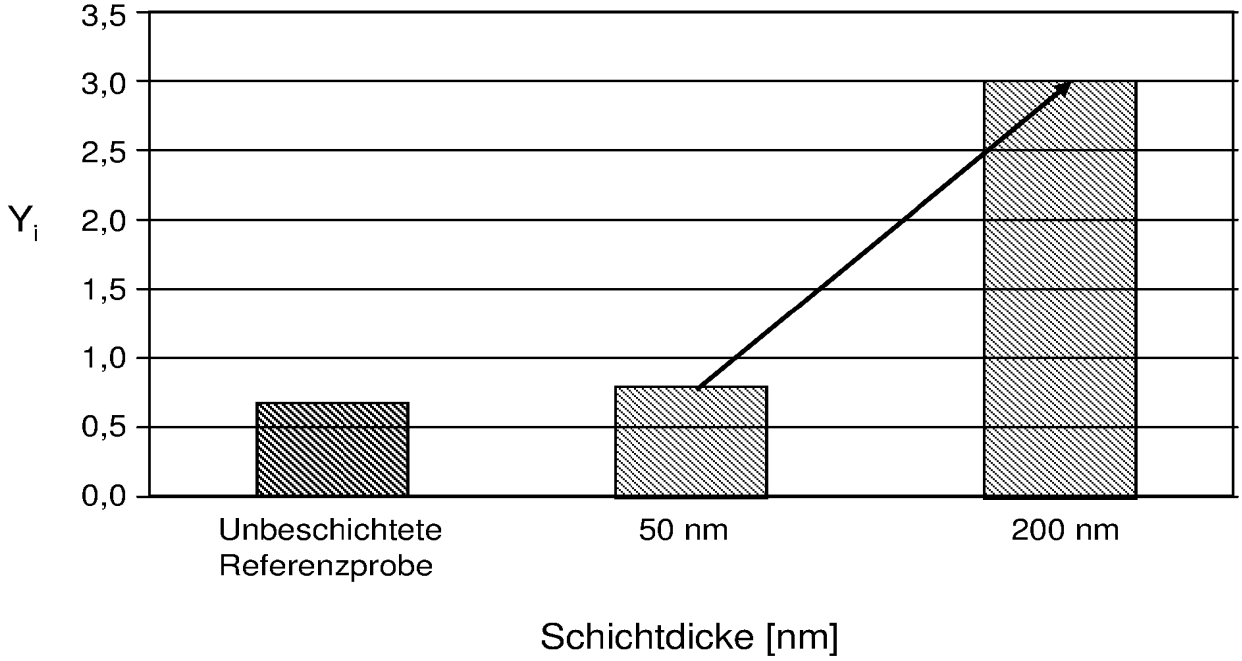



Fig. 2

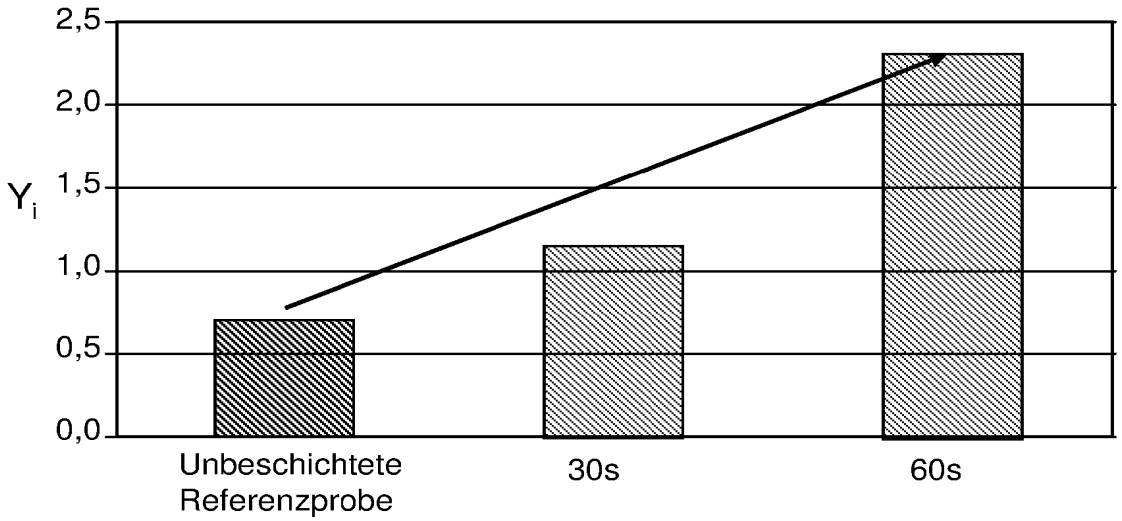

2,5
2,0
1,5
1,0
0,5
0,0
$Y_i$
Unbeschichtete Referenzprobe
30s
60s
Vorbehandlungszeit im Argon-Plasma

Fig. 3

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## ABSTRACT DE102013113718

The invention relates to a film, preferably a multilayer, which is characterized in that silver-colored pigments are incorporated in one or more layers of the film and / or a metallization is applied to at least one outer layer of the film, and on the other hand in at least one or more layers the film is introduced at least one UV absorber, so that, in coordination with the layer thicknesses and the total thickness of the film, the entire film for UV and visible light in a wavelength range of 200 to 800 nm to less than 0.1% permeable and is perceived as being opaque, opaque, and opaque to a viewer, and reflecting more than 20% UV and visible radiation in a wavelength range of 200 to 800 nm. Furthermore, uses are proposed for such a film, for example for the use of such a film in an insertion tube for the pipe rehabilitation area.