

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROAMPAC HOLDINGS INC.,
Petitioner,

v.

PRATT RETAIL SPECIALTIES, LLC,
Patent Owner.

Case IPR2025-01143
Patent No. 11,072,148

PETITION FOR INTER PARTES REVIEW

TABLE OF CONTENTS

I.	Mandatory Notices.....	1
A.	Real Parties in Interest (37 C.F.R. §42.8(b)(1)).....	1
B.	Related Matters (37 C.F.R. §42.8(b)(2)).....	1
C.	Lead and Backup Counsel (37 C.F.R. §42.8(b)(3))	2
D.	Service Information (37 C.F.R. §42.8(b)(4))	2
E.	Payment of Fees	3
II.	Grounds for Standing.....	3
III.	Summary of the Argument	3
IV.	The '148 Patent.....	4
A.	The Effective Filing Date is No Earlier than January 8, 2018.....	4
B.	The Disclosure.....	5
C.	The Claims	9
V.	Level of Ordinary Skill in the Art	10
VI.	Claim Construction.....	10
VII.	The Prior Art and Grounds for Relief.....	11
A.	Prior Art Summaries.....	11
1.	Gundlach	11
2.	Yializis	12
3.	The Voluntary Standard Reference.....	14
4.	Rebouillat	16
B.	Relief Requested and Statutory Grounds of Invalidity	17
VIII.	Ground 1: Claims 1-2, 4, 6-11, and 13-15 Are Anticipated by Gundlach ...	17
A.	Claim 1	17
1.	1[pre]: “A recyclable packaging comprising:”	17
2.	1[a] “a stack including”	18
3.	1[b]: “a paper layer with first and second surfaces;”	19
4.	1[c]: “a polymer layer with third and fourth surfaces, wherein the third surface is affixed to the second surface;”	19

5.	1[d]: “an intermediate coating layer applied to the fourth surface;”	21
6.	1[e]: “an aluminum layer carried by the intermediate coating layer, wherein the aluminum layer has a first thickness of 200 nanometers or less;”	22
7.	1[f]: “wherein said stack has emissivity that is equal to or smaller than a first value of 0.10 as perceived through an outer surface of the aluminum layer; and”	23
8.	1[g]: “wherein, when said packaging is subjected to treatment that includes a) blending the packaging in a blender; b) disintegrating into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm; c) separating in a 0.01 inch aperture screen with a 1 inch water head for 20 minutes; and d) drying in an oven for 4 hours at 221 degrees F. to form a recyclable material, said aluminum layer becomes fully oxidized with no visible aluminum present in said recyclable material,”	27
9.	1[h]: “and further comprising a protective coating layer disposed over the aluminum layer, wherein the protective coating layer has a second thickness of 1 micron or less, and wherein the second thickness is configured i) to maintain the emissivity at the first value after the aluminum layer has been coated with the protective coating and ii) to prevent oxidation of the aluminum layer during normal use of the packaging, while not impeding oxidation of the aluminum layer as a result of the treatment.”	30
B.	Claim 2	34
C.	Claim 4	35
D.	Claim 6	35
E.	Claim 7	35
1.	7[pre]: “A method for manufacturing a recyclable packaging, the method comprising:” and	36
2.	7[a]: “forming a packaging layer stack by:”	36

3.	7[b]: “attaching a polymer layer to a paper layer, wherein an inner surface of the polymer layer is affixed to a first surface of the paper layer;”	36
4.	7[c]: “depositing an aluminum layer on the polymer layer, wherein the aluminum layer has a first thickness of 200 nanometers or less,”	36
5.	7[d]: “and wherein the aluminum layer causes said packaging layer stack to have emissivity that is equal to or smaller than a first value of 0.10; and”	37
6.	7[e]: “wherein said aluminum layer is configured to acquire optical density (OD) of less than 0.09 when the packaging layer stack is exposed to a treatment that includes: a) blending the packaging stack in a blender; b) disintegrating into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm, c) separating an output from step b) in a 0.01 aperture inch screen with a 1 inch water head for 20 minutes, and d) drying in an oven for 4 hours at 221 degrees F.”	37
F.	Claim 8	38
G.	Claim 9	39
1.	9[pre]	39
2.	9[a]	39
3.	9[b]	39
4.	9[c]	39
5.	9[d]	39
6.	9[e]	39
7.	9[f].....	40
H.	Claim 10	40
I.	Claim 11	40
J.	Claim 13	40
K.	Claim 14	40
1.	14[pre].....	41
2.	14[a]: “placing a reflective insulation material in a pre-defined proximity with the good, the pre-defined proximity being	

	suitably chosen to provide adequate thermal insulation to the good, wherein said reflective insulation material comprises the recyclable packaging that includes:”	41
3.	14[b]	42
4.	14[c]	42
5.	14[d]	43
6.	14[e]	43
7.	14[f]	43
L.	Claim 15	43
1.	15[pre]	43
2.	15[a]	44
3.	15[b]	44
4.	15[c]	44
5.	15[d]	44
6.	15[e]	44
7.	15[f]	44
IX.	Ground 2: Claims 1-15 are Obvious Over Gundlach and Yializis.....	44
A.	Claim 1	50
1.	1[pre]-1[e]	50
2.	1[f]	50
3.	1[g]	51
4.	1[h]	53
B.	Claims 2, 4, and 11	54
C.	Claim 3	54
D.	Claims 5 and 12	55
E.	Claims 6 and 13	56
F.	Claims 7, 9, 14, and 15	56
1.	Elements 7[pre]-7[c], 9[pre]-9[d], 14[pre]-14[d], and 15[pre]-15[e]	56
2.	Elements 7[d], 9[e], 14[e], and 15[e]	57
3.	Elements 7[e], 9[f], 14[f], and 15[f]	57

G.	Claims 8, 10.....	57
X.	Ground 3: Claims 1-2 and 4-15 are Obvious Over Gundlach and Rebouillat	57
A.	Claim 1	61
1.	1[pre]-1[e] and 1[g].....	61
2.	1[f].....	62
3.	1[h]	63
B.	Claims 2, 4, and 11	64
C.	Claims 5 and 12	64
D.	Claims 6 and 13	64
E.	Claims 7, 9, 14, and 15	65
1.	Elements 7[pre]-7[c], 7[e], 9[pre]-9[d], 9[f], 14[pre]-14[d], 14[f], 15[pre]-15[f].....	65
2.	Elements 7[d], 9[e], 14[e], and 15[e].....	65
F.	Claims 8, 10.....	65
XI.	Ground 4: Claims 1-2, 4, 6-11, and 13-15 are Obvious Over Gundlach and the Voluntary Standard Reference.....	65
XII.	Ground 5: Claims 1-15 are Obvious Over Gundlach, Yializis, and the Voluntary Standard Reference.....	69
XIII.	Ground 6: Claims 1-2 and 4-15 are Obvious Over Gundlach, Rebouillat, and the Voluntary Standard Reference.....	70
XIV.	No Basis For Discretionary Denial.....	71
XV.	Explanation of Non-Redundancy	72
XVI.	No Secondary Considerations	72
XVII.	Conclusion	72

TABLE OF AUTHORITIES

Page(s)

Cases

<i>Amneal Pharms. v. Supernus Pharms.</i> , IPR2013-00368, Paper 8 (P.T.A.B. Dec. 17, 2013)	72
<i>DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.</i> , 464 F.3d 1356 (Fed. Cir. 2006)	47, 48, 59, 60
<i>Endo Pharms. Sols., Inc. v. Custopharm Inc.</i> , 894 F.3d 1374 (Fed. Cir. 2018)	24, 27, 29, 33
<i>KSR Int’l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007)	<i>passim</i>
<i>Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.</i> , 868 F.3d 1013 (Fed. Cir. 2017)	10
<i>Pratt Retail Specialties, LLC v. ProAmpac LLC</i> , No. 1:24-cv-01073-RGA (D. Del.)	1

Statutes

35 U.S.C.	
§ 102	11
§ 102(a)	<i>passim</i>
§ 103	11
§ 311	1
§ 316(a)(11)	72

Other Authorities

37 C.F.R.

§ 42.8(b)(1)	1
§ 42.8(b)(2)	1
§ 42.8(b)(3)	2
§ 42.8(b)(4)	2
§ 42.15(a)	3
§ 42.20(c)	72
§ 42.100	1
§ 42.104(a)	3

MPEP

§ 2128 II.E	15
§ 2141.III.....	46, 47, 59, 66

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,072,148
1002	Prosecution File History for U.S. Patent No. 11,072,148
1003	Declaration of Glenn May
1004	Curriculum Vitae of Glenn May
1005	U.S. Patent Publication No. US 2014/0044903 (“Gundlach”)
1006	S. Yializis, <i>Multi-Layer, Low Emissivity, Metallized Materials for Replacing Aluminum Foils in Heat Reflection and Energy Management Applications</i> , Society of Vacuum Coaters, 52nd Annual Technical Conference Proceedings, 755-759 (May 2009) (“Yializis”)
1007	<i>The Voluntary Standard for Repulping and Recycling Corrugated Fiberboard Treated to Improve Its Performance in the Presence of Water and Water Vapor</i> , Fibre Box Association (August 16, 2013) (“Voluntary Standard Reference”)
1008	U.S. Patent Application Publication No. 2015/0053086 (“Rebouillat”)
1009	Plaintiff’s Complaint, <i>Pratt Retail Specialties, LLC v. ProAmpac LLC</i> , No. 1:24-cv-01073-RGA (D. Del.)
1010	The Wayback Machine – Corrugated Packaging Alliance, “Recyclable Wax Alternatives” Webpage as of September 6, 2015, https://web.archive.org/web/20150906053842/http://www.corrugated.org/ViewPage.aspx?ContentID=41
1011	The Wayback Machine – The Voluntary Standard PDF Provided Via the Corrugated Packaging Alliance Website on September 10, 2015, https://web.archive.org/web/20150910004711/www.corrugated.org/upload/cpa/documents/vol_std_protocol_2013.pdf
1012	ASTM C1371, <i>Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers</i> , ASTM International (June 2015)

Exhibit No.	Description
1013	<i>The Oxidation of Metallized Aluminum Films Used in Reflective Insulation and Radiant Barrier Applications</i> , Reflective Insulation Manufacturers Association International (RIMA-I), Technical Bulletin #106 (May 2009)
1014	ISBN Search Website, https://isbnsearch.org/isbn/9781615831579
1015	C. Bishop, <i>Vacuum Deposition onto Webs, Films, and Foils</i> (2d ed. 2011)
1016	M. Linder et al., <i>Thickness Measurement Methods for Physical Vapor Deposited Aluminum Coatings in Packaging Applications: A Review</i> , Coating 7(1), 9 (Jan. 14, 2017)
1017	A. Brody et al., <i>Innovative Food Packaging Solutions</i> , 73(8) Journal of Food Science 107 (2008)

CLAIM LISTING

Element Designation	Claim Language
Claim 1	
1[pre]	A recyclable packaging comprising:
1[a]	a stack including
1[b]	a paper layer with first and second surfaces;
1[c]	a polymer layer with third and fourth surfaces, wherein the third surface is affixed to the second surface;
1[d]	an intermediate coating layer applied to the fourth surface;
1[e]	an aluminum layer carried by the intermediate coating layer, wherein the aluminum layer has a first thickness of 200 nanometers or less;
1[f]	wherein said stack has emissivity that is equal to or smaller than a first value of 0.10 as perceived through an outer surface of the aluminum layer; and
1[g]	<p>wherein, when said packaging is subjected to treatment that includes</p> <p>a) blending the packaging in a blender;</p> <p>b) disintegrating into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm;</p> <p>c) separating in a 0.01 inch aperture screen with a 1 inch water head for 20 minutes; and</p> <p>d) drying in an oven for 4 hours at 221 degrees F.</p> <p>to form a recyclable material, said aluminum layer becomes fully oxidized with no visible aluminum present in said recyclable material,</p>
1[h]	<p>and further comprising</p> <p>a protective coating layer disposed over the aluminum layer, wherein the protective coating layer has a second thickness of 1 micron or less, and wherein the second thickness is</p>

	configured i) to maintain the emissivity at the first value after the aluminum layer has been coated with the protective coating and ii) to prevent oxidation of the aluminum layer during normal use of the packaging, while not impeding oxidation of the aluminum layer as a result of the treatment.
Claim 2	
Claim 2	The recyclable packaging of claim 1, wherein the aluminum layer is disposed directly on the intermediate coating.
Claim 3	
Claim 3	The recyclable packaging of claim 1, wherein the intermediate coating has the intermediate coating thickness between 10 nm and 2000 nm and includes a material selected from polymer and oligomer.
Claim 4	
Claim 4	The recyclable packaging of claim 1, wherein the protective coating includes a material selected from: wax, polymer, and lacquer.
Claim 5	
Claim 5	The recyclable packaging of claim 1, wherein the polymer layer includes a material selected from: low density polyethylene, high density polyethylene, polyethylene terephthalate, polypropylene, polyvinyl chloride, polyurethane, and polystyrene.
Claim 6	
Claim 6	The recyclable packaging of claim 1, wherein the polymer layer is a material selected from: film and fabric.
Claim 7	
7[pre]	A method for manufacturing a recyclable packaging, the method comprising:
7[a]	forming a packaging layer stack by:
7[b]	attaching a polymer layer to a paper layer, wherein an inner surface of the polymer layer is affixed to a first surface of the paper layer;

7[c]	depositing an aluminum layer on the polymer layer, wherein the aluminum layer has a first thickness of 200 nanometers or less,
7[d]	and wherein the aluminum layer causes said packaging layer stack to have emissivity that is equal to or smaller than a first value of 0.10; and
7[e]	<p>wherein said aluminum layer is configured to acquire optical density (OD) of less than 0.09 when the packaging layer stack is exposed to a treatment that includes:</p> <p>a) blending the packaging stack in a blender;</p> <p>b) disintegrating into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm,</p> <p>c) separating an output from step b) in a 0.01 aperture inch screen with a 1 inch water head for 20 minutes, and</p> <p>d) drying in an oven for 4 hours at 221 degrees F.</p>
Claim 8	
Claim 8	<p>The method of manufacturing a recyclable packaging of claim 7, further comprising:</p> <p>applying a protective coating over the aluminum layer to form a coated packaging layer stack, wherein the protective coating has a second thickness of 1 micron or less, and wherein the second thickness is defined</p> <p>a) to maintain the emissivity of the packaging layer stack at the first value after the aluminum layer has been coated with the protective coating and</p> <p>b) to prevent oxidation of the aluminum layer during normal use of the recyclable packaging, while the protective coating does not impede oxidation of the aluminum layer during the treatment.</p>
Claim 9	
9[pre]	A recyclable packaging comprising:
9[a]	a stack including

9[b]	a paper layer with first and second surfaces;
9[c]	a polymer layer with third and fourth surfaces, wherein the third surface is affixed to the second surface;
9[d]	an aluminum layer deposited on the fourth surface, wherein the aluminum layer has a first thickness of 200 nanometers or less and
9[e]	wherein the aluminum layer causes an emissivity of an outer surface of the recyclable packaging to be equal to or smaller than a first value of 0.10; and
9[f]	<p>wherein said aluminum layer acquires an optical density (OD) of less than 0.09 with no visible aluminum present in a recyclable material that results from the recyclable packaging being subjected to a treatment, the treatment including</p> <p>a) blending the packaging in a blender to form a first material;</p> <p>b) disintegrating the first material into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm to form a second material;</p> <p>c) separating the second material in a 0.01 inch aperture screen with a 1 inch water head for 20 minutes to form a fourth material; and</p> <p>d) drying the fourth material in an oven for 4 hours at 221 degrees F.</p>
Claim 10	
Claim 10	<p>The recyclable packaging of claim 9, further comprising:</p> <p>a protective coating over the aluminum layer,</p> <p>wherein the protective coating has a second thickness of 1 micron or less,</p> <p>wherein the second thickness is defined to maintain the first value of the emissivity of the recyclable packaging after the aluminum layer has been coated with the protective coating and to prevent oxidation of the aluminum layer during</p>

	normal use of the packaging, wherein the protective coating does not impede oxidation of the aluminum layer during the treatment.
Claim 11	
Claim 11	The recyclable packaging of claim 10, wherein the protective coating includes a material selected from: wax, polymer, and lacquer.
Claim 12	
Claim 12	The recyclable packaging of claim 9, wherein the polymer layer includes a material selected from: low density polyethylene, high density polyethylene, polyethylene terephthalate, polypropylene, polyvinyl chloride, polyurethane, and polystyrene.
Claim 13	
Claim 13	The recyclable packaging of claim 9, wherein the polymer layer includes a material selected from: film and fabric.
Claim 14	
14[pre]	A method for thermally insulating a good within a recyclable packaging, the method comprising:
14[a]	placing a reflective insulation material in a pre-defined proximity with the good, the pre-defined proximity being suitably chosen to provide adequate thermal insulation to the good, wherein said reflective insulation material comprises the recyclable packaging that includes:
14[b]	a paper layer with first and second surfaces;
14[c]	a polymer layer with third and fourth surfaces, wherein the third surface is affixed to the second surface;
14[d]	an aluminum layer deposited on the fourth surface, wherein the aluminum layer has a first thickness of 200 nanometers or less and
14[e]	wherein the aluminum layer causes an emissivity of the recyclable packaging to be equal to or smaller than a first value of 0.10; and

14[f]	<p>wherein said aluminum layer becomes fully oxidized with no visible aluminum present in a recyclable material that results from the recyclable packaging being subjected to a treatment that includes</p> <p>a) blending the packaging in a blender to form a first material;</p> <p>b) disintegrating the first material into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm to form a second material;</p> <p>c) separating the second material in a 0.01 inch screen with a 1 inch water head for 20 minutes to form a fourth material; and</p> <p>d) drying the fourth material in an oven for 4 hours at 221 degrees F.</p>
Claim 15	
15[pre]	A method for thermally insulating a good within a recyclable packaging, the method comprising:
15[a]	placing a reflective insulation material at a pre-defined proximity distance from the good, said pre-defined proximity distance chosen to provide adequate thermal insulation to the good, wherein said reflective insulation material comprises the recyclable packaging that includes:
15[b]	a paper layer with first and second surfaces;
15[c]	a polymer layer with third and fourth surfaces, wherein the third surface is affixed to the second surface;
15[d]	an intermediate coating layer applied to the fourth surface;
15[e]	an aluminum layer carried by the intermediate coating, wherein the aluminum layer has a first thickness of no more than 200 nanometers to cause the recyclable packaging to have emissivity that is equal to or smaller than a first value of 0.10; and
15[f]	wherein said aluminum layer is configured to acquire optical density (OD) of less than 0.09 and become fully

	<p>oxidized with no visible aluminum present in a recyclable material when the recyclable packaging is subjected to a treatment that includes</p> <p>a) blending the packaging in a blender to form a first material;</p> <p>b) disintegrating the first material into water with a British at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm to form a second material;</p> <p>c) separating the second material in a 0.01 inch aperture screen with a 1 inch water head for 20 minutes to form a fourth material; and</p> <p>d) drying the fourth material in an oven for 4 hours at 221 degrees F.</p>
--	---

ProAmpac Holdings Inc. (“ProAmpac” or “Petitioner”) respectfully requests *Inter Partes* Review (“IPR”) of claims 1-15 of U.S. Patent No. 11,072,148 (“the ’148 Patent”) pursuant to 35 U.S.C. §311 and 37 C.F.R. §42.100.

I. MANDATORY NOTICES

A. Real Parties in Interest (37 C.F.R. §42.8(b)(1))

ProAmpac is the real party-in-interest for this proceeding.

B. Related Matters (37 C.F.R. §42.8(b)(2))

Patent Owner Pratt Retail Specialties, LLC (“Patent Owner” or “Pratt”) asserted the ’148 Patent against ProAmpac in a civil action pending in the District of Delaware: *Pratt Retail Specialties, LLC v. ProAmpac LLC*, No. 1:24-cv-01073-RGA (D. Del.) (“the Delaware Action”).¹ EX1009. Pratt served its complaint on ProAmpac on November 18, 2024.

¹ Pratt’s complaint in the Delaware Action misidentifies the proper defendant. It names the defendant as “ProAmpac LLC.” That entity does not exist. ProAmpac Holdings Inc. is the entity that makes, uses, and sells the product accused of infringement in the Delaware Action. The parties are negotiating a Joint Stipulation and Proposed Order Substituting Parties and Changing Case Caption, to substitute ProAmpac Holdings Inc. for ProAmpac LLC as the named defendant in that action.

C. Lead and Backup Counsel (37 C.F.R. §42.8(b)(3))

ProAmpac provides the following designations of counsel:

Lead Counsel	Back-up Counsel
Walter D. Davis, Jr. (Reg. No. 45,137) BLANK ROME LLP 1825 Eye Street NW Washington, D.C. 20006 Tel.: (202) 420-4847 Fax: (202) 478-0914 walter.davis@blankrome.com	Domingo M. Llagostera (Reg. No. 70,684) BLANK ROME LLP 717 Texas Avenue, Suite 1400 Houston, TX 77002 Tel.: (713) 632-8682 Fax: (713) 228-6605 domingo.llagostera@blankrome.com Megan R. Wood (Reg. No. 72,367) BLANK ROME LLP 1825 Eye Street NW Washington D.C. 20006 Tel.: (202) 420-2200 Fax: (202) 420-2201 megan.wood@blankrome.com Jonathan M. Hernandez (<i>pro hac</i> to be filed) BLANK ROME LLP 717 Texas Avenue, Suite 1400 Houston, TX 77002 Tel.: (713) 815-3324 Fax: (713) 228-6605 jonathan.hernandez@blankrome.com

D. Service Information (37 C.F.R. §42.8(b)(4))

Please direct all correspondence to lead counsel and back-up counsel at the addresses shown above. Petitioner consents to electronic service by e-mail, provided that all counsel for Petitioner are copied at the foregoing email addresses.

E. Payment of Fees

The undersigned authorizes the PTO to charge the fee specified by 37 C.F.R. § 42.15(a) to Deposit Account No. 23-2185, and any additional fees that may be required in connection with this Petition.

II. GROUNDS FOR STANDING

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the '148 Patent is available for IPR, and Petitioner is not barred or estopped from requesting IPR of claims 1-15 on the grounds identified herein.

III. SUMMARY OF THE ARGUMENT

The '148 Patent generally claims a recyclable packaging with a radiant barrier insulation used to preserve temperature-sensitive foods. The packaging has a “stack” configuration that includes a paper layer, polymer layer, intermediate coating, aluminum layer, and protective coating (in that order). The '148 Patent's stated advance is that the aluminum layer is vapor deposited on the polymer layer at a thickness ≤ 200 nanometers and gives the stack an emissivity ≤ 0.10 . According to the '148 Patent, because it is vapor deposited and so thin, the aluminum layer fully oxidizes, corrodes away, and turns transparent when the stack is subjected to a well-known, standard recyclability test method herein referred to as the “Voluntary Standard,” which makes the packaging recyclable.

Long before 2018, the claimed stack configuration was disclosed in a single prior art reference—Gundlach—that was not before the Examiner. Gundlach, a

2014 prior-art patent publication, disclosed a recyclable packaging with the exact same stack configuration claimed in the '148 Patent. Thus, Gundlach anticipates nearly all claims of the '148 Patent. The few remaining claims are obvious over the combination of Gundlach combined with Yializis or Rebouillat. Notably, Yializis was authored by the inventor of the '148 Patent and published nearly ten years before the '148 Patent was filed, yet it was never disclosed to the Examiner.

For the reasons stated herein, all claims of the '148 Patent are invalid.

IV. THE '148 PATENT

The '148 Patent is directed to a recyclable packaging material that includes paper combined with an aluminized polymeric film to thermally insulate goods stored in the packaging. EX1001, Abstract, 17:21-34.

A. The Effective Filing Date is No Earlier than January 8, 2018²

The '148 Patent was filed as U.S. Patent Application No. 16/238,998 (“the '998 Application”) on January 3, 2019, and granted on July 27, 2021. *Id.* at

² ProAmpac does not herein admit or deny that the earliest effective filing date is January 8, 2018, and reserves the right to contest that priority date in any co-pending proceedings. That determination is not raised as an issue here, as the prior art relied upon herein long predates January 8, 2018.

(21), (22), (45). It claims priority to Provisional Application No. 62/614,568, filed on January 8, 2018. *Id.* at (60).

B. The Disclosure

An embodiment of the disclosed packaging material is reproduced below in annotated Figure 4 of the '148 Patent.

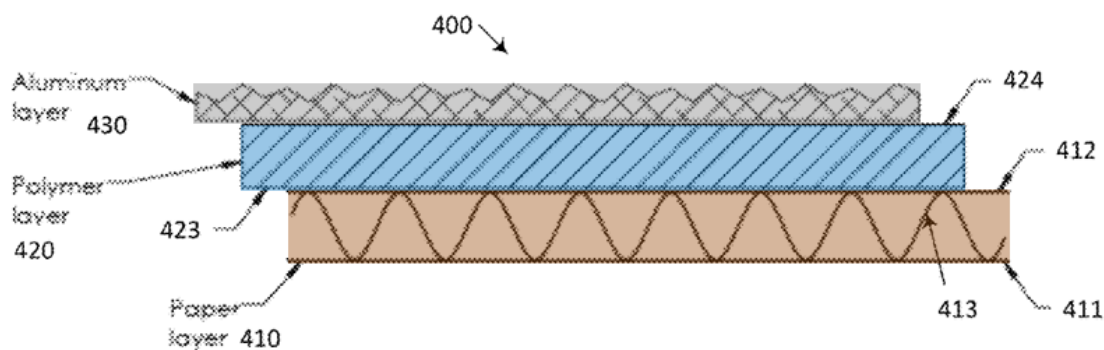


Fig. 4

EX1001, Fig. 4 (annotated). The packaging material comprises a stack of layers. *Id.* The first layer is a paper layer 410 (**brown**). *Id.* at Fig. 4, 12:36-43. A polymer layer 420 (**blue**) is “affixed” to surface 412 of the paper layer 410. *Id.* The polymer layer could include polyethylene, polypropylene, polyvinyl chloride, etc. *Id.* at 1:56-61. An aluminum layer 430 (**silver**) is “deposited” on to surface 424 of the polymer layer. *Id.* at Fig. 4, 12:36-43.

The above-described stack is a reflective insulation material. *Id.* at 3:23-41. The stack can be used as a packaging material, such as a container for shipping goods. *Id.* Goods are positioned within a predefined proximity of the reflective insulation material to achieve thermal insulation. *Id.*

The aluminum layer is deposited to a thickness of no more than 200 nm. *Id.* at 1:30-33, 2:1-5, 2:49-52, 3:34-37. According to the '148 Patent, this results in the outer surface of the packaging having an emissivity ≤ 0.10 . *Id.* The thermal insulation performance of the packaging is highly dependent on the emissivity of the surface of the stack. *Id.* at 6:24-34. "Emissivity represents the ability for heat, provided by a given surface, to radiate from the surface into an adjacent air space." *Id.* at 6:26-43.

According to the '148 Patent, a key characteristic of the aluminum layer is that it "is thin enough such that when the packaging material is subjected to the recycling process, what little amount of aluminum is present is 'crumbled' and fully oxidized (and, as a result, does not affect the recyclability of the packaging material as a whole). *Id.* at 4:44-49. The "recycling process" is identified as the Fibre Box associations standard repulpability test for paper-based containers, published in "The Voluntary Standard For Repulping and Recycling Corrugated Fiberboard Treated to Improve Its Performance in the Presence of Water and Water Vapor" (hereafter "the Voluntary Standard Reference"). *Id.* at 4:64-5:30. The Voluntary Standard Reference is admitted prior art that includes the following testing procedure (hereafter "the Voluntary Standard"):

- a) blending the packaging in a Waring Blender to form a first material;

- b) disintegrating the first material into water with a British Disintegrator at 125 (± 10) degrees F. at 3000 rpm to form a second material;
- c) separating the second material in a 0.01 inch screen with a 1 inch water head for 20 minutes to form a fourth material; and
- d) drying the fourth material in an oven for 4 hours at 221 degrees F.

Id. at 1:33-45, 2:5-13, 2:52-62, 3:4-11, 3:42-49. The Voluntary Standard produces two bins of materials: (i) a pulp material made of the paper part of the packaging material that is sent to recycling, called the “accept,” and (ii) the remaining portions of the packaging material (e.g., aluminum, polymer coating, etc.) that is called the “reject” and is discarded. *Id.* at 5:16-37.

The '148 Patent defines “fully oxidized” aluminum as follows:

Aluminum oxide is visually transparent, when observed with the human eye (that is, substantially not visible or not visually-perceivable), and thus, for the purposes of this disclosure and the claims, the aluminum is considered fully oxidized when the aluminum is substantially transparent instead of silver-colored, for example.

Id. at 10:52-58. “Since aluminum oxide is transparent and un-oxidized aluminum has varying opacity depending on its thickness, the aluminum is considered to be transparent, for the purposes of this disclosure, when the optical density (OD) is less than 0.09.” *Id.* at 10:63-67.

In another embodiment, the stack includes a protective coating over the aluminum layer to prevent the aluminum layer from corrosion during use. *Id.* at 2:18-27, 4:49-53. As shown in annotated Figure 5 below, a protective coating 510 (red) is “over” the aluminum layer 430 (silver).

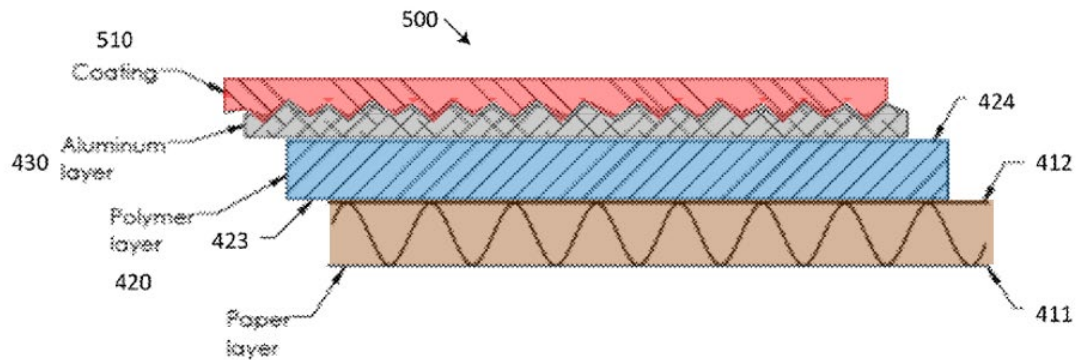


Fig. 5

Id. at Fig. 5, 12:44-50. The coating can be made of wax, polymer, or lacquer. *Id.* at 2:28-34. The coating has a thickness ≤ 1 micron and must (i) maintain the ≤ 0.10 emissivity of the outer surface of the packaging, (ii) prevent premature oxidation of the aluminum layer during normal use, and (iii) not impede oxidation of the aluminum layer during the Voluntary Standard. *Id.* at 2:18-27, 4:52-60.

The '148 Patent describes several advantages of the invention. First, the thinness of the aluminum layer results in a low emissivity surface, which makes the stack a better insulator. *Id.* at 6:51-54, 3:57-61. Second, the aluminum layer is low weight and insignificant compared to the paper, such that when the packaging is

subjected to the Voluntary Standard at least 85% is made into recyclable pulp. *Id.* at 8:2-10.

Third, the '148 Patent states that it was originally believed in the industry that if aluminum is used in the packaging, it must be prevented from being collected in the accepts bin when subjected to the Voluntary Standard for fear of contaminating the recyclable pulp. *Id.* at 11:23-29. For example, if aluminum ended up in the accepts bin, recycled paper could have visible spots. *Id.* at 10:38-40. The '148 Patent purports to have solved that problem with a thin layer of aluminum that “fully oxidizes” in the Voluntary Standard, such that the aluminum that ends up in the accepts bin is invisible. *Id.* at 11:34-37. The '148 Patent states it has found that “actually allowing and not actively preventing small amounts of aluminum to enter the pulp is not detrimental to the process, and is a way of allowing a paper-containing radiant barrier material to be recyclable as paper.” *Id.* at 11:29-34.

C. The Claims

The '148 Patent has 15 claims, with claims 1, 7, 9, 14, and 15 being the independent claims. *Id.*, claims 1-15. Petitioner challenges the validity of each of these claims. A claim listing with identifiers for each limitation is provided above on pages x-xvi. Petitioner uses those identifiers throughout this Petition. Each limitation of claims 1-15 is addressed below in connection with the prior art, showing how the prior art renders each claim unpatentable.

V. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner submits that a person of ordinary skill in the art (“POSITA”) for the ’148 Patent would have possessed at least a bachelor’s degree in packaging science, material science, chemistry, or a related discipline, along with at least five years of professional experience researching or designing recyclable packaging or thermal insulations, or an equivalent level of skill, knowledge, and experience. A POSITA would have been aware of and had general knowledge about the materials used in recyclable packaging, as well as the standards used for testing the repulpability, recyclability, thermal properties and other aspects of such materials, available as of January 8, 2018. EX1003, ¶¶21-26.

VI. CLAIM CONSTRUCTION

Claims must be construed only to the extent necessary to resolve a controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Here, no terms need construction to resolve the controversy in this forum. Petitioner reserves the right to respond to any constructions or other arguments implicating claim construction raised by the Patent Owner or the Board. For this Petition, Petitioner applies prior art in a manner consistent with Patent Owner’s allegations of infringement before the district court.

VII. THE PRIOR ART AND GROUNDS FOR RELIEF

There is at least a reasonable likelihood that the claims of the '148 Patent will be found unpatentable. The '148 Patent claims priority to January 8, 2018, and is therefore subject to AIA §§102 and 103.

A. Prior Art Summaries

1. Gundlach

Gundlach (U.S. Patent Publication No. 2014/0044903), published on February 13, 2014, is prior art under 35 U.S.C. § 102(a). EX1005, (43).

Gundlach discloses a recyclable, paper-based packaging material for bags, containers, and similar packaging used for food and other goods. EX1005, Abstract, [0003], [0032]. Gundlach recognized common formulations of packaging material include aluminum foil, which renders the material “unsuitable for composting or paper recycling,” requires “more expensive” and “economically unfeasible” recycling methods, and relegates the packaging to a landfill. EX1005, [0005]-[0006]. Gundlach therefore discloses a packaging material with a “film structure” that instead includes vacuum metallized aluminum, making the packaging recyclable while maintaining “the superior radiant barrier property of aluminum foil.” EX1005, [0007]-[0009], [0025]-[0027], [0032]-[0036].

Figure 1 illustrates an embodiment of the disclosed packaging material, which comprises a film 10:

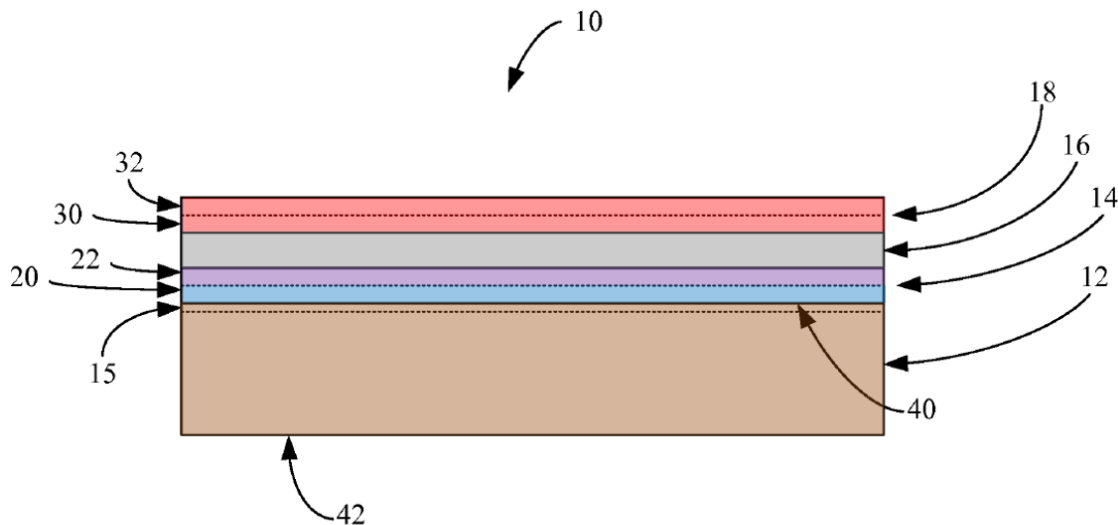


Figure 1

EX1005, Fig. 1 (annotated). Film 10 is a multilayered structure including a base material 12 (**brown**), base coat structure 14 with an inner base layer 20 (**blue**) and outer base layer 22 (**purple**), metallized layer 16 (**silver**), and top coat structure 18 (**red**). EX1005, [0008], [0036]. The metallized layer is a thin layer of vacuum metallized aluminum, which Gundlach describes as a “good radiant barrier with an emissivity” as low as “0.05 units.” EX1005, [0007], [0043].

2. Yializis

Yializis is an article authored by the same inventor of the '148 Patent; however, it was not disclosed as prior art during prosecution of the '998 Application. EX1001, (56), (72); EX1006, 755; *see generally* EX1002 (no IDS ever filed by Applicant). Yializis was published by the “Society of Vacuum Coaters” as part of its “52nd Annual Technical Conference Proceedings,” held on “May 9-14, 2009,” in

“Santa Clara, CA,” where Steven Yializis presented his manuscript. EX1006, 755. The International Standard Book Number (ISBN) assigned to the conference’s book shows it was published and publicly available in 2009 (thus no later than December 31, 2009). EX1014. Yializis demonstrates it was published and publicly available in 2009, as evidenced by its “© 2009” copyright marking and citations dated before 2009. EX1006, 755, 759. Yializis also bears “ISSN 0737-5921,” which is its International Standard Serial Number, a unique serial code assigned to periodical publications. EX1006, 755; EX1003, ¶67. The Society of Vacuum Coaters was “a reputable organization and publication that a POSITA would have looked at to understand and determine the state of the art, behaviors, and solutions related to vacuum metallization, coatings, and packaging materials.” *Id.* Accordingly, Yializis is a printed publication that was publicly accessible no later than 2009 and is therefore prior art under 35 U.S.C. § 102(a).

Yializis describes multilayered, low emissivity, metallized materials for replacing aluminum foil in heat reflection and insulation applications, including “food, agricultural, biomedical and electronic packaging.” EX1006, 755, 757, 758 (describing “packaging-grade” films). Yializis teaches that “[v]acuum metallized materials, generally composed of a polymer substrate and a vapor deposited low-e layer” of aluminum ranging in thickness “from 0.02 μm to 0.50 μm ,” suffer from oxidation and corrosion when exposed to high heat and moisture. EX1006, 755.

Due to “the amount of sacrificial aluminum available,” the thin metallized aluminum is “completely consumed by the oxidation and corrosion reactions” caused by high heat and moisture (e.g., steam for five minutes), resulting in the aluminum layer becoming “entirely transparent” and “the emissivity of the material being entirely compromised.” EX1005, 755-756. Yializis further teaches a thin protective coating deposited on the aluminum layer to maintain the material’s emissivity (e.g., at “ $\epsilon = 0.03$ ”) and prevent oxidation during normal applications. EX1006, 756-759.

3. The Voluntary Standard Reference

The Voluntary Standard Reference is a standard developed and published by the Fibre Box Association and dated “August 16, 2013.” EX1007, 1, 3. The ’148 Patent admits the Voluntary Standard Reference is prior art. Specifically, the ’148 Patent states:

Features of the method employed for testing the repulpability of a paper-based containers are summarized in Part I of the document titled “The Voluntary Standard For Repulping and Recycling Corrugated Fiberboard Treated to Improve Its Performance in the Presence of Water and Water Vapor”, *published by the Fibre Box Association (available at fibrebox.org) This test method is recognized in related industry—and, in particular, by the Fibre Box Association and Corrugated Packaging Alliance—and represents the commonly-used test*, the exposure of a given container or packaging to

which is required to be able to determine whether such given corrugated container or packaging can be classified as repulpable or recyclable.

EX1001, 4:64-5:11.³

The Voluntary Standard Reference was “originally issued 2/1/05 with administrative [non-testing related] revisions issued on 11/20/07, 5/15/10, and 8-16-13.” EX1007, 23. The 2013 edition was publicly available on the Internet at least as early as September 6, 2015, published online by the Corrugated Packing Alliance in association with the Fibre Box Association, as evidenced by the Wayback Machine®. EX1010; EX1011; EX1003, ¶¶70-71; MPEP §2128 II.E. The Voluntary Standard Reference was publicly available to and accessed by POSITAs at least as early as 2013. EX1003, ¶71. It was well known and widely adopted by POSITAs, companies, and other organizations in the packaging industry as the gold standard in recyclability. *Id.* Accordingly, the Voluntary Standard Reference is prior art under 35 U.S.C. § 102(a).

The Voluntary Standard Reference describes the Voluntary Standard, which is a “method to determine the repulpability and recyclability” of paper products using “common mill technology.” EX1007, 3-4. It is a multi-part test method that

³ All emphases added by Petitioner unless stated otherwise.

simulates “a commonly used subset of repulping and recycling processes” and applies “process technology either in effect or readily achievable in mills currently involved in recycling.” EX1007, 4, 9, 11-12. Under “PART 1: Repulpability,” the standard describes a process that includes blending a packaging in a Waring blender, disintegrating the blended material in a British disintegrator set to “125° F ± 10° F” and “3000 rpm,” separating the disintegrated material in 0.01 inch “slotted open flat screen, maintaining 1” water head – for 20 minutes,” and drying the separated material “in a laboratory oven for 12 hours (± 4 hours) at 221°F.” EX1007, 5, 9. If the packaging is “capable of being processed into new paper or paperboard using the process defined in” the standard, it is considered “recyclable.” EX1007, 5-8, 23.

4. Rebouillat

Rebouillat (U.S. Patent Publication No. 2015/0053086), published on February 26, 2015, is prior art under 35 U.S.C. § 102(a). EX1008, (43).

Rebouillat discloses a multilayered, low emissivity reflective sheet and cover for thermally insulating foods and pharmaceuticals. EX1008, Abstract, [0002], [0021], [0043], [0068], Fig. 1b. The sheet/cover includes a “metal layer” vapor deposited onto a polymer substrate. EX1008, [0032], [0046]-[0050]. The metal layer is aluminum, has a thickness “less than 0.2 microns,” and provides the inner surface of the sheet/cover with an emissivity of “less than 0.1.” EX1008, [0050]. A “protective lacquer coating” having a thickness “between 0.2 and 1.0 micron” is

applied on top of the metal layer to prevent corrosion during use. EX1008, [0032], [0051]. “The thickness and composition of this protective lacquer is selected such that it substantially changes neither the moisture vapor permeability of the reflective sheet, nor the emissivity of the low emissivity metal layer to which it is applied.”
Id.

B. Relief Requested and Statutory Grounds of Invalidity

Petitioner requests IPR and cancellation of claims 1-15 of the '148 Patent based on the following grounds:

Ground	Claims	Basis
1	1-2, 4, 6-11, 13-15	Anticipated by Gundlach
2	1-15	Obvious over Gundlach and Yializis
3	1-2, 4-15	Obvious over Gundlach and Rebouillat
4	1-2, 4, 6-11, 13-15	Obvious over Gundlach and the Voluntary Standard Reference
5	1-15	Obvious over Gundlach, Yializis, and the Voluntary Standard Reference
6	1-2, 4-15	Obvious over Gundlach, Rebouillat, and the Voluntary Standard Reference

VIII. GROUND 1: CLAIMS 1-2, 4, 6-11, AND 13-15 ARE ANTICIPATED BY GUNDLACH

A. Claim 1

1. 1[pre]: “A recyclable packaging comprising:”

To the extent the preamble is limiting, Gundlach teaches it. EX1003, ¶78. Gundlach discloses a packaging material, including “film structures for packaging” that are “formed into bags, sacks, containers, wraps and the like for packaging food

and other goods.” EX1005, [0003], [0006], [0032]-[0035], Abstract; EX1003, ¶78. Gundlach teaches the packaging material “having characteristics that are well suited for paper recycling and commercial or industrial composting, while maintaining the superior radiant barrier property of aluminum foil.” EX1005, [0007], [0009], [0025]-[0027], [0032]-[0036].

2. 1[a] “a stack including”

Gundlach teaches that the recyclable packaging comprises a stack (e.g., film 10). EX1005, [0008]-[0009], [0032], [0036], Fig. 1; EX1003, ¶80. Film 10 includes a base material 12 (brown), inner base layer 20 (blue), outer base layer 22 (purple), metallized layer 16 (silver), and top coat structure 18 (red). EX1005, [0036].

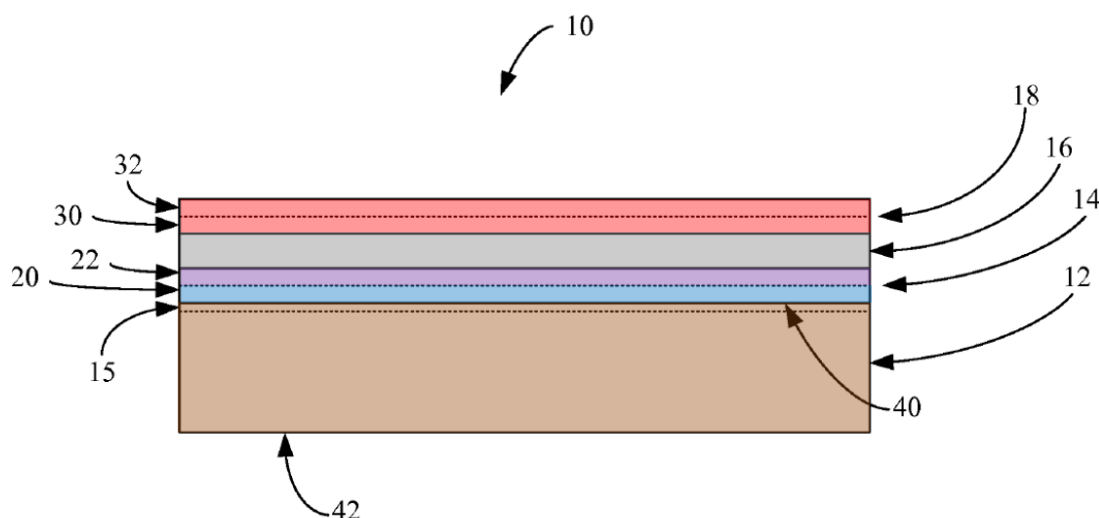


Figure 1

EX1005, Fig. 1 (annotated); EX1003, ¶80.

3. 1[b]: “a paper layer with first and second surfaces;”

Gundlach teaches that film 10 includes a paper layer (e.g., base material 12) with first and second surfaces. EX1005, [0036]-[0037], Fig. 1; EX1003, ¶81. Base material 12 comprises “a cellulosic material, such as, for example, a cellulose based paperboard material and includes top surface 40 and bottom surface 42.” EX1005, [0037], [0008], [0053], [0058] (disclosing exemplary paperboards). As shown in Figure 1, base material 12 (**brown**) has a first surface (bottom surface 42) and a second surface (top surface 40).

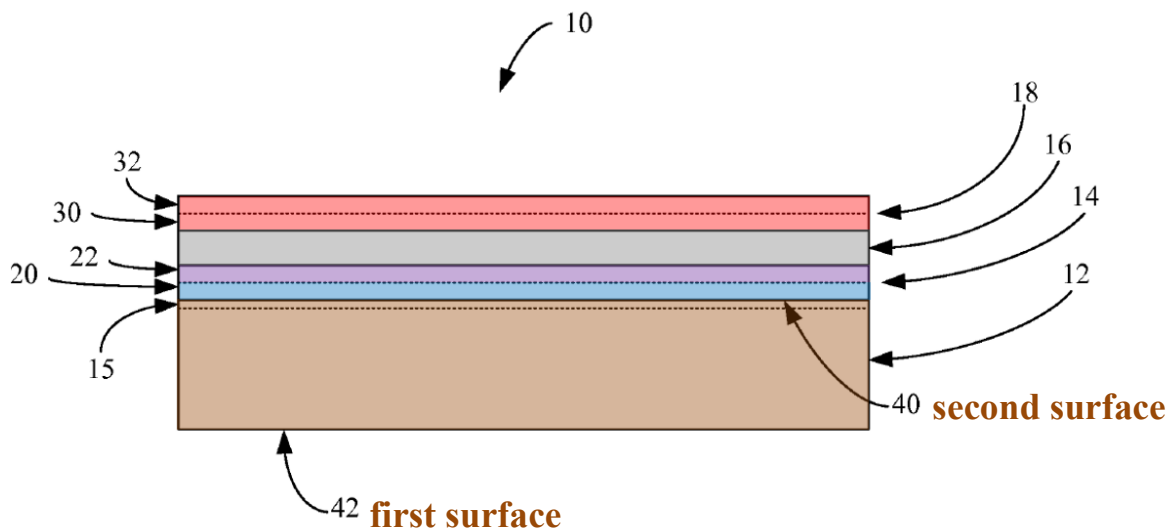


Figure 1

EX1005, Fig. 1 (annotated); EX1003, ¶81.

4. 1[c]: “a polymer layer with third and fourth surfaces, wherein the third surface is affixed to the second surface;”

Gundlach teaches that film 10 includes a polymer layer (e.g., inner base layer 20) with third and fourth surfaces. EX1005, [0036], [0038], Fig. 1; EX1003, ¶82.

Gundlach teaches that inner base layer 20 is a polymer. EX1005, [0009], [0038]-[0039], [120] (disclosing polymer examples), claims 1, 19 (“inner base layer . . . comprising polymer coating[.]”). As shown in Figure 1, inner base layer 20 (**blue**) has a third surface and fourth surface.

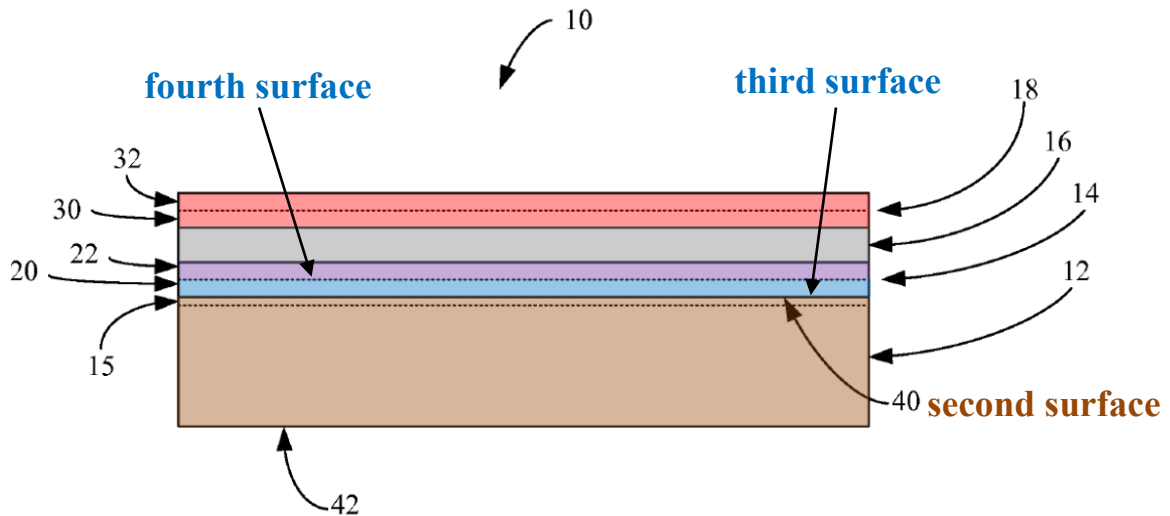


Figure 1

EX1005, Fig. 1 (annotated); EX1003, ¶82. The third surface is affixed to the second surface of base material 12, as shown above. EX1005, [0009] (“one base layer extending over substantially the entirety of the top surface of the base material”), claims 1, 2, 19 (“inner base layer applied directly to the top surface of the base material”), Fig. 1; EX1003, ¶82.

5. 1[d]: “an intermediate coating layer applied to the fourth surface;”

Gundlach teaches that film 10 includes an intermediate coating layer (e.g., outer base layer 22) applied to the fourth surface. EX1005, [0009], [0036], [0038], Fig. 1; EX1003, ¶83. As shown in Figure 1, outer base layer 22 (**purple**) is applied to the fourth surface of inner base layer 20 (**blue**).

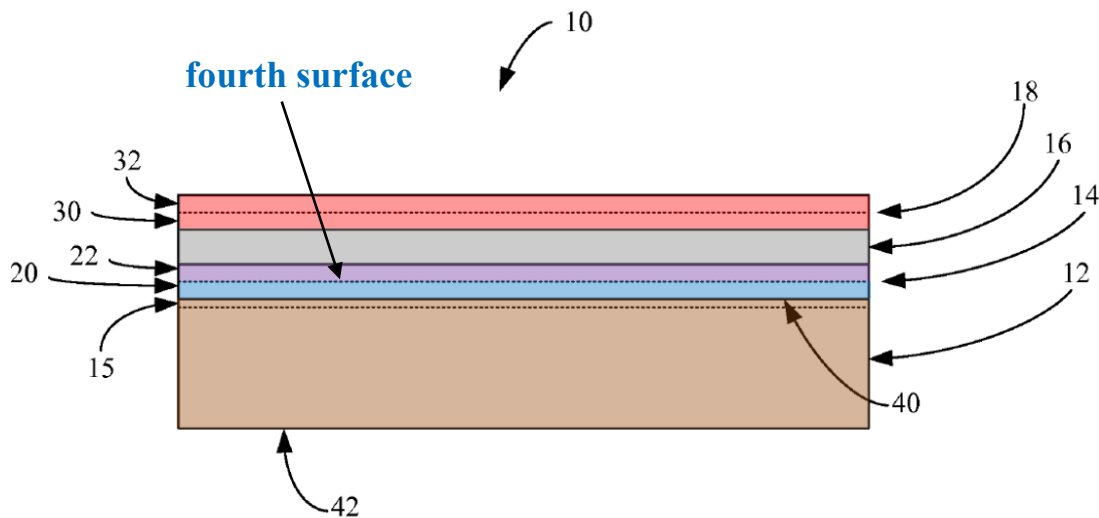


Figure 1

EX1005, Fig. 1 (annotated); EX1003, ¶83. Gundlach further discloses that outer base layer 22 is “applied to the inner base coat layer 20.” EX1005, [0054], [0059], claims 2 (“outer base layer applied over the inner base layer”), claims 3, 19 (similar); EX1003, ¶83.

6. 1[e]: “an aluminum layer carried by the intermediate coating layer, wherein the aluminum layer has a first thickness of 200 nanometers or less;”

Gundlach teaches that film 10 includes an aluminum layer (e.g., metallized layer 16) carried by outer base layer 22. EX1005, [0008]-[0009], [0036], [0043], Fig. 1; EX1003, ¶¶84-85. Metallized layer 16 (**silver**) is “a metallized vapor deposited layer of aluminum” and applied “directly onto the outer base layer 22” (**purple**), as shown in Figure 1 below. EX1005, [0043], [0055]; EX1003, ¶84.

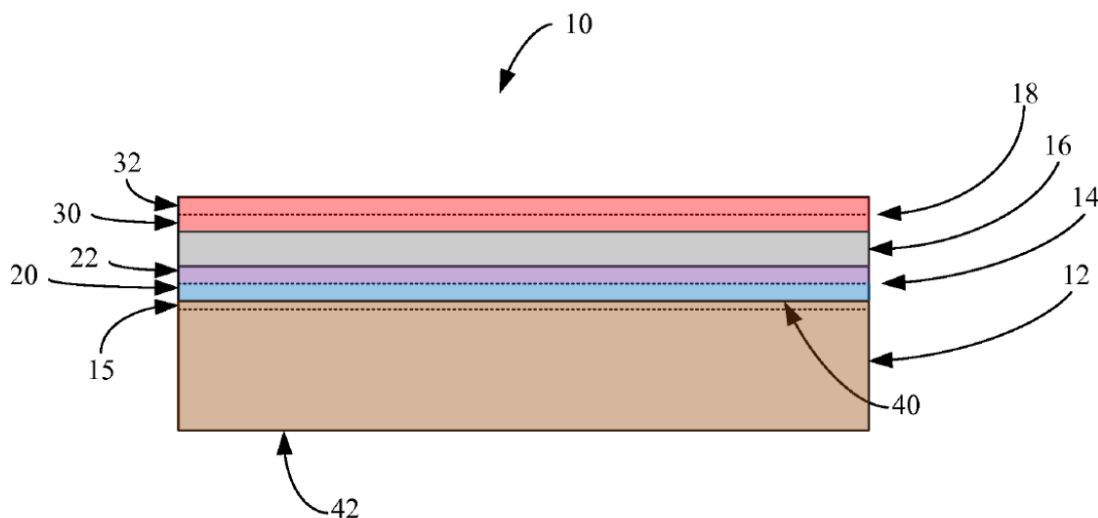


Figure 1

EX1005, Fig. 1 (annotated).

Gundlach teaches that metallized layer 16 has a thickness between 122-500 Angstroms (i.e., 12.2-50 nanometers),⁴ which is a first thickness ≤ 200 nanometer.

⁴ 1.0 angstrom ($\text{\AA}$) = 0.10 nanometers (nm).

EX1005, [0044] (describing “ultra-thin” metallized layer with “122 angstroms thickness” or “500 angstroms thickness”), [0045] (describing “aluminum thickness” from 173 angstroms to 292 angstroms); EX1003, ¶85.

7. **1[f]: “wherein said stack has emissivity that is equal to or smaller than a first value of 0.10 as perceived through an outer surface of the aluminum layer; and”**

Gundlach teaches:

It would be advantageous to devise and utilize packaging material which has performance characteristics that are suitable for use in association with food items, including hot food items, such as sandwiches, while also having characteristics that are well suited for paper recycling and commercial or industrial composting, while maintaining the superior radiant barrier property of aluminum foil. Radiant barrier is quantitatively measured with an Emissometer, for which the silver standard is 0.05 units and the black standard is 0.87 units. ***Both aluminum foil and vacuum metallized aluminum products exhibit good radiant barrier with an emissivity range of 0.05 units to 0.15 units***, compared to white papers, which exhibit an emissivity of approximately 0.75 units to 0.85 units.

EX1005, [0007].

Gundlach also teaches its inventive film 10 “provides radiant barrier properties ***substantially equal to the foil.***” EX1005, [0044]. In other words,

Gundlach teaches that film 10 produces an emissivity substantially similar to the target emissivity range of 0.05 (“silver standard”) to 0.15. EX1003, ¶¶86-87. Thus, Gundlach expressly teaches that its stack (film 10) has an “emissivity that is equal to or smaller than a first value of 0.10.”

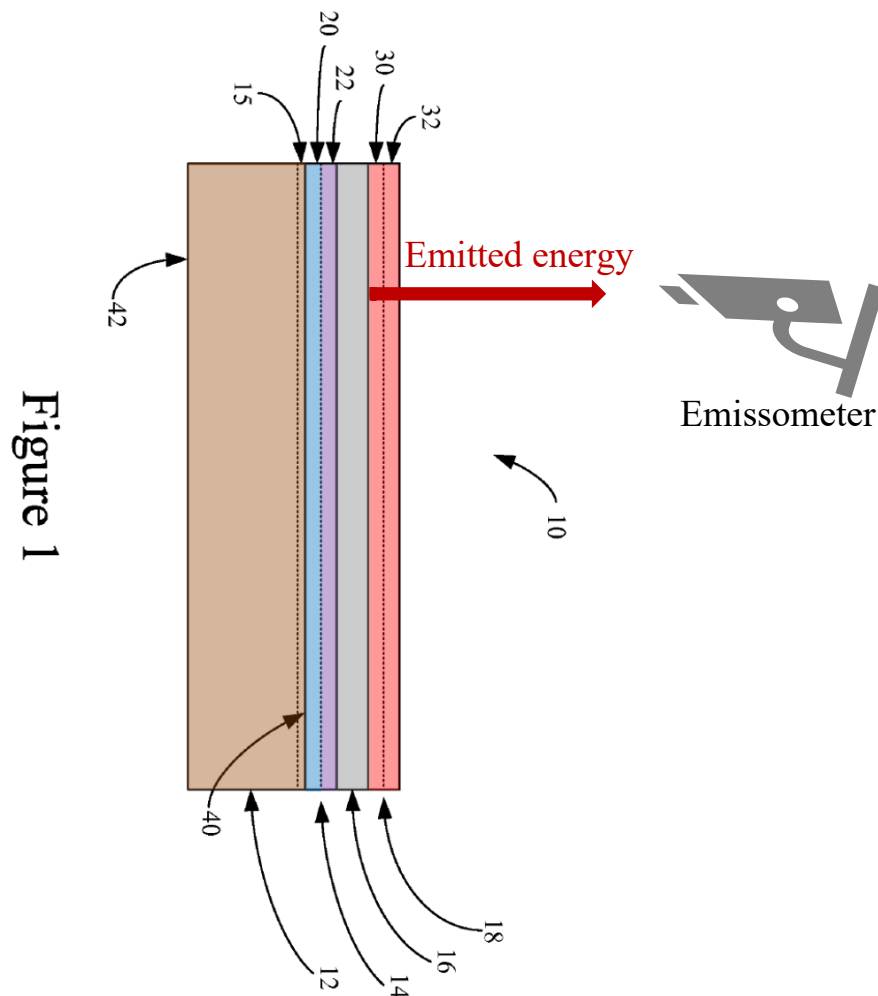
To the extent the Board disagrees Gundlach expressly teaches emissivity $\leq$ 0.10, a POSITA would have understood it was inherently taught by Gundlach. EX1003, ¶¶88-89. To establish that a prior art reference inherently discloses a claim limitation, “the limitation at issue necessarily must be present, or [is] the natural result of the combination of elements explicitly disclosed by the prior art.” *Endo Pharms. Sols., Inc. v. Custopharm Inc.*, 894 F.3d 1374, 1381 (Fed. Cir. 2018) (internal quotation marks omitted). As explained above, Gundlach’s advance over the prior art is its packaging material being recyclable and having a “superior **radiant barrier** property of aluminum foil.” EX1005, [0007], [0044]. A POSITA would interpret Gundlach’s reference to a “radiant barrier” as meaning the packaging material has an emissivity $\leq$ 0.10, since that is how the term is used in the industry. EX1003, ¶88; EX1012, 5-7. Indeed, as the ’148 Patent acknowledges, “[t]he ASTM C1313 . . . is the industry standard specification for a radiant barrier, and **defines a radiant barrier as a material having an emissivity of 0.10 or less.**” EX1001, 6:54-61; 13:3-8. A POSITA also knows that aluminum foil has an emissivity typically at the silver standard or less, or $\leq$ 0.05. EX1003, ¶88. A POSITA would understand

that by Gundlach stating it achieved “radiant barrier” properties “substantially equal to [aluminum] foil,” Gundlach’s emissivity was at the lower end of its target 0.05-0.15 range, or ≤ 0.10 . *Id.* Thus, emissivity ≤ 0.10 is necessarily present, and thus inherent, in Gundlach’s disclosure of a packaging material with a radiant barrier “substantially equal to [aluminum] foil.” *Id.*

Gundlach also expressly teaches that emissivity is “perceived from the outer surface of the aluminum layer.” As described in the ’148 Patent, it was common at the time of the alleged invention to measure emissivity as “discussed in ASTM C1371 (available at astm.org/Standards/C1371.htm and incorporated herein by reference).” EX1001, 6:34-38. At that time, emissivity was well-known and standard. EX1003, ¶90. An emissometer is used to measure the ratio of infrared radiation emitted by the surface of a material compared to that emitted by a perfect black body at the same temperature. EX1012, 3-4, 7; EX1003, ¶90. The emissometer then calculates the emissivity of the sample based on the measured radiation. EX1012, 4; EX1003, ¶90. In the case of a stack including a radiant barrier, to calculate emissivity, the stack must be positioned with the radiant barrier facing the emissometer so that the infrared light is directly transmitted to the outer surface of the radiant barrier. EX1003, ¶91. Otherwise, if the stack’s opposite side were exposed to the emissometer, the light would be scattered by intervening structures (e.g., paper and polymer layers) and may not even reach the radiant

barrier, resulting in a faulty emissivity result. *Id.* Indeed, all emissivity testing described in the '148 Patent is described as being performed on the outer surface of the packaging. No other way makes sense.

As for Gundlach's stack, the aluminum layer is the radiant barrier, because it is the aluminum layer that provides the insulation for food products in the packaging. EX1003, ¶92. To test its emissivity, as explained above, the aluminum layer is necessarily placed facing the emissometer. *Id.* For example, below is a schematic demonstrating how the emissivity of Gundlach's stack (film 10) is tested:



EX1005, Fig. 1 (annotated); EX1003, ¶92. The emissometer measures how much energy is emitted back from the outer surface of the aluminum layer and then calculates its emissivity. As explained below, Gundlach’s top coat does not impact the emissivity because it is designed to “preserve[] the integrity of the metallized layer.” EX1005, [0046]; *supra* §VIII.A.9.

For the foregoing reasons, Gundlach expressly teaches that the stack (film 10) has an emissivity “as perceived through an outer surface of the aluminum layer.” EX1003, ¶93.

To the extent the Board disagrees Gundlach expressly teaches measuring emissivity from the “outer surface” of the aluminum layer, a POSITA would have understood that it is in inherently taught by Gundlach. *See Endo*, 894 F.3d at 1381; EX1003, ¶94. As explained above, it was standard to measure emissivity of a radiant barrier included in a stack by positioning the aluminum side facing an emissometer. EX1003, ¶¶91-92, 94; EX1012, 3-4. A POSITA would understand that the radiant barrier in Gundlach’s stack (film 10) is the aluminum layer (metallized layer 16), and its emissivity is necessarily measured with the aluminum layer facing the emissometer, as depicted in the figure above. EX1003, ¶94. Thus, emissivity of Gundlach’s stack is inherently “perceived through an outer surface of the aluminum layer.” *Id.*

8. **1[g]: “wherein, when said packaging is subjected to treatment that includes a) blending the packaging in a**

blender; b) disintegrating into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm; c) separating in a 0.01 inch aperture screen with a 1 inch water head for 20 minutes; and d) drying in an oven for 4 hours at 221 degrees F. to form a recyclable material, said aluminum layer becomes fully oxidized with no visible aluminum present in said recyclable material,”

Element 1[g] recites that when the claimed stack is subjected to testing steps a)-d), the aluminum layer is fully oxidized such that no visible aluminum is present in the recyclable material. Testing steps a)-d) are the Voluntary Standard, which the '148 Patent admits was “the commonly-used test” method in the art at the time of the alleged invention. *Supra* §IV.B.

The '148 Patent teaches that the disclosed stack has a vacuum deposited aluminum layer that is no more than 200 nm thick, and “[b]ecause the thickness of the aluminum used in an embodiment of the invention is so thin, any aluminum that does make it into (is processed into) the accepts portion produced by the repulping process ends up being fully oxidized and corroded in the heat and humidity levels used in the process.” EX1001, 10:47-52; *see also id.*, Abstract, 4:39-63, 12:8-14, 12:51-67. In other words, according to the '148 Patent, it is the vacuum deposition of the aluminum at no more than 200 nm thickness that causes full oxidization of the aluminum layer when it is subjected to the Voluntary Standard. The '148 Patent does not describe any other aspects or details of the aluminum layer that contribute to full oxidization in the Voluntary Standard.

Like the '148 Patent, Gundlach teaches that using aluminum foils in packaging materials is problematic because it makes them unsuitable for recycling. EX1005, [0006]. Gundlach also teaches an inventive packaging with an aluminum layer (metallized layer 16) deposited on polymer and is recyclable. EX1005, [0007], [0043]; EX1003, ¶97. Like the '148 Patent, Gundlach teaches the aluminum layer is vacuum deposited and has a thickness ≤ 200 nanometers; indeed, Gundlach teaches it is only 12.2-50 nanometers thick. *Supra* §VIII.A.6. According to the '148 Patent, because Gundlach's aluminum layer is vacuum deposited to a thickness under 200 nm, it will fully oxidize when subjected to the Voluntary Standard. EX1003, ¶97.

Accordingly, Gundlach expressly teaches that when the packaging is subjected to the treatment recited in element 1[g] to form a recyclable material, the aluminum layer becomes fully oxidized with no visible aluminum present in the recyclable material. EX1003, ¶98.

To the extent the Board disagrees Gundlach expressly teaches this element, a POSITA would have understood it was inherently taught by Gundlach. EX1003, ¶99. *See Endo*, 894 F.3d at 1374. A POSITA would have understood Gundlach's metallized layer 16, which is vapor deposited aluminum and has a thickness well under 200 nanometers, must necessarily fully oxidize when subjected to the Voluntary Standard based on the '148 Patent's teachings. EX1003, ¶99. Indeed,

according to the '148 Patent, if the aluminum layer is vapor deposited at ≤ 200 nm (as is Gundlach's), it will necessarily fully oxidize and become transparent when the stack is subjected to the Voluntary Standard. EX1001, 10:47-58.

9. **1[h]: “and further comprising a protective coating layer disposed over the aluminum layer, wherein the protective coating layer has a second thickness of 1 micron or less, and wherein the second thickness is configured i) to maintain the emissivity at the first value after the aluminum layer has been coated with the protective coating and ii) to prevent oxidation of the aluminum layer during normal use of the packaging, while not impeding oxidation of the aluminum layer as a result of the treatment.”**

Element 1[h] recites a protective layer disposed over the aluminum layer, with a thickness of no more than one micron. It also recites that “the thickness is configured to” achieve the following two characteristics for the stack: (i) it maintains the emissivity of the aluminum layer (i.e., ≤ 0.10); and (ii) it prevents the aluminum layer from oxidizing during normal use, while not impeding the oxidization of the aluminum layer when it is subject to the Voluntary Standard, i.e., the aluminum layer still fully oxidizes when the stack is subjected to the Voluntary Standard, notwithstanding the protective layer.

The '148 Patent teaches that the aluminum layer can be coated with a protective layer made of wax, lacquer, or polymer, such as an “acidic acrylic copolymer.” EX1001, 2:28-29, 2:54-56, 13:57-14:6. It also teaches that it is the thickness of the protective layer that defines whether the emissivity of the aluminum

layer is maintained, and whether the aluminum layer is able to fully oxidize when subjected to the Voluntary Standard. EX1001, 1:45-54, 3:12-20, 8:65-9:4, 13:57-14:16, Fig. 8. Finally, the '148 Patent teaches that a thickness of no more than one micron achieves the characteristics of maintaining the emissivity of the aluminum layer, protecting the aluminum layer during normal use, and allowing it to fully oxidize in the Voluntary Standard. In other words, according to the patent, it is the material and thickness of the protective layer of no more than one micron that drives the claimed aforementioned stack characteristics.

Gundlach expressly teaches element 1[h]. It teaches that film 10 includes a protective coating layer (e.g., top coat structure 18) disposed over the aluminum layer. EX1005, [0036], [0046], Fig. 1; EX1003, ¶102. This is shown in Figure 1 below, where top coat structure 18 (**red**) is disposed over metallized layer 16 (**silver**).

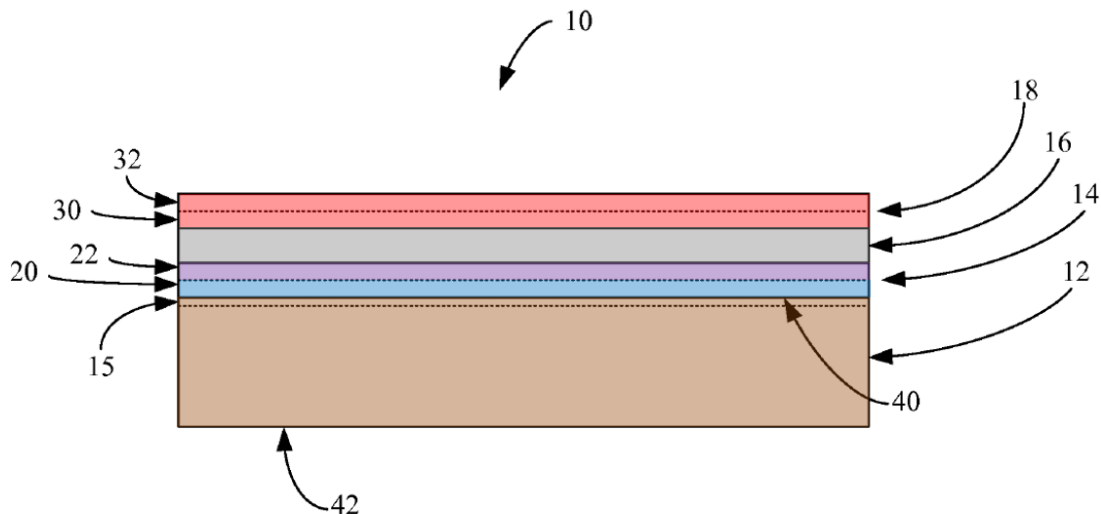


Figure 1

EX1005, Fig. 1 (annotated); *id.*, [0055] (“Once the aluminum had been deposited, the top coat structure was then applied.”), [0060] (same). The protective layer could be made of a polymer, such as a “high acid acrylic copolymer.” EX1005, [0021], [0074].

Gundlach teaches that the top coat structure has a second thickness of one micron or less. EX1003, ¶103. Gundlach also teaches that the top coat structure is configured to “preserve[] the integrity of the metallized layer, precluding flaking and the like.” EX1005, [0046]. According to the ’148 Patent, due to the material used in Gundlach’s protective layer and its thinness, Gundlach’s protective layer necessarily maintains the emissivity of the aluminum layer, protects the aluminum layer in normal use, and still allows for full oxidization of the aluminum layer during

the Voluntary Standard. EX1003, ¶103. Thus, Gundlach expressly teaches element 1[h].

To the extent the Board disagrees Gundlach expressly teaches a protective coating layer that has a “second thickness” ≤ 1 micron and the claimed configuration, a POSITA would have understood these properties were necessarily present, and thus inherent, in Gundlach. *See Endo*, 894 F.3d at 1381; EX1003, ¶104.

A POSITA would have understood that Gundlach’s top coat structure has a thickness under one micron because it is necessary to ensure the packaging material is both recyclable and maintains the radiant barrier provided by the aluminum layer. EX1003, ¶105. Gundlach explains that a single layer of coating must not “amount to more than 1 percent of the overall weight of the base material,” because anything more than that would impair the packaging material’s ability to be recycled. EX1005, Abstract, [0010], [0046], [0051]. A POSITA would interpret that requirement to mean that the top coat structure must be as thin as possible. EX1003, ¶105. This was common consideration in the packaging industry, and it was routinely addressed by using a coating that has a thickness under one micron. *Id.*

A POSITA would have also understood that Gundlach’s protective coating is necessarily configured to maintain the emissivity of the aluminum layer (i.e., ≤ 0.10) and protect the aluminum layer in normal use while allowing for full oxidization of the layer during the Voluntary Standard. EX1003, ¶106. As explained above,

Gundlach’s advance over the prior art was its teachings of a packaging material that has: (1) performance characteristics suitable for foods, particularly hot food; (2) a “superior radiant barrier,” i.e., emissivity ≤ 0.10 ; and (3) characteristics suitable for paper recycling. *Supra* §VIII.A.7. It teaches achieving these with a film structure (film 10) that uses a vapor deposited aluminum layer (metallized layer 16) and a top coat structure 18 that has a “configuration” that “preserves the integrity of the metallized layer, precluding flaking and the like.” EX1005, [0046]. A POSITA would understand these teachings to mean that the top coat structure must prevent oxidation of the aluminum layer during normal use, including when the packaging is used to store hot food (i.e., maintain the radiant barrier properties), but allow full oxidization of the aluminum layer as a result of a recycling treatment, such as the Voluntary Standard (i.e., ensure the packaging is recyclable). EX1003, ¶106. If the top coat structure were not configured that way, it would completely counteract the whole aim of Gundlach. *Id.*

B. Claim 2

As shown in *supra* §VIII.A.6, Gundlach teaches that the aluminum layer (metallized layer 16) in film 10 is disposed directly on the intermediate coating (outer base layer 22). EX1005, [0009] (“The metallized layer is applied directly to the outer base layer.”), [0043] (“The metallized layer preferably comprises a metallized vapor deposited layer of aluminum . . . directly onto the outer base layer

22. The metallized layer is generally applied to the underlying outer base layer.”), [0055] (“a layer of aluminum was vapor deposited onto the exposed outer base coat layer 22”), [0060] (same), Fig. 1; EX1003, ¶¶107-108.

C. Claim 4

Gundlach teaches that its protective coating (e.g., top coat structure 18) in film 10 includes a “polymer” or “copolymer” material. EX1005, [0009] (“The inner top layer and the outer top layer comprise polymer coatings.”), [0021], [0047]-[0050], [0074]; EX1003, ¶¶109-110.

D. Claim 6

Gundlach teaches that the polymer layer (e.g., inner base layer 20) in film 10 is a film. EX1005, [0038]; EX1003, ¶¶111-112. Gundlach teaches that the inner base layer includes “film forming” agents in its polymer material. EX1005, [0009], [0038]; EX1003, ¶112. A POSITA would have readily understood that the inner base layer was a film given the flexible materials taught by Gundlach. *Id.*

E. Claim 7

Independent claims 1 and 7 are similar, and thus the mappings for claim 7 are nearly identical to those of claim 1, as shown below. Claim 7 is a method claim and recites all the features of the stack recited in claim 1, but it does not require an intermediate coating layer between the polymer layer and the aluminum layer. *See* EX1001, claims 1, 7. Additionally, instead of reciting a full oxidization feature (element 1[g]), claim 7 recites that the aluminum layer acquires an optical density <

0.09 when the stack is subjected to the Voluntary Standard. *Id.* Claim 7 is also anticipated by Gundlach, as shown below.

1. 7[pre]: “A method for manufacturing a recyclable packaging, the method comprising:”

To the extent the preamble is limiting, Gundlach teaches a method for manufacturing a recyclable packaging for the same reasons as explained for element 1[pre]. *Supra* §VIII.A.1; EX1003, ¶114.

2. 7[a]: “forming a packaging layer stack by:”

Gundlach teaches forming a packaging layer stack for the same reasons as element 1[a]. *Supra* §VIII.A.2; EX1003, ¶115.

3. 7[b]: “attaching a polymer layer to a paper layer, wherein an inner surface of the polymer layer is affixed to a first surface of the paper layer;”

As demonstrated in Sections VIII.A.3-5, Gundlach teaches affixing an inner surface of a polymer layer (e.g., base coat structure 14) to a first surface of a paper layer (e.g., base material 12). *Supra* §§VIII.A.3-5; EX1005, [0036], [0038], [0051], Fig. 3; EX1003, ¶116.

4. 7[c]: “depositing an aluminum layer on the polymer layer, wherein the aluminum layer has a first thickness of 200 nanometers or less,”

Gundlach teaches element 7[c] for the same reasons as element 1[e]. *Supra* §VIII.A.6; EX1003, ¶117. Further, Gundlach teaches a second embodiment where metallized layer 16 (**silver**) is “a metallized vapor deposited layer of aluminum” that

is deposited “directly onto” base coat structure 14 (blue). EX1005, [0043], [0051]; EX1003, ¶117. This is depicted below in Figure 3:

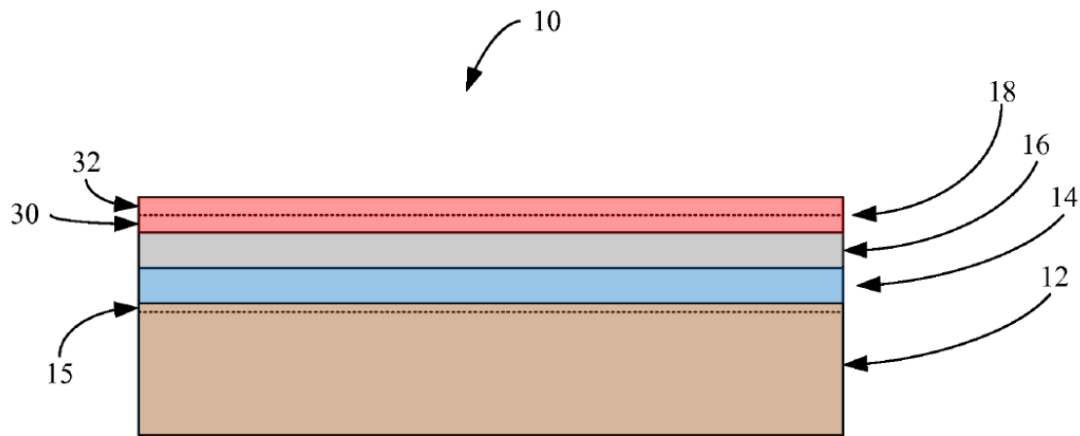


Figure 3

EX1005, Fig. 3 (annotated).

5. 7[d]: “and wherein the aluminum layer causes said packaging layer stack to have emissivity that is equal to or smaller than a first value of 0.10; and”

As explained in Section VIII.A.7, Gundlach teaches that the aluminum layer causes the stack to have an emissivity that is equal to or smaller than 0.10. *Supra* §VIII.A.7; EX1001, ¶118.

6. 7[e]: “wherein said aluminum layer is configured to acquire optical density (OD) of less than 0.09 when the packaging layer stack is exposed to a treatment that includes: a) blending the packaging stack in a blender; b) disintegrating into water with a British Disintegrator at a temperature within a range from about 115 degrees F. to about 135 degrees F. at 3000 rpm, c) separating an output from step b) in a 0.01 aperture inch screen with a 1 inch water head for

20 minutes, and d) drying in an oven for 4 hours at 221 degrees F.”

According to the '148 Patent, “[a]luminum oxide is visually transparent, when observed with the human eye (that is, substantially not visible or not visually-perceivable), and thus, for the purposes of this disclosure and the claims, the aluminum is considered fully oxidized when the aluminum is substantially transparent instead of silver-colored, for example. . . . Since aluminum oxide is transparent and un-oxidized aluminum has varying opacity depending on its thickness, the aluminum is considered to be transparent, for the purposes of this disclosure, when the optical density (OD) is less than 0.09.” EX1001, 10:52-67. In other words, according to the '148 Patent, if the aluminum is fully oxidized in the Voluntary Standard, that necessarily means it has an $OD < 0.09$. EX1003, ¶119.

As explained in Section VIII.A.8, Gundlach expressly or inherently teaches its aluminum layer is configured such that it fully oxidizes when subjected to the Voluntary Standard. *Supra* §VIII.A.8. According to the '148 Patent, that means Gundlach expressly or inherently teaches that the aluminum layer acquires an $OD < 0.09$ when the stack is subjected to the Voluntary Standard. EX1003, ¶120. Gundlach therefore expressly or inherently anticipates element 7[e]. *Id.*

F. Claim 8

Gundlach teaches claim 8 for the same reasons as element 1[h]. *Supra* §VIII.A.9; EX1003, ¶121.

G. Claim 9

Independent claim 9 is the composition version of independent method claim 7, and thus the mappings are identical, as shown below.

1. 9[pre]

Gundlach teaches element 9[pre] for the same reasons as element 7[pre] (referring to element 1[pre]). *Supra* §§VIII.A.1, VIII.E.1; EX1003, ¶123.

2. 9[a]

Gundlach teaches element 9[a] for the same reasons as element 7[a] (referring to element 1[a]). *Supra* §§VIII.A.2, VIII.E.2; EX1003, ¶124.

3. 9[b]

Gundlach teaches element 9[b] for the same reasons as element 7[b] (referring to element 1[b]). *Supra* §§VIII.A.3, VIII.E.3; EX1003, ¶125.

4. 9[c]

Gundlach teaches element 9[c] for the same reasons as element 7[c] (referring to element 1[c]). *Supra* §§VIII.A.4, VIII.E.3; EX1003, ¶126.

5. 9[d]

Gundlach teaches element 9[d] for the same reasons as element 7[d] (referring to element 1[e]). *Supra* §§VIII.A.6, VIII.E.4; EX1003, ¶127.

6. 9[e]

Gundlach teaches element 9[e] for the same reasons as element 7[d] (referring to element 1[f]). *Supra* §§VIII.A.7, VIII.E.5; EX1003, ¶128.

7. 9[f]

Gundlach teaches element 9[f] for the same reasons as elements 7[e] (referring to element 1[g]). *Supra* §§VIII.A.8, VIII.E.6; EX1003, ¶129.

H. Claim 10

Gundlach teaches claim 10 for the same reasons as element 1[h]. *Supra* §VIII.A.9; EX1003, ¶130.

I. Claim 11

Gundlach teaches claim 11 for the same reasons as claim 4. *Supra* §VIII.C; EX1003, ¶131.

J. Claim 13

Gundlach teaches claim 13 for the same reasons as claim 6. *Supra* §VIII.D; EX1003, ¶132.

K. Claim 14

Independent claims 1 and 14 are similar, and thus the mappings for claim 14 are nearly identical to those of claim 1, as shown below. Claim 14 is a method claim and recites all the features of the stack recited in claim 1, but it does not require an intermediate coating layer between the polymer layer and the aluminum layer. *See* EX1001, claims 1, 14. Additionally, it requires placing a reflective insulation material in a pre-defined proximity of a good. *Id.*

1. 14[pre]

Gundlach teaches element 14[pre] for the same reasons as element 1[pre].

Supra §VIII.A.1; EX1003, ¶134.

2. 14[a]: “placing a reflective insulation material in a pre-defined proximity with the good, the pre-defined proximity being suitably chosen to provide adequate thermal insulation to the good, wherein said reflective insulation material comprises the recyclable packaging that includes:”

Element 14[a] recites that a reflective insulation material is placed in a pre-defined proximity with the good. As the '148 Patent describes, “[i]n one embodiment, the reflective insulation material is used to wrap or otherwise enclose the good.” EX1001, 2:40-42. The pre-defined proximity is chosen to provide “adequate thermal insulation” to the good, which the '148 Patent defines as “protection (of such good) from heat, cold, or changes between heat and cold, such that the desired temperature range of such object is maintained during and throughout the shipment, mail delivery, etc. time frame.” EX1001, 17:29-34. Additionally, the reflective insulation material comprises the recyclable packaging.

Gundlach teaches this element. EX1003, ¶¶135-137. Gundlach teaches that its packaging material is formed into “bags, sacks, containers, wraps and the like for packaging food and other goods.” EX1005, [0003]. The packaging material has “performance characteristics that are suitable for use in association with food items, including hot food items, such as sandwiches,” while maintaining “the superior

radiant barrier property of aluminum foil.” EX1005, [0007], [0032]-[0034]. For example, when the packaging material is used as a “wrap,” “the sandwich or other product can be placed on the sheet and the sheet can be rolled around the sandwich, with both of the ends being folded over for purposes of closure.” EX1005, [0035]. Gundlach further describes using the packaging material as a bag (e.g., bag 100) that is formed according to Figures 1 and 2 of Gundlach. EX1005, [0052], [0075], Figs. 1, 2. For example, when the packaging material is used as a bag, hot food items are placed inside the bag to maintain the temperature of the food, for example, “above 140F for FDA food catering requirements” or during a “90 minute catering run.” EX1005, [0036], [0045], [0052], [0075].

Gundlach also teaches that the reflective insulation material comprises the recyclable packaging for the same reasons as element 1[a]. *Supra* §VIII.A.1; EX1003, ¶137.

3. 14[b]

Gundlach teaches element 14[b] for the same reasons as element 1[b]. *Supra* §VIII.A.3; EX1003, ¶138.

4. 14[c]

Gundlach teaches element 14[c] for the same reasons as elements 1[c] and 7[b]. *Supra* §§VIII.A.4, VIII.E.3; EX1003, ¶139.

5. 14[d]

Gundlach teaches element 14[d] for the same reasons as elements 1[e] and 7[c]. *Supra* §§VIII.A.6, VIII.E.4; EX1003, ¶140.

6. 14[e]

Gundlach teaches element 14[e] for the same reasons as element 1[f]. *Supra* §VIII.A.7; EX1003, ¶141.

7. 14[f]

Gundlach teaches element 14[f] for the same reasons as element 1[g]. *Supra* §VIII.A.8; EX1003, ¶142.

L. Claim 15

Independent claim 15 is a combination of independent claims 1, 7, 14, and 15, and thus the mappings for claim 15 are nearly identical to those of claims 1 and 14. Claim 15 recites all the features of the stack recited in claim 14. EX1001, claims 14, 15. It also requires an intermediate coating layer between the polymer layer and the aluminum layer, as recited in claim 1. EX1001, claims 1, 15. Additionally, instead of reciting a full oxidization feature (element 14[f]), claim 15 recites the aluminum layer acquires an optical density < 0.09 when the stack is subjected to the Voluntary Standard. *Id.* Claim 15 is also anticipated by Gundlach, as shown below.

1. 15[pre]

Gundlach teaches element 15[pre] for the same reasons as element 14[pre] (referring to element 1[a]). *Supra* §§VIII.A.1, VIII.K.1; EX1003, ¶144.

2. 15[a]

Gundlach teaches element 15[a] for the same reasons as element 14[a]. *Supra* §VIII.K.2; EX1003, ¶145.

3. 15[b]

Gundlach teaches element 15[b] for the same reasons as element 14[b] (referencing element 1[b]). *Supra* §§VIII.A.3, VIII.K.3; EX1003, ¶146.

4. 15[c]

Gundlach teaches element 15[c] for the same reasons as 14[c] (referencing element 1[c]). *Supra* §VIII.A.4, VIII.K.4; EX1003, ¶147.

5. 15[d]

Gundlach teaches element 15[d] for the same reasons as element 1[d]. *Supra* §VIII.A.5; EX1003, ¶148.

6. 15[e]

Gundlach teaches element 15[e] for the same reasons as for elements 1[e]-1[f] and 14[e]. *Supra* §§VIII.A.6-7, VIII.K.6; EX1003, ¶149.

7. 15[f]

Gundlach teaches element 15[f] for the same reasons as element 7[e] (referring to element 1[g]). *Supra* §§VIII.A.8, VIII.E.6; EX1003, ¶150.

IX. GROUND 2: CLAIMS 1-15 ARE OBVIOUS OVER GUNDLACH AND YIALIZIS

As explained for Ground 1, Gundlach expressly or inherently teaches claims 1-2, 4, 6-11, and 13-15. *Supra* §VIII. Should the Board disagree that Gundlach

teaches certain aluminum layer, protective layer, full oxidation, or polymer layer elements recited in claims 1, 6-10, and 13-15, these elements would have been obvious based on the combined teachings of Gundlach and Yializis. In addition to those claims, the combined teachings of Gundlach and Yializis would have also rendered obvious claims 3, 5, and 12.

As explained above, Yializis is a printed publication that was authored by the same inventor named on the '148 Patent, yet the applicant did not disclose Yializis during prosecution of the '998 Application. *Supra* §VII.A.2.

It would have been obvious to a POSITA to incorporate Yializis's teachings into Gundlach's packaging material so that:

- Gundlach's stack has an emissivity ≤ 0.10 as perceived through an outer surface of the aluminum layer;
- Gundlach's aluminum layer becomes fully oxidized with no visible aluminum present in the recyclable material when subjected to the Voluntary Standard; and/or
- Gundlach's protective layer has a thickness ≤ 1.0 microns and is configured to (i) maintain the emissivity at the first value and (ii) prevent oxidation of the aluminum layer during normal use of the packaging, while not impeding oxidation of the aluminum layer as a result of the treatment.

EX1003, ¶¶151-159. The teachings of Gundlach and Yializis provide ample motivation to combine them.

A POSITA would have been motivated to combine these references because they are directed to the same field of endeavor: low emissivity materials that include an aluminum layer vacuum deposited on to a polymer layer, where the aluminum layer is a replacement for aluminum foil and is used in heat reflection applications. EX1005, Abstract, [0005]-[0007], [0032], [0043]-[0045]; EX1006, 755-756, 759; EX1003, ¶153. The motivation is further enhanced by other similarities and common features shared between the references, including: (1) desired emissivity ≤ 0.10 (EX1005, [0007]; EX1006, 757); (2) the use of their materials for food packaging (EX1005, [0003]-[0007], [0032]; EX1006, 756); (3) the use of vapor/vacuum deposition techniques (EX1005, [0043], [0055], [0060]; EX1006, 756-758); and (4) both include a protective coating over the metallized aluminum layer that is designed to maintain the target low emissivity (EX1005, [0009], [0036], [0046]; EX1006, 757-759). EX1003, ¶153.

Gundlach provided the precise type of teaching, suggestion, or motivation that would have prompted a POSITA to combine Gundlach and Yializis. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007); MPEP § 2141.III; EX1003, ¶154. Indeed, Gundlach expressly taught and suggested such a combination. *Id.* In discussing how to improve upon prior-art material, Gundlach emphasized the need for a design

that includes metallized aluminum instead of aluminum foil, because the foil is not suitable for recycling, or requires more expensive recycling methods, and usually results in the packaging being sent to a landfill. EX1005, [0006]-[0007]. Gundlach taught that it would be advantageous for packaging materials to have “performance characteristics” suitable for use with food, including hot food items, “characteristics that are well suited for paper recycling and commercial or industrial composting,” and “the superior radiant barrier property of aluminum foil.” *Id.* Gundlach further teaches aluminum foil and vacuum metalized aluminum products exhibit good radiant barriers with an emissivity range of 0.05 to 0.15, and that Gundlach’s stack achieved radiant barrier properties “substantially equal to the foil.” *Id.*

Yializis teaches a food packaging stack that accomplished Gundlach’s goals. As explained above, Yializis teaches a metallized aluminum layer combined with a protective layer thick enough to provide sufficient oxidation protection in normal use of the stack, yet thin enough to maintain the emissivity under 0.10 and “match the emissivity performance of bulk aluminum foil.” EX1006, 755-756, 759. A POSITA would have been motivated to incorporate Yializis’s stack configuration into Gundlach’s packaging material to optimize its performance and radiant barrier, protect the aluminum layer from oxidizing during normal uses, e.g., packaging for hot food, and ensure the packaging remains recyclable. *See DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir.

2006) (“motivation to combine exists” when the combination “results in a product” that is “more desirable, for example because it is stronger” or “more efficient”); EX1003, ¶155. A POSITA would have been particularly motivated to ensure the packaging material matches the emissivity of aluminum foil (emissivity < 0.03), as expressly suggested and taught by Gundlach and Yializis. *Id.*

A POSITA would have also been motivated to include Yializis’s protective layer teachings to accomplish the known advantages that such a configuration would provide, including to: (1) maintain the radiant barrier property of packaging; (2) preserve the low emissivity provided by vacuum deposited aluminum; (3) minimize the amount of polymers in the packaging, increasing its likelihood of being repulpable/recyclable; and (4) allow a manufacturer to produce a packaging with a sufficient protection against oxidation during normal uses, yet still able to meet recycling standards. EX1003, ¶156. Well before 2018, the packaging industry had been exploring ways to accomplish these advantages, including by reducing the size of the materials. *Id.* A POSITA would have been familiar with the techniques taught by Yializis and found them well-suited to improve Gundlach’s packaging material, and therefore achieve Gundlach’s expressly stated goals. *Id.*

Furthermore, “when a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.”

KSR, 550 U.S. at 417 (quoting *Sakraid v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976)). Every element of claim 1 (and every element of claims 2-15, as explained below) appears in both Gundlach and Yializis. Those elements consist of standard, predictable stacks using well-known materials and characteristics that would be familiar to any POSITA. EX1003, ¶157. There is nothing unpredictable about the claimed use of those materials in a recyclable packaging. *Id.* See *KSR*, 550 U.S. at 417 (“[A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.”). A POSITA would be familiar with the laminated paper materials claimed in the ’148 Patent, and taught by Gundlach and Yializis, because they had existed in the packaging industry well before 2018. EX1003, ¶157.

A POSITA would have a reasonable expectation of success in implementing Yializis’s teachings into Gundlach’s packaging material because such metallized aluminum and protective coating configurations were well-known, commonly used, and encouraged in the field of thermal insulations and radiant barriers before 2018. *Supra* §VIII.A.9; EX1003, ¶158. The coating was “commercially available” before 2018 and in fact required by certain trade associations to “be used on metalized aluminum films that are intended for reflective insulation and radiant barrier applications.” EX1013; EX1017, 110-111; EX1003, ¶158. Aluminum and polymer films were common materials, and these configurations were routinely used in

commercial packaging by then. *Id.*; EX1013; EX1015, 13-15, 28-31; EX1016, 1-2; EX1017, 110-111. Conventional methods and technology, such as vacuum deposition or roll coating, would have made implementing them technically feasible and simple. EX1003, ¶158; EX1008, [0048]-[0049]; EX1013; EX1015, 13-31; 1016, 1-2; EX1017, 110-111. Such technology was already in effect or readily available in most manufacturing facilities. EX1003, ¶159.

A. Claim 1

1. 1[pre]-1[e]

Gundlach teaches elements 1[pre]-1[e]. *Supra* §§VIII.A.1-6.

2. 1[f]

To the extent the Board disagrees Gundlach teaches the “emissivity that is equal to or smaller than a first value of 0.10 as perceived through an outer surface of the aluminum layer” portion of element 1[f], that portion is taught by Yializis. EX1003, ¶¶161-162. Yializis teaches “multi-layer, low emissivity materials....” EX1006, 755. The material comprises a polymer substrate and a vacuum deposited aluminum layer for use in heat reflection applications, including food packaging. EX1006, 755, 759. Yializis teaches using the vacuum metallized aluminum as a replacement for aluminum foil because it is much thinner and can have a similarly low emissivity. EX1006, 755-756. The aluminum layer has a thickness as low as 0.02 μm (20 nanometers) and an emissivity of 0.03, like aluminum foil. EX1006, 755, 756, 759. The emissivity of the material is measured “per ASTM test method

C 1371” using an emissometer. EX1006, 758. As explained for Ground 1, testing under the ASTM C1371 method is performed on the outer surface of the aluminum layer. *Supra* §VIII.A.7.

It would have been obvious to incorporate Yializis’s emissivity into Gundlach’s stack for the reasons explained in *supra* §IX. EX1003, ¶162.

3. 1[g]

To the extent the Board disagrees Gundlach teaches the “aluminum layer becomes fully oxidized with no visible aluminum present in said recyclable material” portion of element 1[g], that portion is taught is taught by Yializis. EX1003, ¶¶163-165. Yializis explains that “[m]etallized aluminum films . . . are far more susceptible to performance degradation as a result of oxidation and corrosion of the reflective aluminum layer in the presence of heat and moisture.” EX1006, 755. Yializis teaches “[e]xtreme environments consisting of high heat and moisture can result in propagation of oxidation and corrosion sites to the degree that a vapor deposited, low-e surface, is consumed entirely.” EX1006, 755. This occurs with “thin vacuum deposited aluminum layers” due to “the amount of sacrificial aluminum available to be consumed by the reaction.” EX1006, 755-756. “This means that very little oxidation of the aluminum layer needs to occur to consume the aluminum in its entirety.” EX1006, 756. Yializis further teaches:

[T]he thin metallized aluminum, when exposed to steam
for only 5 minutes, is *completely consumed by the*

oxidation and corrosion reactions caused by the water vapor. In addition to having the emissivity of the material being entirely compromised, the thin metallized film is corrupted visually. Whereas the visual impact of the corrosion reaction is not visibly obvious on the thicker foil, *the thin metallized film has been rendered entirely transparent.*

EX1006, 756. It is well-known that the steam point of water is 212°F. EX1003, ¶163.

The Voluntary Standard exposes the aluminum layer in packaging materials to similar, if not more extreme, heat and moisture conditions. During the Voluntary Standard, the material is blended into many pieces using a Waring blender and disintegrated into water at 125°F ± 10°F. EX1007, 5, 9. During that process, the material is scratched, scraped, saturated, and otherwise separated into paper products and non-paper products, and the aluminum is exposed to the heat and moisture as a result. *Id.*; EX1003, ¶164. It is then exposed to more water for 20 minutes and dried in an oven at 221°F for 12 hours ± 4 hours. EX1007, 5, 9. Because Yializis teaches its aluminum layer fully oxidizes in high heat and moisture, its aluminum layer necessarily fully oxidizes when subjected to the Voluntary Standard.

It would have been obvious to incorporate Yializis's full oxidation characteristics into Gundlach's stack for the same reasons explained in *supra* §IX. EX1003, ¶165.

4. 1[h]

To the extent the Board disagrees Gundlach teaches a protective coating with “second thickness of 1 micron or less” that maintains “the emissivity at the first value after the aluminum layer has been coated with the protective coating,” and that prevents “oxidation of the aluminum layer during normal use of the packaging, while not impeding oxidation of the aluminum layer as a result of the treatment,” those portions of element 1[h] are taught by Yializis. EX1003, ¶¶166-168.

Yializis teaches a protective layer deposited on the aluminum layer, to protect it from corrosion. EX1006, 755-757. Yializis teaches that the “protective layer” ranges in “thickness from 0.02 μm to up to 0.50 μm ” and is “designed to protect vacuum deposited aluminum layers” in “low-e applications,” including in food packaging. EX1006, 755-757; 756 (“Metallized aluminum films, for reasons stated above, require additional processing, both before, and after metallization, to prevent corrosion and oxidation.”). Yializis further teaches configuring the thickness to maintain emissivity values for a composite material at 0.03. EX1006, 759 (“Many low-e applications do not require emissivity values equal to aluminum foil (0.03); however, for those that do have such requirements, . . . coatings should be on the order of 0.07 μm .”); Fig. 6. Yializis describes testing the emissivity of these “[m]ulti-layer, low-e, composites” and demonstrating that “it is possible to produce metalized films that match the emissivity performance of bulk aluminum foil.”

EX1006, 759. A POSITA would understand these teachings to mean that the protective layer prevents oxidation of the aluminum layer during normal use, including when the material is used in food packaging (i.e., maintain the radiant barrier properties), but allows full oxidization of the aluminum layer as a result of a recycling treatment, such as the Voluntary Standard (i.e., ensure the packaging is recyclable). EX1003, ¶167.

It would have been obvious to incorporate Yializis's protective layer into Gundlach's stack for the reasons explained in *supra* §IX. EX1003, ¶168.

B. Claims 2, 4, and 11

As explained in Ground 1, Gundlach teaches claims 2, 4, and 11. *Supra* §§VIII.B, VIII.C, VIII.I.

C. Claim 3

Yializis teaches a “planarizing layer,” which is an intermediate coating deposited onto the polymer substrate “prior to metallization, to smooth or ‘planarize,’ the substrate surface to reduce scattering and improve surface emissivity.” EX1006, 757-758. Yializis teaches the planarizing layer has a thickness of 0.20 μm (equivalent to 200 nm) and includes a “polymer” material. EX1006, EX1006, 757-758 (describing planarizing layers as “polymer layers” used to “enhance the emissivity properties of substrates”), 758 (“[P]lanarizing layers were deposited to thickness of approximately 0.20 μm .”), 759 (“A planarizing layer with

a nominal thickness of 0.20 μm was deposited onto a HDPE substrate.”); EX1003, ¶170.

It would have been obvious to incorporate Yializis’s 200 nm coating thickness into Gundlach’s intermediate coating (e.g., outer base layer 22) for the same reasons explained in *supra* §IX. EX1003, ¶171. A POSITA would have also been motivated to minimize the amount of polymers in the packaging, thereby increasing the likelihood of being recyclable and satisfying Gundlach’s 1% rule. *Id.*; EX1005, Abstract, [0009], [0051]. A POSITA would have also had a reasonable expectation of success because thin intermediate coatings were routinely used in commercial products before 2018. EX1003, ¶171.

D. Claims 5 and 12

Yializis teaches a “polymer” layer. EX1006, 755-756 (describing “polymer substrate” or “polymer film”). Yializis teaches the polymer layer includes polyethylene terephthalate or high-density polyethylene. EX1006, 758 (“Substrates used for experimentation included a 12 μm , packaging- grade, polyester (PET) film and a 76.2 μm high-density polyethylene (HDPE).”), 759 (“HDPE substrate”); EX1003, ¶172.

It would have been obvious to incorporate a PET or HDPE material, as taught by Yializis, into Gundlach’s polymer layer (e.g., inner base layer 20) for the same reasons explained in *supra* §IX and §IX.C. EX1003, ¶173. A POSITA would have

also been motivated to implement PET or HDPE films because they were among the most common polymers and routinely used in packaging materials at the time of the alleged invention. *Id.*

E. Claims 6 and 13

To the extent the Board disagrees Gundlach teaches a recyclable packaging, “wherein the polymer layer is [or include] a material selected from: film and fabric,” this element is taught by Yializis. EX1003, ¶¶174-175. Yializis teaches its polymer layer is a “film,” such as PET or HPDE films. EX1006, 756-757 (“aluminum deposited onto a polymer film”), 758 (polymer substrate includes “polyester (PET) film”), 759 (describing “film surface” of “HDPE substrate”); EX1003, ¶174.

It would have been obvious to incorporate the PET or HDPE film taught by Yializis into Gundlach’s polymer layer (e.g., inner base layer 20) for the same reasons explained in *supra* §IX, §IX.C, and §IX.D. EX1003, ¶175. A POSITA would have also been motivated to implement PET and HDPE films because they were among the most common polymers and routinely used in packaging materials at the time of the alleged invention. *Id.*

F. Claims 7, 9, 14, and 15

1. Elements 7[pre]-7[c], 9[pre]-9[d], 14[pre]-14[d], and 15[pre]-15[e]

Gundlach teaches elements 7[pre]-7[c], 9[pre]-9[d], 14[pre]-14[d], and 15[pre]-15[e]. *Supra* §§VIII.E.1-4, VIII.G.1-5, VIII.K.1-5, VIII.L.1-6.

2. Elements 7[d], 9[e], 14[e], and 15[e]

Gundlach teaches elements 7[d], 9[e], 14[e], and 15[e] . *Supra* §§VIII.E.5, VIII.G.6, VIII.K.6, VIII.L.6. To the extent the Board disagrees Gundlach teaches these elements, they are taught by Yializis for the same reasons explained for element 1[f]. *Supra* §IX.A.2; EX1003, ¶177.

3. Elements 7[e], 9[f], 14[f], and 15[f]

Gundlach teaches elements 7[e], 9[f], 14[f], and 15[f]. *Supra* §§VIII.E.6, VIII.G.7, VIII.K.7, VIII.L.7. To the extent the Board disagrees Gundlach teaches these elements, they are taught by Yializis for the same reasons explained for element 1[g]. *Supra* §IX.A.3; EX1003, ¶178.

G. Claims 8, 10

Gundlach teaches claims 8 and 10. *Supra* §§VIII.F, VIII.H. To the extent the Board disagrees Gundlach teaches these claims, they are taught by Yializis for the same reasons explained for element 1[h]. *Supra* §IX.A.4; EX1003, ¶179.

X. GROUND 3: CLAIMS 1-2 AND 4-15 ARE OBVIOUS OVER GUNDLACH AND REBOUILLAT

As explained above, Gundlach teaches claims 1-2, 4, 6-11, and 13-15. *Supra* §VIII. Should the Board disagree Gundlach teaches the aluminum layer, protective coating, or polymer layer in claims 1, 6-10, and 13-15, they would have been obvious based on the combined teachings of Gundlach and Rebouillat. Specifically, it would have been obvious to incorporate the emissivity and protective coating taught by

Rebouillat into Gundlach's stack so: (1) emissivity is ≤ 0.10 as perceived through an outer surface of the aluminum layer; (2) the protective layer has a thickness ≤ 1.0 microns, maintains the emissivity value, prevents oxidation of the aluminum layer during normal use, and does not impede oxidation of the aluminum layer during the Voluntary Standard; and (3) the polymer layer includes a film or fabric. EX1003, ¶¶180-181. Their combined teachings also render obvious claims 5 and 12.

A POSITA would have been motivated to combine these references because they are directed to the same field of endeavor: thermal insulation of goods using low emissivity, aluminized polymer material. EX1005, Abstract, [0005]-[0007], [0032], [0043]-[0045]; EX1008, [0004], [0021], [0043]-[0044]. The motivation is enhanced by other similarities and common features shared between them, e.g.:

- Uses for packaging food. EX1005, [0003]-[0007], [0032]; EX1008, [0004], [0021], [0108].
- Desired emissivity ≤ 0.10 . EX1005, [0007]; EX1008, [0050].
- Vapor depositing aluminum over polymer. EX1005, [0043], [0055], [0060]; EX1008, [0021], [0048]-[0050].
- Protective coatings over the aluminum layer. EX1005, [0009], [0036], [0046]; EX1008, [0032], [0051].

EX1003, ¶182.

Gundlach and Rebouillat provided the precise type of teaching, suggestion, or motivation to prompt a POSITA to combine them. *KSR*, 550 U.S. at 418; MPEP § 2141.III; EX1003, ¶182. Gundlach taught and suggested such a combination for the same reasons explained in *supra* §IX, e.g., emphasizing the need for packaging with performance suitable for temperature sensitive foods and a radiant barrier equal to aluminum foil. EX1003, ¶¶182-183. Rebouillat’s configuration accomplishes those needs. For example, Rebouillat’s stack includes thin layers of aluminum and protective lacquer and achieves an emissivity of “less than 0.1,” “improved thermal insulation,” and a “barrier to convective heat transfer.” *Supra* §VII.A.4; EX1008, [0050]-[0051], [0021], [0043]-[0044]. A POSITA would have been motivated to incorporate Rebouillat’s layers in Gundlach’s stack to optimize its performance and radiant barrier. EX1003, ¶183. A POSITA would have known that emissivity $\leq$ 0.10 was necessary to achieve a “radiant barrier” per industry standards. *Supra* §VIII.A.7. A POSITA would have been motivated to ensure this emissivity to achieve Gundlach’s express desire for the “superior radiant barrier property of aluminum foil.” EX1003, ¶184; *DyStar*, 464 F.3d at 1368.

A POSITA would have been motivated to incorporate Rebouillat’s protective lacquer in Gundlach’s stack to achieve the benefits suggested by both references. EX1003, ¶184. For example, Gundlach suggested the need for coating that “preserves the integrity of the metallized layer” and stays under 1% of the

packaging's overall weight. *Supra* §VIII.A.9. Similarly, Rebouillat recognized metallized layers are susceptible to corrosion damage during use. EX1008, [0051]. Hence, Rebouillat teaches a protective lacquer with a thickness configured to maintain “the emissivity of the low emissivity metal layer to which it is applied.” *Id.* A POSITA would have been motivated to implement Rebouillat's design to maximize the protection, strength, and durability of Gundlach's metallized layer during normal use, e.g., from moisture caused by hot food, and maintain its radiant barrier's emissivity. EX1003, ¶184; *DyStar*, 464 F.3d at 1368. A POSITA would have been motivated to do so to accomplish the same known advantages explained in *supra* §IX. EX1003, ¶185. Indeed, before 2018, the packaging industry had been exploring ways to accomplish those advantages, and a POSITA would have been familiar with Rebouillat's techniques and found them well-suited to improve Gundlach. *Id.*; *supra* §IX.

Moreover, as explained in *supra* §IX, the '148 Patent's claims simply arrange common elements that perform the same functions they were known to perform and yield predictable results. *KSR*, 550 U.S. at 417. Every element of claims 1-2 and 4-15 appears in both Gundlach and Rebouillat. *Infra* §X.A-F. Those elements consist of standard, predictable stack layers using well-known materials and established techniques familiar to any POSITA before 2018. EX1003, ¶186. For example, a POSITA would have been familiar with the flexible laminates and thinly deposited

aluminum claimed in the patent because they had existed in the industry before 2018. *Id.* There is nothing unpredictable about the claimed use of those materials and techniques in a recyclable packaging. *Id.*

Likewise, a POSITA would have a reasonable expectation of success in implementing Rebouillat's aluminum and protective coating configurations in Gundlach's stack because they were well-known, commonly used, and encouraged in the relevant field before 2018. *Supra* §IX; EX1003, ¶187. Aluminumized polymeric films and lacquers were already used routinely in packaging by 2018. *Id.*; EX1015, 13-15, 28-31; EX1016, 1-2; EX1017, 110-111. And protective coatings were "commercially available" before then and required by trade associations "on metalized aluminum films that are intended for reflective insulation and radiant barrier applications." EX1013; EX1017, 110-111; EX1003, ¶187. Conventional methods and technology would have made implementing them technically feasible, routine, and easy. *Id.*; EX1008, [0048]-[0049]; EX1013; EX1015, 13-31; EX1016, 1-2; EX1017, 110-111.

A. Claim 1

1. 1[pre]-1[e] and 1[g]

Gundlach teaches elements 1[pre]-1[e] and 1[g]. *Supra* §§VIII.A.1-6, VIII.A.8.

2. 1[f]

To the extent the Board disagrees Gundlach teaches “emissivity that is equal to or smaller than a first value of 0.10 as perceived through an outer surface of the aluminum layer,” it is taught by Rebouillat. EX1003, ¶¶189-191. Rebouillat teaches multilayered, low emissivity cover materials and reflective sheets for thermally insulating temperature-sensitive products, including food. EX1008, Abstract, [0002], [0008], [0021], [0032], [0043]-[0044], [0060], [0068]-[0069]. Figure 1b below illustrates an embodiment of a “cover 11” comprising a polymer “layer 1” (**blue**), “metal layer 2” (**silver**), and “protective lacquer coating 3” (**purple**). EX1008, [0032], [0046]-[0051].

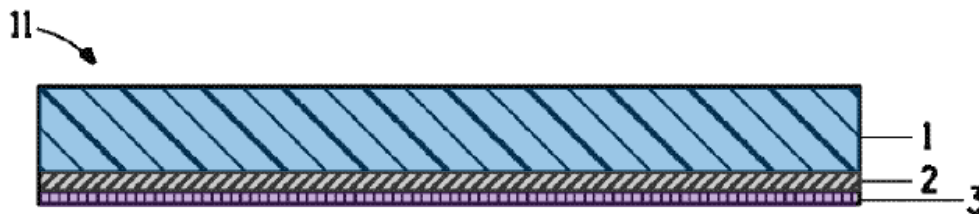


FIG. 1b

EX1008, Fig. 1b (annotated). Metal layer 2 is vapor deposited “aluminum,” has a thickness “less than 0.2 microns and most preferably less than 0.1 microns,” and provides “an inner surface with an emissivity” of “less than 0.1.” EX1008, [0032], [0048], [0050]. Emissivity of the cover material is measured from the

metallized/inner side, per ASTM C1371. EX1008, [0021], [0031], [0069], [0089]; *supra* §VIII.A.7.

It would have been obvious to incorporate Rebouillat's emissivity into Gundlach's stack for the same reasons explained in *supra* §X.A. EX1003, ¶191.

3. 1[h]

To the extent the Board disagrees Gundlach teaches a protective coating with "second thickness of 1 micron or less" that maintains "the emissivity at the first value after the aluminum layer has been coated with the protective coating," and that prevents "oxidation of the aluminum layer during normal use of the packaging, while not impeding oxidation of the aluminum layer as a result of the treatment," they are taught by Rebouillat. EX1003, ¶¶192-194.

Rebouillat teaches disposing a protective lacquer "on top of the low emissivity metal layer" at a thickness "between 0.2 and 1.0 micron." EX1008, [0051]. The "thickness and composition of this protective lacquer is selected such that it substantially changes neither the moisture vapor permeability of the reflective sheet, nor the emissivity of the low emissivity metal layer to which it is applied." *Id.* A POSITA would understand this to mean the protective lacquer prevents oxidation of the aluminum layer during normal use, including when the cover material is used for food packaging (i.e., maintain the radiant barrier), but allows full oxidization of the

aluminum layer during a recycling treatment, e.g., the Voluntary Standard, to ensure the packaging is recyclable. EX1003, ¶193.

It would have been obvious to incorporate Rebouillat's protective lacquer into Gundlach's stack for the same reasons explained in *supra* §X.A. EX1003, ¶194.

B. Claims 2, 4, and 11

Gundlach teaches claims 2, 4, and 11. *Supra* §§VIII.B, VIII.C, VIII.I.

C. Claims 5 and 12

Rebouillat teaches the polymer layer includes polypropylene or Tyvek®. EX1008, [0032], [0043], [0046]-[0047]; EX1003, ¶196. It would have been obvious to include polypropylene or HDPE, as taught by Rebouillat, in Gundlach's polymer layer for the same reasons explained in *supra* §X. EX1003, ¶196. A POSITA would have also been motivated to use these materials because they were among the most common polymers and routinely used in packaging by 2018. *Id.*

D. Claims 6 and 13

To the extent the Board disagrees Gundlach teaches a polymer layer that is or includes a material selected from “film and fabric,” it is taught by Rebouillat. EX1003, ¶¶197-198. Rebouillat teaches the polymer layer can include “any fabric known in the fabric art” or “microporous films.” EX1008, [0044], [0046]-[0047]; EX1003, ¶197.

It would have been obvious to include a fabric or film, as taught by Rebouillat, in Gundlach's polymer layer for the same reasons explained in *supra* §X and §X.C.

EX1003, ¶198. A POSITA would have been motivated to include these materials because they were very common and routinely used in commercial packaging by 2018. *Id.*; EX1008, [0047].

E. Claims 7, 9, 14, and 15

1. Elements 7[pre]-7[c], 7[e], 9[pre]-9[d], 9[f], 14[pre]-14[d], 14[f], 15[pre]-15[f]

Gundlach teaches elements 7[pre]-7[c], 7[e], 9[pre]-9[d], 9[f], 14[pre]-14[d], 14[f], 15[pre]-15[f]. *Supra* §§VIII.E.1-4, VIII.E.6, VIII.G.1-5, VIII.G.7, VIII.K.1-5, VIII.K.7, VIII.L.1-6, VIII.L.1-7.

2. Elements 7[d], 9[e], 14[e], and 15[e]

Gundlach teaches elements 7[d], 9[e], 14[e], and 15[e]. *Supra* §§VIII.E.5, VIII.G.6, VIII.K.6, VIII.L.6. To the extent the Board disagrees Gundlach teaches these elements, they are taught by Rebouillat for the same reasons explained for element 1[f]. *Supra* §X.A.2; EX1003, ¶200.

F. Claims 8, 10

Gundlach teaches claims 8 and 10. *Supra* §§VIII.F, VIII.H. To the extent the Board disagrees Gundlach teaches these claims, they are taught by Rebouillat for the same reasons explained for element 1[h]. *Supra* §X.A.3; EX1003, ¶201.

XI. GROUND 4: CLAIMS 1-2, 4, 6-11, AND 13-15 ARE OBVIOUS OVER GUNDLACH AND THE VOLUNTARY STANDARD REFERENCE

As explained above, Gundlach teaches every element of claims 1-2, 4, 6-11, and 13-15. *Supra* §VIII. To the extent the Board requires a reference that teaches

the Voluntary Standard, in the alternative, these claims would have been obvious based on the combined teachings of Gundlach and the Voluntary Standard Reference. EX1003, ¶¶202-210.

It would have been obvious to a POSITA to implement the recycling treatment taught by the Voluntary Standard Reference on the recyclable packaging taught by Gundlach. EX1003, ¶203. Indeed, a POSITA would have understood that for Gundlach’s packaging material to be considered “recyclable,” it must be subjected to the testing steps recited in independent claims 1, 7, 9, 14, and 15, as further taught by the Voluntary Standard Reference. *Id.* At the time of the alleged invention, the Voluntary Standard was widely viewed by packaging companies and POSITAs to be the “gold standard” for recyclability. *Id.* Before 2018, the test method described in the standard was known and routinely used by companies and POSITAs to determine whether a paper product was recyclable. *Id.* The ’148 Patent admits the test method was “recognized” in the industry, was “the commonly-used test” for paper packaging, and was “required to be able to determine whether such given corrugated container or packaging can be classified as repulpable or recyclable.” EX1001, 4:64-5:30.

Gundlach and the Voluntary Standard Reference provided the precise type of teaching, suggestion, or motivation that would have prompted a POSITA to combine both references. *KSR*, 550 U.S. at 418; MPEP § 2141.III; EX1003, ¶204. Gundlach

identified significant drawbacks in packaging material using aluminum foil, including being “unsuitable for composting or paper recycling,” “more expensive and often economically unfeasible” to recycle, and often sent to a landfill. EX1005, [0006]. Gundlach emphasized the need for material that was “well suited for paper recycling and commercial or industrial composting.” EX1005, [0007], [0051].

The Voluntary Standard Reference addressed similar considerations: “Disposing of treated corrugated that cannot be recycled can be a financial and logistical burden” and “certain treatments to improve performance in the presence of water or water vapor have made recycling difficult.” EX1007, 3-4. A problem the Voluntary Standard Reference solved was to provide a process to “determine the repulpability and recyclability” of paper products applying a “commonly used subset of repulping and recycling processes,” and establishing “minimum levels of performance” for the products to be considered “recyclable.” EX1007, 4-6, 9, 11-12, 23. Before 2018, a POSITA would have been familiar with these issues and processes and would have embraced the idea of a packaging material with both superior performance and recyclability characteristics. EX1003, ¶205.

Indeed, a POSITA would have readily turned to the Voluntary Standard Reference as a go-to recycling process for Gundlach’s packaging material because, at the time of the ’148 Patent’s filing, the Voluntary Standard was widely considered to be the gold standard for recyclability testing and a necessity in order to classify

commercial packaging as “recyclable.” EX1003, ¶206. Moreover, both references are directed to the same field of endeavor: paper packaging materials that are recyclable. EX1005, [0003]-[0007], [0037]; EX1007, 3-6.

A POSITA would have had a reasonable expectation of success implementing the Voluntary Standard Reference’s treatment because it was an established and routine recycling process in the packaging field by 2018. EX1003, ¶207. As the reference explains, it used “common mill” and “process technology either in effect or readily achievable in mills currently involved in recycling.” EX1007, 3-4. By 2018, it was predictable to implement the Voluntary Standard on Gundlach’s packaging to form a recyclable material. EX1003, ¶207. Furthermore, the ’148 Patent supports a reasonable expectation of success because, as explained above, it admits that the Voluntary Standard was “commonly-used” within the industry, and the ’148 Patent itself uses and refers to its processes throughout. *Supra* §VII.A.3.

The Voluntary Standard Reference teaches the “treatment” recited in elements 1[g], 7[e], 9[f], 14[f], and 15[f]. The standard describes a recycling process that simulates the repulping/recycling processes and technology commonly used in mills involved in the recycling of paper products. EX1007, 3-5. The standard teaches the process includes blending a packaging material in a Waring blender and disintegrating the resulting material with “a British Disintegrator in water . . . maintained at 125°F (±10°)” at 3000 rpm. EX1007, 5, 9 (“Preheat blender and

British disintegrator to 125° F ± 10° F.” “Blend in a one-gallon Waring blender . . . on low speed (15,000 rpm) for four minutes.” “Rinse all fibers from the blender with 500 ml. of hot water.” “Deflake for five minutes in the British disintegrator (2000 ml. total volume) at 3000 rpm.”). Further, the process includes separating the disintegrated material “in a screen with 0.010-inch or smaller slots” with a one-inch water head for 20 minutes. EX1007, 5, 9 (“Run on .010” (.254 mm) slotted open flat screen, maintaining 1” water head, – for 20 minutes; save the accepts and rejects in aluminum weighing pans.”). The process then includes drying that resulting material in an oven for eight hours at 221°F. EX1007, 9 (“Dry in a laboratory oven for 12 hours (± 4 hours) at 221°F.”).

Gundlach teaches the remaining element of claims 1-2, 4, 6-11, and 13-15. *Supra* §VIII.

Thus, because a POSITA would have been motivated to combine Gundlach and the Voluntary Standard Reference, and all elements of claims 1-2, 4, 6-11, and 13-15 are taught by these references, the claims are rendered obvious over this combination.

XII. GROUND 5: CLAIMS 1-15 ARE OBVIOUS OVER GUNDLACH, YIALIZIS, AND THE VOLUNTARY STANDARD REFERENCE

As explained above, the combined teachings of Gundlach and Yializis render obvious claims 1-15. *Supra* §IX. To the extent the Board requires a reference that teaches the Voluntary Standard, in the alternative, these claims would have been

obvious based on the combined teachings of Gundlach, Yializis, and the Voluntary Standard Reference. EX1003, ¶¶211-214.

It would have been obvious to a POSITA to combine the Voluntary Standard Reference's treatment with the Gundlach-Yializis packaging, and a POSITA would have been motivated to do so with a reasonable expectation of success, for the same reasons explained in *supra* §IX and §XI. EX1003, ¶212.

The Voluntary Standard Reference teaches the "treatment" recited in elements 1[g], 7[e], 9[f], 14[f], and 15[f] for the reasons explained in *supra* §XI. The combination of Gundlach and Yializis teach the remaining elements of claims 1-15 for the reasons explained in *supra* §IX.

Thus, because a POSITA would have been motivated to combine Gundlach, Yializis, and the Voluntary Standard Reference, and all elements of claims 1-15 are taught by these references, the claims are rendered obvious over this combination.

XIII. GROUND 6: CLAIMS 1-2 AND 4-15 ARE OBVIOUS OVER GUNDLACH, REBOUILLAT, AND THE VOLUNTARY STANDARD REFERENCE

As explained above, the combined teachings of Gundlach and Rebouillat render obvious claims 1-15. *Supra* §X. To the extent the Board requires a reference that teaches the Voluntary Standard, in the alternative, these claims would have been obvious based on the combined teachings of Gundlach, Rebouillat, and the Voluntary Standard Reference. EX1003, ¶¶215-218.

It would have been obvious to a POSITA to combine the Voluntary Standard Reference's treatment with the Gundlach-Rebouillat packaging, and a POSITA would have been motivated to do so with a reasonable expectation of success, for the same reasons explained in *supra* §X and §XI. EX1003, ¶216.

The Voluntary Standard Reference teaches the "treatment" recited in elements 1[g], 7[e], 9[f], 14[f], and 15[f] for the reasons explained in *supra* §XI. The combination of Gundlach and Rebouillat teaches the remaining elements of claims 1-2 and 4-15 for the reasons explained in *supra* §X.

Thus, because a POSITA would have been motivated to combine Gundlach, Rebouillat, and the Voluntary Standard Reference, and all elements of claims 1-2 and 4-15 are taught by these references, the claims are rendered obvious over this combination.

XIV. NO BASIS FOR DISCRETIONARY DENIAL

Pursuant to and in reliance on Acting Director Coke M. Stewart's March 26, 2025, Memorandum regarding Interim Processes for PTAB Workload Management, Petitioner understands that discretionary denial issues, if any, will be raised in a separate brief to be filed by Patent Owner. If Patent Owner files such a brief, Petitioner intends to respond in an opposition brief consistent with Acting Director Coke M. Stewart's March 26, 2025, Memorandum regarding Interim Processes for PTAB Workload Management.

XV. EXPLANATION OF NON-REDUNDANCY

The alternative grounds for challenging patentability are not redundant, due to art not considered by the Examiner, including the inventor's own publication, and due to the relative strengths and weaknesses of the asserted prior art to the various claim limitations. Further, given the limited total number of references, the consideration of all of the asserted grounds will not affect the Board's ability to fulfill its statutory responsibilities pursuant to 35 U.S.C. § 316(a)(11). Likewise, such consideration would not impact the just, speedy, or inexpensive resolution of this proceeding pursuant to 37 C.F.R. § 42.20(c).

XVI. NO SECONDARY CONSIDERATIONS

Petitioner is unaware of any secondary considerations that weigh against institution. EX1003, ¶¶219-221. Should Patent Owner identify any, Petitioner requests an opportunity to rebut such evidence. *Amneal Pharms. v. Supernus Pharms.*, IPR2013-00368, Paper 8, at 12-13 (P.T.A.B. Dec. 17, 2013).

XVII. CONCLUSION

For the forgoing reasons, Petitioner respectfully requests institution of IPR and cancellation of claims 1-15.

Dated: June 11, 2025

Respectfully submitted,

/Walter D. Davis, Jr./
Walter D. Davis, Jr.
Reg. No. 45,137
Counsel for Petitioner

CERTIFICATE OF WORD COUNT

I hereby certify that the foregoing Petition complies with the type-volume limitation of 37 C.F.R. §42.24 and contains 13,950 words based on the word count indicated by the word processing system used to prepare this Petition, excluding those portions exempted by §42.24(a)(1). I also certify that the foregoing Petition complies with the general format requirements of 37 C.F.R. §42.6(c) and has been prepared using Microsoft® Word in 14-point, Times New Roman font.

/Walter D. Davis, Jr./
Walter D. Davis, Jr.
Reg. No. 45,137
Counsel for Petitioner

CERTIFICATE OF SERVICE

I hereby certify that on this 11th day of June 2025, a true and correct copy of this Petition for Inter Partes Review, including exhibits, was filed with the Patent Trial and Appeal Board Case Tracking System (P-TACTS) and served via overnight FedEx on the Patent Owner at the correspondence addresses of record as follows:

34282 - QUARLES & BRADY LLP (TUC)
Attn: IP Docket
One South Church Ave, Suite 1800
Tucson, Arizona 85701

Courtesy copies of these documents were also served via electronic mail on Patent Owner's counsel of record in the Delaware Action.

/Walter D. Davis, Jr./
Walter D. Davis, Jr.
Reg. No. 45,137
Counsel for Petitioner