

Small Entity Declaration

PATENT
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**Application Number:** 14/325414**Current Date:** May 13, 2022**Filing Date:** July 8, 2014**Patent Number:** 8,968,924**Issue Date:** March 3, 2015**ASSERTION OF SMALL ENTITY STATUS**
PURSUANT TO 37 C.F.R. §1.27 (c)(1)Commissioner for Patents
Mail Stop M Correspondence
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This communication hereby asserts that the above-identified patent is entitled to small entity status.

COMPANY or FIRM
NAME AND ADDRESS:Molecular Rebar Design LLC
13477 Fitzhugh Rd
Austin TX

Respectfully submitted,

Signature

STEPHEN P. KRUPP

Printed Name

CHIEF PATENT COUNSEL

Title

Reg. # If US Attorney 34366

FAX TO:

Commissioner of Patents and Trademarks
Attn. Maintenance Fee Branch
Office of Finance – Maintenance Fee Division
2051 Jamieson Ave – Suite 300
Alexandria, VA 22314

Fax no.: 001 571 273-6500

16 May 2022

URGENT

Dear Sirs,

Please see the attached entity status form to be amended to **SMALL** Entity status.

Please can you amend you records accordingly.

Many thanks for your assistance.

Kind regards,

Ruchi Nautiyal

Data Verification Specialist

CPA GLOBAL

Direct Dial: +91 120 406 7564

E-mail: Ruchi.nautiyal@clarivate.com

Certificate of Facsimile Transmission

I hereby certify that this document is being facsimile transmitted to the USPTO at 001 571-273-6500 on the date shown below.

Date
16-May-22

Signed Ruchi Nautiyal

Large Entity Declaration

PATENT
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ASSERTION OF LARGE ENTITY STATUS
PURSUANT TO 37 C.F.R. §1.27 (g)(2)

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

Sir:

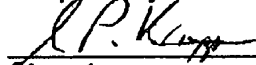
This communication hereby asserts that the patents identified in the attached
Schedule A are entitled to large entity status.

COMPANY or FIRM
NAME AND ADDRESS:

Molecular Rebar Design, LLC
13477 Fitzhugh Road
Austin, TX 78736

Account: 2486785

Respectfully submitted,



Signature

Stephen Krupp

Printed Name

Chief Patent Counsel

Title

OR

Reg. # if US Attorney 34,866



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/325,414	03/03/2015	8968924	DENA-0008WO/US/D1	3135

117364 7590 02/11/2015
Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

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

Clive P. Bosnyak, Dripping Springs, TX;
Molecular Rebar Design, LLC, Austin, TX, Assignee (with 37 CFR 1.172 Interest);
Kurt W. Swogger, Austin, TX;

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

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

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

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

117364 7590 12/31/2014
Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

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

Certificate of Mailing or Transmission

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

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1	3135

TITLE OF INVENTION: LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	03/31/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
MCCONNELL, WYATT P	1726	429-209000

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

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

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

1 **Jackson Walker L.L.P.**

2 _____

3 _____

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

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

(A) NAME OF ASSIGNEE

Molecular Rebar Design, LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Austin, Texas

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

4a. The following fee(s) are submitted:

- ☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number **10-0096** (enclose an extra copy of this form).

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

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
☐ Applicant asserting small entity status. See 37 CFR 1.27
☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature

T. Ling Chwang

Date **January 21, 2015**

Typed or printed name

T. Ling Chwang

Registration No. **33590**

Electronic Patent Application Fee Transmittal				
Application Number:		14325414		
Filing Date:		08-Jul-2014		
Title of Invention:		LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		
First Named Inventor/Applicant Name:		Clive P. Bosnyak		
Filer:		T. Ling Chwang/Debbie Sams		
Attorney Docket Number:		DENA-0008WO/US/D1		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				480

Electronic Acknowledgement Receipt	
EFS ID:	21262821
Application Number:	14325414
International Application Number:	
Confirmation Number:	3135
Title of Invention:	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
First Named Inventor/Applicant Name:	Clive P. Bosnyak
Customer Number:	117364
Filer:	T. Ling Chwang/Debbie Sams
Filer Authorized By:	T. Ling Chwang
Attorney Docket Number:	DENA-0008WO/US/D1
Receipt Date:	21-JAN-2015
Filing Date:	08-JUL-2014
Time Stamp:	11:52:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$480
RAM confirmation Number	10818
Deposit Account	100096
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	012115_Issue_Fee_Transmittal.pdf	140850 dc28114ad675626d0e7916fc3100a78c1cf489	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30801 62a612e9a67edd9c24a70dea3362cd1536e21edf	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			171651		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

117364 7590 12/31/2014
Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

EXAMINER

MCCONNELL, WYATT P

ART UNIT

PAPER NUMBER

1726

DATE MAILED: 12/31/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1	3135

TITLE OF INVENTION: LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	03/31/2015

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885**

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

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

117364 7590 12/31/2014
Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

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

Certificate of Mailing or Transmission

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

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1	3135

TITLE OF INVENTION: LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	03/31/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
MCCONNELL, WYATT P	1726	429-209000

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

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

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

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

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

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

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

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1	3135

117364	7590	12/31/2014
Molecular Rebar Design, LLC		
Jackson Walker L.L.P.		
901 Main Street, Suite 6000		
Dallas, TX 75202		

EXAMINER	
MCCONNELL, WYATT P	

ART UNIT	PAPER NUMBER
1726	

DATE MAILED: 12/31/2014

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

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

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

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

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 14/325,414	Applicant(s) BOSNYAK ET AL.	
	Examiner WYATT MCCONNELL	Art Unit 1726	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *After-final amendment filed December 19, 2014*.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☒ The allowed claim(s) is/are 14,16-18,20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

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

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

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

Attachment(s)

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

	/PATRICK RYAN/ Supervisory Patent Examiner, Art Unit 1726
--	--

Issue Classification 	Application/Control No. 14325414	Applicant(s)/Patent Under Reexamination BOSNYAK ET AL.	
	Examiner WYATT MCCONNELL	Art Unit 1726	

CPC					
Symbol				Type	Version
H01M	4	366		F	2013-01-01
H01M	4	131		I	2013-01-01
H01M	4	133		I	2013-01-01
H01M	4	134		I	2013-01-01
H01M	4	1391		I	2013-01-01
H01M	4	1393		I	2013-01-01
H01M	4	1395		I	2013-01-01
H01M	4	505		I	2013-01-01
H01M	4	525		I	2013-01-01
H01M	4	625		I	2013-01-01
H01M	10	0525		I	2013-01-01
Y02E	60	122		A	2013-01-01
B82Y	99	00		A	2013-01-01
H01M	4	587		I	2013-01-01
Y10S	977	742		A	2013-01-01
Y10S	977	948		A	2013-01-01
B82Y	30	00		A	2013-01-01
H01M	4	0416		I	2013-01-01

CPC Combination Sets						
Symbol			Type	Set	Ranking	Version

/W.M./ Examiner.Art Unit 1726 (Assistant Examiner)	12/24/2014 (Date)	Total Claims Allowed: 5	
/PATRICK RYAN/ Supervisory Patent Examiner.Art Unit 1726 (Primary Examiner)	12/29/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification 	Application/Control No. 14325414	Applicant(s)/Patent Under Reexamination BOSNYAK ET AL.
	Examiner WYATT MCCONNELL	Art Unit 1726

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION													
CLASS		SUBCLASS				CLAIMED					NON-CLAIMED								
429		209				H	0	1	M	4 / 133 (2010.01.01)									
CROSS REFERENCE(S)																			
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																		

/W.M./ Examiner.Art Unit 1726 (Assistant Examiner)	12/24/2014 (Date)	Total Claims Allowed: 5	
/PATRICK RYAN/ Supervisory Patent Examiner.Art Unit 1726 (Primary Examiner)	12/29/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

<i>Search Notes</i> 	Application/Control No. 14325414	Applicant(s)/Patent Under Reexamination BOSNYAK ET AL.
	Examiner WYATT MCCONNELL	Art Unit 1726

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Reviewed search in 14/128,392	7/27/2014	/W.M./

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
EAST search		12/24/2014	/W.M./

--	--

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Clive P. Bosnyak, *et al.*

Serial No.: 14/325,414

Filed: July 8, 2014

Art Unit: 1726

OK TO ENTER: /W.M./

Examiner: McConnell, Wyatt P.

Conf. No.: 3135

For: LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES,
METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED
THEREFROM

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

Sir:

RESPONSE TO FINAL OFFICE ACTION

In response to the communication from the Examiner dated November 19, 2014, having a deadline for response expiring February 19, 2015, Applicants hereby amend the application as follows and submit the following remarks.

Amendments to the Claims are reflected in the listing of claims that begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

Conclusion begins on page 4 of this paper.



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BIB DATA SHEET

CONFIRMATION NO. 3135

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
14/325,414	07/08/2014	429	1726	DENA-0008WO/US/D1		
APPLICANTS Molecular Rebar Design, LLC, Austin, TX, Assignee (with 37 CFR 1.172 Interest); INVENTORS Clive P. Bosnyak, Dripping Springs, TX; Kurt W. Swogger, Austin, TX; ** CONTINUING DATA ***** This application is a DIV of 14/128,392 12/20/2013 PAT 8808909 which is a 371 of PCT/US12/43534 06/21/2012 which claims benefit of 61/500,560 06/23/2011 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 07/18/2014						
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and /WYATT P Acknowledged MCCONNELL/ Examiner's Signature		☐ Met after Allowance Initials	STATE OR COUNTRY TX	SHEETS DRAWINGS 3	TOTAL CLAIMS 10	INDEPENDENT CLAIMS 3
ADDRESS Molecular Rebar Design, LLC Jackson Walker L.L.P. 901 Main Street, Suite 6000 Dallas, TX 75202 UNITED STATES						
TITLE LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM						
FILING FEE RECEIVED 730	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
14/325,414	07/08/2014	1726	730	DENA-0008WO/US/D1	10	3

CONFIRMATION NO. 3135

CORRECTED FILING RECEIPT



OC000000072511155

117364

Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

Date Mailed: 12/23/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Clive P. Bosnyak, Dripping Springs, TX;
Kurt W. Swogger, Austin, TX;

Applicant(s)

Molecular Rebar Design, LLC, Austin, TX

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a DIV of 14/128,392 12/20/2013 PAT 8808909
which is a 371 of PCT/US12/43534 06/21/2012
which claims benefit of 61/500,560 06/23/2011

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 07/18/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/325,414**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

Preliminary Class

429

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Clive P. Bosnyak, *et al.*

Serial No.: 14/325,414

Filed: July 8, 2014

Art Unit: 1726

Examiner: McConnell, Wyatt P.

Conf. No.: 3135

For: LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES,
METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED
THEREFROM

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

Sir:

RESPONSE TO FINAL OFFICE ACTION

In response to the communication from the Examiner dated November 19, 2014, having a deadline for response expiring February 19, 2015, Applicants hereby amend the application as follows and submit the following remarks.

Amendments to the Claims are reflected in the listing of claims that begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

Conclusion begins on page 4 of this paper.

IN THE CLAIMS:

Claims 1-13 (Cancelled).

14. (Previously presented) A composition used in lithium ion batteries comprising:
discrete carbon nanotubes having ion active material attached to their surface, wherein the discrete carbon nanotubes have an aspect ratio of 10 to 500 and oxidation levels from 1% to 15% by weight of the carbon nanotube, and wherein the ion active material comprise a lithium metal salt and an element selected from the group consisting of: iron, manganese, cobalt, copper, nickel, vanadium, titanium, and mixtures thereof.
15. (Cancelled).
16. (Previously presented) The composition of claim 14, further comprising graphene or oxygenated graphene.
17. (Previously presented) The composition of claim 16, wherein the weight ratio of graphene to carbon nanotube is in the range of 0.1:99.9 to 99.9:0.1.
18. (Previously presented) The composition of claim 14, wherein the carbon nanotubes are present in a weight percentage of 0.1% to 10% by weight of the ion active material.
19. (Cancelled).
20. (Previously presented) The composition of claim 14, comprising uniformly dispersible oxidized carbon nanotubes having ion active materials attached to their surface.
21. (Cancelled).

REMARKS

Applicants have carefully considered this Application in connection with the Examiner's Action, and respectfully requests reconsideration of this Application in view of the above Amendments and the following remarks.

Pending in the current application are Claims 14, 16-18, and 20. Claims 1-7, 10-13, 15, 19, and 21 were previously cancelled. Claims 8-9 are cancelled in this response.

I. Rejections Under 35 U.S.C. §112**A. Enablement – 35 U.S.C. §112, First Paragraph**

Claims 8 and 9 stand rejected under 35 U.S.C. §112, first paragraph (pre-AIA), as being non-enabled by the specification. Applicants respectfully disagree with the Examiner's reasoning and submit that the claims are enabled. However, to advance prosecution of this application, Claims 8-9 have been cancelled. Applicants respectfully request that the rejections under 35 U.S.C. §112, first paragraph (pre-AIA), for lacking enablement be withdrawn.

B. Written Description – 35 U.S.C. §112, First Paragraph

Claims 8 and 9 stand rejected under 35 U.S.C. §112, first paragraph (pre-AIA), as failing to comply with the written description requirement. Applicants respectfully disagree with the Examiner's reasoning and submit that the claims are supported by the written description. However, to advance prosecution of this application, Claims 8-9 have been cancelled. Applicants respectfully request that the rejections under 35 U.S.C. §112, first paragraph (pre-AIA), for lacking written description be withdrawn.

II. Allowable Subject Matter

Applicants thank the Examiner for indicating that Claims 14, 16-18, and 20 are allowed. Following the cancellation of Claims 8-9, all pending claims in this application are now allowed.

CONCLUSION

Applicants respectfully submit that in light of the foregoing amendment and comments, Claims 14, 16-18, and 20 are in condition for allowance. A Notice of Allowance is respectfully requested.

If additional information is required, the Examiner is encouraged to contact the undersigned at (214) 953-5959 so that such issues may be resolved as expeditiously as possible.

The Commissioner is hereby authorized to charge any additional fee or credit any refund to Deposit Account No. 10-0096.

Date: Dec. 19, 2014

Respectfully submitted,

By: T. Ling Chwang
T. Ling Chwang
Reg. No. 33,590

Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202
Tel: (214) 953-5959
Fax: (214) 661-6870

Electronic Acknowledgement Receipt	
EFS ID:	21021945
Application Number:	14325414
International Application Number:	
Confirmation Number:	3135
Title of Invention:	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
First Named Inventor/Applicant Name:	Clive P. Bosnyak
Customer Number:	117364
Filer:	T. Ling Chwang/Debra Pepper
Filer Authorized By:	T. Ling Chwang
Attorney Docket Number:	DENA-0008WO/US/D1
Receipt Date:	19-DEC-2014
Filing Date:	08-JUL-2014
Time Stamp:	16:16:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response After Final Action	DENA0008WOUSD1RESPTOFINAL.pdf	181421 01c5481d5411defc88f0c54a6eee02b313c13fb7	no	4

Warnings:

Information:

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 14/325,414		Filing Date 07/08/2014		☐ To be Mailed				
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO													
APPLICATION AS FILED – PART I													
(Column 1)			(Column 2)										
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)					
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A							
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A							
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A							
TOTAL CLAIMS (37 CFR 1.16(j))		minus 20 =		*		X \$ =							
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		X \$ =							
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).											
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))													
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL							
APPLICATION AS AMENDED – PART II													
(Column 1)			(Column 2)			(Column 3)							
AMENDMENT	12/19/2014		CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		* 5		Minus	** 20		= 0		X \$40 =		0	
	Independent (37 CFR 1.16(h))		* 1		Minus	***3		= 0		X \$210 =		0	
	☐ Application Size Fee (37 CFR 1.16(s))												
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))												
	TOTAL ADD'L FEE											0	
(Column 1)			(Column 2)			(Column 3)							
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		*		Minus	**		=		X \$ =			
	Independent (37 CFR 1.16(h))		*		Minus	***		=		X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))												
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))												
	TOTAL ADD'L FEE												
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.													

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Molecular Rebar Design, LLC
Serial No.: 14/325,414
Filed: July 8, 2014
Art Unit: 1726
Examiner: unknown
Confirmation No.: 3135
For: **LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES,
METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED
THEREFROM**

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

Sir:

REQUEST FOR CORRECTED FILING RECEIPT

Enclosed is a supplemental Application Data Sheet correcting the domestic priority claim. Specifically, the filing date of U.S. Serial No. 14/128,392 has been changed to 2013-12-20. Also enclosed is a marked up copy of the Filing Receipt, which indicates the removal of the asterisk in the domestic priority data field. All other details are correct. Please issue a corrected Filing Receipt in due course.

Date: December 16, 2014

Respectfully submitted,

By: /T. Ling Chwang/
T. Ling Chwang
Reg. No. 33,590

Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202
Tel: (214) 953-5959
Fax: (214) 661-6870



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
14/325,414	07/08/2014	1726	730	DENA-0008WO/US/D1	10	3

CONFIRMATION NO. 3135

FILING RECEIPT



117364
Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

Date Mailed: 07/21/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Clive P. Bosnyak, Dripping Springs, TX;
Kurt W. Swogger, Austin, TX;

Applicant(s)

Molecular Rebar Design, LLC, Austin, TX

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a DIV of 14/128,392 12/20/2013 /
which is a 371 of PCT/US12/43534 06/21/2012
which claims benefit of 61/500,560 06/23/2011

~~(*)Data provided by applicant is not consistent with PTO records.~~

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 07/18/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/325,414**

Projected Publication Date: 10/30/2014

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

Preliminary Class

429

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1						Remove	
Legal Name							
Prefix	Given Name	Middle Name	Family Name	Suffix			
	Clive	P.	Bosnyak				
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service							
City	Dripping Springs	State/Province	TX	Country of Residence	US		
Mailing Address of Inventor:							
Address 1		12001 Settlers Trail					
Address 2							
City	Dripping Springs	State/Province	TX				
Postal Code	78620	Country i	US				
Inventor 2						Remove	
Legal Name							
Prefix	Given Name	Middle Name	Family Name	Suffix			
	Kurt	W.	Swogger				
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service							
City	Austin	State/Province	TX	Country of Residence	US		
Mailing Address of Inventor:							
Address 1		4211 Waters Edge Cove					
Address 2							
City	Austin	State/Province	TX				
Postal Code	78731	Country i	US				
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.							

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

☐ An Address is being provided for the correspondence information of this application.			
Customer Number	117364		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		
Attorney Docket Number	DENA-0008WO/US/D1	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	3	Suggested Figure for Publication (if any)	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	117364		

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Division of	14128392	2013-12-20
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14128392	a 371 of international	PCT/US12/43534	2012-06-21
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US12/43534	Claims benefit of provisional	61500560	2011-06-23
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. ☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
--

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.
--

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

☒ Assignee	☐ Legal Representative under 35 U.S.C. 117	☐ Joint Inventor
☐ Person to whom the inventor is obligated to assign.	☐ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name Molecular Rebar Design, LLC

Mailing Address Information For Applicant:

Address 1 13477 Fitzhugh Road

Address 2

City Austin

State/Province TX

Country US

Postal Code 78736

Phone Number

Fax Number

Email Address

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ⁱ		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.					
Signature	/T. Ling Chwang/			Date (YYYY-MM-DD)	2014-12-16
First Name	T. Ling	Last Name	Chwang	Registration Number	33590
Additional Signature may be generated within this form by selecting the Add button.					

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

Electronic Acknowledgement Receipt	
EFS ID:	20971640
Application Number:	14325414
International Application Number:	
Confirmation Number:	3135
Title of Invention:	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
First Named Inventor/Applicant Name:	Clive P. Bosnyak
Customer Number:	117364
Filer:	T. Ling Chwang/Debra Pepper
Filer Authorized By:	T. Ling Chwang
Attorney Docket Number:	DENA-0008WO/US/D1
Receipt Date:	16-DEC-2014
Filing Date:	08-JUL-2014
Time Stamp:	10:54:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Corrected Filing Receipt	DENA0008WOUSD1THIRDREQ CORRFR.pdf	312685 4f9a01b849eb5f1d416d10645188cfd7161a30fe	no	4

Warnings:

Information:

2	Application Data Sheet	DENA0008WOUSD1SUPPADS. pdf	775886 f04be30b809cb8b0610fc159a3463dd5bef9a601	no	7
Warnings:					
Information:					
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Total Files Size (in bytes):			1088571		
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1	3135
117364 7590 11/19/2014 Molecular Rebar Design, LLC Jackson Walker L.L.P. 901 Main Street, Suite 6000 Dallas, TX 75202			EXAMINER MCCONNELL, WYATT P	
			ART UNIT 1726	PAPER NUMBER
			MAIL DATE 11/19/2014	DELIVERY MODE PAPER

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

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

Office Action Summary	Application No. 14/325,414	Applicant(s) BOSNYAK ET AL.	
	Examiner WYATT MCCONNELL	Art Unit 1726	AIA (First Inventor to File) Status No

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

Period for Reply

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

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

Status

- 1) ☒ Responsive to communication(s) filed on October 31, 2014.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 8,9,14,16-18 and 20 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☒ Claim(s) 14,16-18 and 20 is/are allowed.
- 7) ☒ Claim(s) 8 and 9 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

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

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

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

Attachment(s)

- | | |
|--|---|
| 1) ☐ Notice of References Cited (PTO-892) | 3) ☐ Interview Summary (PTO-413) |
| 2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) | Paper No(s)/Mail Date. ____. |
| Paper No(s)/Mail Date ____. | 4) ☐ Other: ____. |

1. The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 112

I. Rejections Under 112, First Paragraph

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

A. Scope of Enablement

Claims 8 and 9 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of making or composition comprising discrete carbon nanotubes having layers of lithium ion active material where the lithium ion active material is a salt and compositions comprising those coated discrete carbon nanotubes, does not reasonably provide enablement for a method of making or composition comprising discrete carbon nanotubes requiring an annealing step to achieve said composition. It is well settled that, in order to be enabling with respect to a claim, a specification must enable one of ordinary skill in the art to make and use the *entire scope* of the claimed invention without undue experimentation, not merely a single species falling within the scope of claim. MPEP 2164.08.

2. An enablement analysis requires a determination of whether one of ordinary skill in the art at the time of invention could make or use the invention without undue experimentation. MPEP 2164.01. This is a factual inquiry, requiring a determination of the breadth of the claims, the nature of the invention, the state of the prior art, the level

of one of ordinary skill, the level of predictability in the art, the amount of direction provided by the inventor, the existence of working examples, and the quantity of experimentation needed to make or use the invention based on the content of the disclosure. MPEP 2164.01(a). Those factors are considered below, followed by the conclusion drawn from that consideration.

(i) Breadth of the claims

3. Claims 8 and 9 are directed to methods of making discrete carbon nanotubes. Claims 8 and 9 require an annealing step involving selecting a temperature that can lead to the claimed discrete carbon nanotube structure. Thus, to be enabling with respect to claims 8 and 9 the specification must enable methods for making discrete carbon that involves selection of an appropriate annealing temperature after a lithium salt has been deposited on the carbon nanotube surface.

(ii) Nature of the invention

4. The invention relates to novel carbon nanotube materials and methods of making those materials for use in lithium battery technologies.

(iii) State of the prior art

5. Production of discrete carbon nanotubes was known at the time of filing. Those methods involved suspending carbon nanotubes in a solution comprising certain nanocrystalline materials. See U.S. Patent Application Publication No. 2011/0294013. Importantly, none of the nanocrystalline materials used to exfoliate the carbon nanotubes were a lithium salt. Although the '013 publication states that the discrete carbon nanotubes may include $\text{Li}_4\text{Ti}_5\text{O}_{12}$ on their surfaces, no method is provided for

attaching such material to the surface. Although the disclosure does state that the surface may be functionalized to allow attachment to surface functional groups, it is unclear what surface functionalization would allow for the attachment of a lithium salt or oxide with that salt/oxide remaining a lithium salt and active as a lithium ion insertion material. Thus, the prior art is of limited benefit for enablement of claims 8 and 9

(iv) The level of ordinary skill:

It is considered that one working in this art has at least an undergraduate degree in materials science or a related field, and is familiar with methods of manufacturing solid-state electrolyte and other thin-film materials.

(v) The level of predictability in the art:

6. Chemistry is generally considered to be an unpredictable art. *See, e.g., In re Carelton*, 599 F.2d 1021, 202 USPQ 165, 170 (CCPA 1979) (“Although there is a vast amount of knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave.”). The materials disclosed in the present disclosure are novel, the prior art not disclosing materials having discrete carbon nanotubes where the nanotubes have lithium salt and/or lithium ion active material attached to their surfaces. The surface chemistry of the discrete nanotubes is critical to those materials remaining in a discrete state, with most previously known discrete carbon nanotubes being susceptible to re-agglomeration. Thus, it is difficult to predict how such discrete carbon nanotubes will respond to an annealing.

(vi) The amount of direction provided by the inventor/working examples:

7. Regarding claim 8, the instant disclosure provides two example methods similar in scope to the claim, Examples 2 and 4. Each of those methods includes the use of a lithium-transition metal-phosphate lithium salt. Both examples utilize lithium acetate, transition-metal acetate and ammonium phosphate as the reagents for making the lithium salt. Importantly, neither example describes any sort of annealing step during or after the drying. Indeed, nowhere in the specification is it noted either how one might select a temperature for annealing that leads to the claimed discrete carbon nanotubes rather than an agglomerated product. Indeed, the only reference made in the specification to an annealing step is in reference to production of an olivine crystal structure of the lithium ion active material on the carbon nanotube surface. As discussed in the previous Office Action the specification utterly fails to explain how one might select annealing parameters to arrive at such a structure. Thus, merely deleting "crystal" or "olivine structure" from the claim doesn't change the fact that generic disclosure of annealing in the specification utterly fails to give the person of ordinary skill in the art sufficient guidance to choose an appropriate annealing temperature that leads to discrete carbon nanotubes rather than agglomerated carbon nanotubes.

8. Regarding claim 9, the instant disclosure provides only one related example, Example 9. Example 9 is also silent regarding any annealing step during or after drying which might lead to an olivine crystal structure, and the specification as a whole is silent any details regarding such method, including selection of a temperature that results in discrete carbon nanotubes rather than agglomerated nanotubes.

(vii) The quantity of experimentation needed to make or use the invention based on the content of the disclosure:

9. The person of ordinary skill in the art at the time of invention would be faced with discovering an annealing process that successfully leads to discrete carbon nanotubes rather than agglomerated carbon nanotubes. Importantly, the lithium salt and/or lithium ion active materials are in an attached state on the surface of a discrete, separated individual carbon nanotube, and are present in small amounts providing layer thickness on the order to tens of nanometers prior to annealing. The annealing process must not cause agglomeration of the carbon nanotubes or otherwise destroying the structure of the discrete coated carbon nanotube materials. Given the novelty of the materials containing the lithium salt/active material prior to annealing, the small amount of lithium salt/active material present on any one carbon nanotube surface, the general instability of discrete carbon nanotubes and the general unpredictability in the chemical arts, the person of ordinary skill in the art at the time of invention would be facing considerable research to provide a useful annealing step as required by claims 8, 9.

(viii) Conclusion

10. Here, given the lack of any guidance whatsoever regarding how to apply an annealing process to arrive at the claimed structures; the novelty of the materials disclosed; and the highly unpredictable nature of this specific art, the Office concludes that enablement of claims 8 and 9 would require undue experimentation. Accordingly, those claims are rejected under section 112, first paragraph for lack of enablement commensurate in scope with the claims.

B. Written Description

11. Claims 8 and 9 are further rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The written description requirement is separate and distinct from the enablement requirement, and examination of claims with respect to each of these requirements involves a separate and distinct analysis. MPEP 2161; *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 94 USPQ2d 1161, 1167 (Fed. Cir. 2010). In the present case, the claims do not meet either requirement.

12. A specification adequately describes an invention when it “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad*, 94 USPQ2d at 1171. The original claims of a disclosure do not necessarily constitute such reasonable conveyance, and more description of the claimed invention may therefore be required to satisfy the written description requirement. *Id.* at 1170.

13. Claims 8 and 9 are directed to a method of making “discrete carbon nanotubes having lithium ion active materials attached to their surface”. As noted above, the present disclosure fails to describe any specific example method comprising annealing discrete carbon nanotube having lithium salt attached to its surface or any other guidance regarding how one might select an appropriate annealing temperature for such a structure that leads to discrete carbon nanotubes. The Office notes that “a mere wish or plan for obtaining the claimed invention is not adequate written description.”

Centocor Ortho Biotech, Inc. v. Abbott Labs, 636 F.3d 1341, 1348 (Fed. Cir. 2011).

Thus, Applicant's mere assertion in the specification that the invention includes such an annealing step is not sufficient written description of the step, since it in no way shows that Applicant was in possession of a specific method step involving selection of an appropriate annealing temperature that leads to the specific discrete carbon nanotube structure required by the claims. Thus, the Office finds the specification fails to establish that Applicant was in possession of a method of making a material comprising discrete carbon nanotubes involving selection of an appropriate annealing temperature for carbon nanotubes having lithium salt deposited on their surface. For this reason, claims 8 and 9 are rejected under section 112 for lack of written description.

Allowable Subject Matter

14. Claims 14, 16-18 and 20 are allowed. Although the prior art teaches discrete carbon nanotubes having lithium ion active material attached to the surface thereof, it fails to suggest nanotubes having the recited aspect ratio or level of oxidation. Indeed, in lithium battery arts higher aspect ratios are preferred for improved conductivity, thus teaching away from the recited relatively low aspect ratio.

Conclusion

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WYATT MCCONNELL whose telephone number is (571)270-7531. The examiner can normally be reached on Monday to Friday, 9am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571)272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/W. M./
Examiner, Art Unit 1726

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1726

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Clive P. Bosnyak, *et al.*

Serial No.: 14/325,414

Filed: July 8, 2014

Art Unit: 1726

Examiner: McConnell, Wyatt P.

Conf. No.: 3135

For: LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES,
METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED
THEREFROM

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

Sir:

RESPONSE TO OFFICE ACTION

In response to the communication from the Examiner dated July 31, 2014, having a deadline for response expiring October 31, 2014, Applicants hereby amend the application as follows and submits the following remarks.

Amendments to the Claims are reflected in the listing of claims that begin on page 2 of this paper.

Remarks begin on page 4 of this paper.

Conclusion begins on page 7 of this paper.

IN THE CLAIMS:

Claims 1-7 (Cancelled).

8. (Currently Amended) A process for the production of solid discrete carbon nanotubes ~~having crystals or layers of lithium ion active materials attached to their surface~~ used in lithium ion batteries, comprising the steps of:

- a) selecting discrete carbon nanotubes of aspect ratio 10 to 500 and oxidation level 1% to 15% percent by weight to give selected carbon nanotubes;
- b) mixing the selected carbon nanotubes with a ~~high-boiling-point~~ liquid to give a carbon nanotubes/liquid mixture;
- c) adding reagents to the carbon nanotubes/liquid mixture in correct balance ~~to synthesize~~ for synthesis of a lithium salt in a new mixture;
- d) reacting the new mixture at a temperature to form the lithium salt while sonicating the new mixture;
- e) separating ~~the solid discrete carbon nanotube salts~~ nanotubes, having the lithium salt attached thereon from the liquid; and
- f) drying and annealing the solid discrete carbon ~~nanotube salts~~ nanotubes, having the lithium salt attached thereon under an inert atmosphere at sufficient temperature to obtain ~~an olivine crystal structure~~ the solid discrete carbon nanotubes used in lithium ion batteries.

9. (Currently Amended) A process for the production of solid discrete carbon nanotubes ~~having crystals or layers of lithium ion active materials attached to their surface~~ used in lithium ion batteries, comprising the steps of:

- a) selecting carbon nanotubes of aspect ratio 10 to 500 and oxidation level of 1% to 15% by weight to give selected carbon nanotubes;
- b) mixing the selected carbon nanotubes and a lithium salt in a liquid with a surfactant to give a liquid carbon nanotube/lithium salt mixture;
- c) sonicating the liquid carbon nanotube/lithium salt mixture;

- d) separating ~~the solid salts~~ discrete carbon nanotubes, having the lithium salt attached thereon from the liquid; and
- e) drying and annealing the solid discrete carbon nanotubes ~~with attached~~ having lithium salts attached thereon under an inert atmosphere at sufficient temperature to obtain ~~an olivine crystal structure~~ the solid discrete carbon nanotubes used in lithium ion batteries.

Claims 10-13 (Cancelled).

- 14. (Currently Amended) A composition ~~useful for~~ used in lithium ion batteries comprising:
discrete carbon nanotubes having ~~crystals or layers of lithium~~ ion active material attached to their surface, wherein the discrete carbon nanotubes have an aspect ratio of 10 to 500 and oxidation levels from 1% to 15% by weight of the carbon nanotube, and wherein the ~~crystals or layers of lithium~~ ion active material comprise a lithium metal salt and an element selected from the group consisting of: iron, manganese, cobalt, copper, nickel, vanadium, titanium, and mixtures thereof.
- 15. (Cancelled).
- 16. (Previously Presented) The composition of claim 14, further comprising graphene or oxygenated graphene.
- 17. (Currently Amended) The composition of claim 16, wherein the weight ratio of ~~grapheme~~ graphene to carbon nanotube is in the range of 0.1:99.9 to 99.9:0.1.
- 18. (Currently Amended) The composition of claim 14, wherein the carbon nanotubes are present in a weight percentage of 0.1% to 10% by weight of the ~~lithium~~ ion active material.
- 19. (Cancelled).
- 20. (Currently Amended) The composition of claim 14, comprising uniformly dispersible oxidized carbon nanotubes having ~~crystals or layers of lithium~~ ion active materials attached to their surface.
- 21. (Cancelled).

REMARKS

Applicant has carefully considered this Application in connection with the Examiner's Action, and respectfully requests reconsideration of this Application in view of the above Amendments and the following remarks.

Pending in the current application are Claims 8, 9, 14, 16-18, and 20. Claims 1-7 and 10-13 were previously cancelled. Claims 15, 19, and 21 have now been cancelled. Claims 8, 9, 14, 18, and 20 have been amended to address issues discussed more fully below. Claim 17 has been amended to correct an inadvertent typographical error in the spelling of "graphene."

I. Divisional Application

Applicant notes that the original pending claims were identical to claims previously presented in the parent application and previously rejected. Applicant respectfully submits that the currently amended claims are not identical to those rejected in the parent application. Applicant provides arguments below regarding the pending rejections.

II. Rejections Under 35 U.S.C. §112**A. Enablement – 35 U.S.C. §112, First Paragraph**

Claims 8, 9, and 14-21 stand rejected under 35 U.S.C. §112, first paragraph (pre-AIA), as being non-enabled by the specification. The Examiner states that the specification is enabling for a method of making or a composition comprising discrete carbon nanotubes having layers of lithium ion active material where the lithium ion active material is a salt and for compositions comprising these coated discrete carbon nanotubes. The Examiner also asserts that the specification does not reasonably provide enablement for a method of making or a composition comprising discrete carbon nanotubes having crystals of lithium ion active material where the lithium ion active material is a salt. Applicant respectfully disagrees with the Examiner's reasoning and submits that the claims as amended are enabled.

Initially, Applicant notes that Claims 15, 19, and 21 have been cancelled. Claim 15 previously recited "an olivine crystal structure." References to the "olivine crystal structure" have also been removed from Claims 8-9. Claims 8-9 as amended address the production of solid discrete carbon nanotubes having a lithium salt attached thereon. References to "crystals or layers" have

been removed from Claims 8-9 and Claim 14. Claims 18 and 20 are further amended to refer back to the ion active material of Claim 14, which is defined to comprise a lithium metal salt. Applicant submits that support for these amendments is found in the original Claims 8-9 and 14, as well as in throughout the specification, including Paragraphs [0009]-[0011], [0025]-[0027] and [0030]-[0037].

As the Examiner has indicated, the specification is enabling for a method of making or a composition comprising discrete carbon nanotubes having layers of lithium ion active material where the lithium ion active material is a salt and for compositions comprising these coated discrete carbon nanotubes. The claims as amended are directed to this enabled subject matter and do not refer to crystals of lithium ion active material, nor do they refer to an olivine crystal structure. Applicant submits that the amended claims are fully enabled.

In view of these amendments and remarks, Applicant respectfully requests that the rejections under 35 U.S.C. §112, first paragraph (pre-AIA), be withdrawn.

B. Written Description – 35 U.S.C. §112, First Paragraph

Claims 8, 9, and 14-21 stand rejected under 35 U.S.C. §112, first paragraph (pre-AIA), as failing to comply with the written description requirement. The Examiner asserts that the written description does not support materials comprising discrete carbon nanotubes having crystalline lithium salts attached to the surface, particularly an olivine crystal structure. Applicant respectfully disagrees with the Examiner's reasoning and submits that the claims as amended are supported by the written description.

Applicant again refers to the amended claim set, as discussed more fully above. The claims as amended do not recite discrete carbon nanotubes having a crystalline lithium salt attached to their surface, nor do they recite an olivine crystal structure. Further, the annealing step of Claims 8-9, as amended, does not recite that an olivine crystal structure is obtained. The specification clearly supports the claimed carbon nanotubes having lithium salts attached thereon. The examples in the specification also clearly refer to a heating step in the process, with the resulting compound being the discrete carbon nanotubes having lithium salts attached thereon. Applicant submits that the amended claims are fully supported by the written description.

In view of these amendments and remarks, Applicant respectfully requests that the rejections under 35 U.S.C. §112, first paragraph (pre-AIA), be withdrawn.

C. Indefiniteness – 35 U.S.C. §112, Second Paragraph

Claims 8 and 9 stand rejected under 35 U.S.C. §112, second paragraph (pre-AIA), as being indefinite. The Examiner asserts that the term “high boiling point” is a relative term which is not defined and that the term “the solid discrete carbon nanotube salts” has insufficient antecedent basis.

With regard to “high boiling point” in Claim 8, this term has been removed. Support for this amendment is found in Paragraph [0011] of the specification, as well as in Claim 9. Applicant submits that Claim 9 does not recite “high boiling point.”

With regard to “the solid discrete carbon nanotube salts” in Claim 8, Applicant has amended this claim to recite, in step (e), “separating solid discrete carbon nanotubes, having the lithium salts attached thereon.” Applicant submits that this amendment makes it clear that the lithium salts formed in the previous step (d) are attached to the solid discrete carbon nanotubes prior to separation in step (e).

In view of these amendments and remarks, Applicant respectfully requests that the rejections under 35 U.S.C. §112, second paragraph, be withdrawn.

CONCLUSION

Applicants respectfully submit that in light of the foregoing amendment and comments, Claims 8-9, 14, 16-18, and 20 are in condition for allowance. A Notice of Allowance is respectfully requested.

If additional information is required, the Examiner is encouraged to contact the undersigned at (214) 953-5959 so that such issues may be resolved as expeditiously as possible.

The Commissioner is hereby authorized to charge any additional fee or credit any refund to Deposit Account No. 10-0096.

Date: October 31, 2014

Respectfully submitted,

By: T. Ling Chwang
T. Ling Chwang
Reg. No. 33,590

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Electronic Acknowledgement Receipt	
EFS ID:	20575108
Application Number:	14325414
International Application Number:	
Confirmation Number:	3135
Title of Invention:	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
First Named Inventor/Applicant Name:	Clive P. Bosnyak
Customer Number:	117364
Filer:	T. Ling Chwang/Debra Pepper
Filer Authorized By:	T. Ling Chwang
Attorney Docket Number:	DENA-0008WO/US/D1
Receipt Date:	31-OCT-2014
Filing Date:	08-JUL-2014
Time Stamp:	14:09:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	DENA0008WOUSD1RESPONSE.pdf	436371 3130b1676a532a3502a2435b3ea3a32d9f7fbc39	no	7

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 14/325,414		Filing Date 07/08/2014		☐ To be Mailed				
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO													
APPLICATION AS FILED – PART I													
(Column 1)			(Column 2)										
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)					
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A							
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A							
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A							
TOTAL CLAIMS (37 CFR 1.16(j))		minus 20 =		*		X \$ =							
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		X \$ =							
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).											
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))													
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL							
APPLICATION AS AMENDED – PART II													
(Column 1)			(Column 2)			(Column 3)							
AMENDMENT	10/31/2014		CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		* 7		Minus	** 20		= 0		X \$40 =		0	
	Independent (37 CFR 1.16(h))		* 2		Minus	***3		= 0		X \$210 =		0	
	☐ Application Size Fee (37 CFR 1.16(s))												
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))												
	TOTAL ADD'L FEE											0	
(Column 1)			(Column 2)			(Column 3)							
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		*		Minus	**		=		X \$ =			
	Independent (37 CFR 1.16(h))		*		Minus	***		=		X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))												
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))												
	TOTAL ADD'L FEE												
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.													

LIE
/HALLEY MASSEY/

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

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



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1

CONFIRMATION NO. 3135

117364

Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

PUBLICATION NOTICE



OC000000071614611

Title:LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

Publication No.US-2014-0322610-A1

Publication Date:10/30/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1

CONFIRMATION NO. 3135

IMPROPER CFR REQUEST



117364
Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

Date Mailed: 08/15/2014

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The filing date of a parent application cannot be changed by this request. A petition to correct the filing date in the parent application is required.

/ttran/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Molecular Rebar Design, LLC
Serial No.: 14/325,414
Filed: July 8, 2014
Art Unit: 1726
Examiner: unknown
Confirmation No.: 3135
For: **LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES,
METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED
THEREFROM**

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

Sir:

REPLY TO RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

In response to the Office communication dated August 8, 2014, the correction we seek is on the Filing Receipt for the above-referenced application, not the parent. The filing date of the parent is correct. On the Filing Receipt for this application (see domestic priority data), the filing date of the parent application is shown as December 20, 2013. This is incorrect, since that date is the 371 filing date, not the official filing date. Therefore, on the Filing Receipt received from the Office for Serial No. 14/325,414, the date of December 20, 2013 should be changed to the official filing date of June 21, 2012. No corrections to the parent application are required or requested. Please issue a corrected Filing Receipt in due course.

Date: August 13, 2014

Respectfully submitted,

By: /T. Ling Chwang/
T. Ling Chwang
Reg. No. 33,590

Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202
Tel: (214) 953-5959, Fax: (214) 661-6870



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	TOT CLAIMS	IND CLAIMS
14/325,414	07/08/2014	1726	730	DENA-0008WO/US/D1	10	3

CONFIRMATION NO. 3135

FILING RECEIPT



0C000000069690678

117364
Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

Date Mailed: 07/21/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Clive P. Bosnyak, Dripping Springs, TX;
Kurt W. Swogger, Austin, TX;

Applicant(s)

Molecular Rebar Design, LLC, Austin, TX

Power of Attorney: None

Domestic Priority data as claimed by applicant

06/21/2012
This application is a DIV of 14/128,392 42/20/2013 *
which is a 371 of PCT/US12/43534 06/21/2012
which claims benefit of 61/500,560 06/23/2011
(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 07/18/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/325,414**

Projected Publication Date: 10/30/2014

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

Preliminary Class

429

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

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Electronic Acknowledgement Receipt	
EFS ID:	19849787
Application Number:	14325414
International Application Number:	
Confirmation Number:	3135
Title of Invention:	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
First Named Inventor/Applicant Name:	Clive P. Bosnyak
Customer Number:	117364
Filer:	T. Ling Chwang/Debra Pepper
Filer Authorized By:	T. Ling Chwang
Attorney Docket Number:	DENA-0008WO/US/D1
Receipt Date:	13-AUG-2014
Filing Date:	08-JUL-2014
Time Stamp:	09:10:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Corrected Filing Receipt	DENA0008WOUSD1REQCORRF R2.pdf	319605 c6aa90b528e1a042902d2c73a2cf5e08681 1c26e	no	4

Warnings:

Information:

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1

CONFIRMATION NO. 3135

IMPROPER CFR REQUEST



OC000000070072914

117364

Molecular Rebar Design, LLC

Jackson Walker L.L.P.

901 Main Street, Suite 6000

Dallas, TX 75202

Date Mailed: 08/08/2014

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The filing date of a parent application cannot be changed by this request. A petition to correct the filing date in the parent application is required.

/gasgedom/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Molecular Rebar Design, LLC

Serial No.: 14/325,414

Filed: July 8, 2014

Art Unit: 1726

Examiner: unknown

Confirmation No.: 3135

For: **LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS
FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM**

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

Sir:

REQUEST FOR CORRECTED FILING RECEIPT

The Filing Receipt received from the Office indicates that the priority data as claimed is not consistent with the PTO records. It is submitted that the originally filed Application Data Sheet indicated the correct priority claims, however, the specification contained one incorrect filing date. Since the Application Data Sheet was correct, we request that the filing date for 14/128,392 be corrected to 06/21/2012. A copy of the Filing Receipt showing the correction is attached.

Please enter the correct priority claim and issue a corrected Filing Receipt in due course.

Date: August 1, 2014

Respectfully submitted,

By: /T. Ling Chwang/
T. Ling Chwang
Reg. No. 33,590

Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202
Tel: (214) 953-5959, Fax: (214) 661-6870



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	TOT CLAIMS	IND CLAIMS
14/325,414	07/08/2014	1726	730	DENA-0008WO/US/D1	10	3

CONFIRMATION NO. 3135

117364

Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

FILING RECEIPT



OC000000069690678

Date Mailed: 07/21/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Clive P. Bosnyak, Dripping Springs, TX;
Kurt W. Swogger, Austin, TX;

Applicant(s)

Molecular Rebar Design, LLC, Austin, TX

Power of Attorney: None

Domestic Priority data as claimed by applicant

06/21/2012
This application is a DIV of 14/128,392 ~~42/20/2013~~ *
which is a 371 of PCT/US12/43534 06/21/2012
which claims benefit of 61/500,560 06/23/2011
(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 07/18/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/325,414**

Projected Publication Date: 10/30/2014**Non-Publication Request:** No**Early Publication Request:** No**** SMALL ENTITY ****

Title

LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

Preliminary Class

429

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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Electronic Acknowledgement Receipt	
EFS ID:	19755272
Application Number:	14325414
International Application Number:	
Confirmation Number:	3135
Title of Invention:	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
First Named Inventor/Applicant Name:	Clive P. Bosnyak
Customer Number:	117364
Filer:	T. Ling Chwang/Debra Pepper
Filer Authorized By:	T. Ling Chwang
Attorney Docket Number:	DENA-0008WO/US/D1
Receipt Date:	01-AUG-2014
Filing Date:	08-JUL-2014
Time Stamp:	15:46:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Corrected Filing Receipt	DENA0008WOUSD1REQCORRF R.pdf	374986 0622c17c00197114790996006ae5070c2e5 51500	no	4

Warnings:

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/325,414	07/08/2014	Clive P. Bosnyak	DENA-0008WO/US/D1	3135
117364 7590 07/31/2014 Molecular Rebar Design, LLC Jackson Walker L.L.P. 901 Main Street, Suite 6000 Dallas, TX 75202			EXAMINER MCCONNELL, WYATT P	
			ART UNIT 1726	PAPER NUMBER
			MAIL DATE 07/31/2014	DELIVERY MODE PAPER

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

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

Office Action Summary	Application No. 14/325,414	Applicant(s) BOSNYAK ET AL.	
	Examiner WYATT MCCONNELL	Art Unit 1726	AIA (First Inventor to File) Status No

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

Period for Reply

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

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

Status

- 1) ☒ Responsive to communication(s) filed on 7/8/2014.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 8,9 and 14-21 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 8,9 and 14-21 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

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

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 7/8/2014 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

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

Attachment(s)

- | | |
|---|---|
| 1) ☐ Notice of References Cited (PTO-892) | 3) ☐ Interview Summary (PTO-413) |
| 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) | Paper No(s)/Mail Date. ____. |
| Paper No(s)/Mail Date ____. | 4) ☐ Other: ____. |

DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

Divisional Application

2. The present case is a divisional application claiming priority to U.S. Application No. 14/128,392. The pending independent claims are identical in subject matter to claims previously rejected in the parent case for indefiniteness, lack of enablement, and lack of adequate written description. In the remarks filed with the preliminary amendment in the present case Applicant asserts that the pending claims in this case are fully supported and enabled by the disclosure, but provides no actual argument in relation to the rejection of record in the parent application. Moreover, Applicant has made no attempt to address the indefiniteness issues with the claims in the preliminary amendment. Thus, the rejections still stand and are repeated below.

Claim Rejections - 35 USC § 112

I. Rejections Under 112, First Paragraph

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

A. Scope of Enablement Claims 8, 9, and 14-21 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of making or composition comprising discrete carbon nanotubes having layers of lithium ion active material where the lithium ion active material is a salt and compositions comprising

those coated discrete carbon nanotubes, does not reasonably provide enablement for a method of making or composition comprising discrete carbon nanotubes having crystals of lithium ion active material where the lithium ion active material is a salt. It is well settled that, in order to be enabling with respect to a claim, a specification must enable one of ordinary skill in the art to make and use the *entire scope* of the claimed invention without undue experimentation, not merely a single species falling within the scope of claim. MPEP 2164.08.

4. An enablement analysis requires a determination of whether one of ordinary skill in the art at the time of invention could make or use the invention without undue experimentation. MPEP 2164.01. This is a factual inquiry, requiring a determination of the breadth of the claims, the nature of the invention, the state of the prior art, the level of one of ordinary skill, the level of predictability in the art, the amount of direction provided by the inventor, the existence of working examples, and the quantity of experimentation needed to make or use the invention based on the content of the disclosure. MPEP 2164.01(a). Those factors are considered below, followed by the conclusion drawn from that consideration.

(i) Breadth of the claims

5. Claims 8 and 9 are directed to methods of making discrete carbon nanotubes having lithium ion active material attached to their surfaces. Although the preamble does not limit the type of lithium ion active material that may be attached, the method steps that follow the preamble do limit the type of lithium ion active material to a lithium salt. Similarly, claim 14 and those that depend therefrom are directed to compositions

comprising discrete carbon nanotubes having lithium salt attached to their surfaces. Thus, the relevant claims exclude, for example, methods of making and compositions comprising discrete carbon nanotubes having titanium oxide attached to their surfaces. Moreover, the relevant claims require the lithium ion active material to be present as crystals or layers. Finally, claims 8 and 9 require an annealing step involving selecting a temperature that can lead to an olivine crystal structure. Thus, to be enabling with respect to claims 8, 9, and 14-21 the specification must enable methods for making both discrete carbon nanotubes having lithium salt attached to their surface as crystals and methods for making discrete carbon nanotubes having lithium salt attached to their surface as layers. Further regarding claims 8, 9, and 15 the specification must enable selection of an annealing temperature that can lead to an olivine crystal structure.

(ii) Nature of the invention

6. The invention relates to novel carbon nanotube materials and methods of making those materials for use in lithium battery technologies.

(iii) State of the prior art

7. Production of discrete carbon nanotubes was known at the time of filing. Those methods involved suspending carbon nanotubes in a solution comprising certain nanocrystalline materials. See U.S. Patent Application Publication No. 2011/0294013. Importantly, none of the nanocrystalline materials used to exfoliate the carbon nanotubes were a lithium salt. Although the '013 publication states that the discrete carbon nanotubes may include $\text{Li}_4\text{Ti}_5\text{O}_{12}$ on their surfaces, no method is provided for attaching such material to the surface. Although the disclosure does state that the

surface may be functionalized to allow attachment to surface functional groups, it is unclear what surface functionalization would allow for the attachment of a lithium salt or oxide with that salt/oxide remaining a lithium salt and active as a lithium ion insertion material. Thus, the prior art is of limited benefit for enablement of claims 8, 9, and 14-21.

(iv) The level of ordinary skill: It is considered that one working in this art has at least an undergraduate degree in materials science or a related field, and is familiar with methods of manufacturing solid-state electrolyte and other thin-film materials.

(v) The level of predictability in the art:

8. Chemistry is generally considered to be an unpredictable art. *See, e.g., In re Carelton*, 599 F.2d 1021, 202 USPQ 165, 170 (CCPA 1979) ("Although there is a vast amount of knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave."). The materials disclosed in the present disclosure are novel, the prior art not disclosing materials having discrete carbon nanotubes where the nanotubes have lithium salt and/or lithium ion active material attached to their surfaces. The surface chemistry of the discrete nanotubes is critical to those materials remaining in a discrete state, with most previously known discrete carbon nanotubes being susceptible to re-agglomeration. Thus, it is difficult to predict how such discrete carbon nanotubes will respond to an annealing process designed to change the crystal structure of a lithium salt/active material attached to their surface.

(vi) The amount of direction provided by the inventor/working examples:

9. Regarding claim 8, the instant disclosure provides two example methods falling within the scope of the claim, Examples 2 and 4. Each of those materials includes the use of a lithium-transition metal-phosphate lithium salt. Both examples utilize lithium acetate, transition-metal acetate and ammonium phosphate as the reagents for making the lithium salt. Importantly, (1) neither example describes the product as including crystals of lithium salt on the surface of the carbon nanotubes or provides data from which the crystalline nature of the lithium salt may be determined and (2) neither example describes any sort of annealing step during or after the drying step much less an annealing step that is described as providing an olivine crystal structure. Indeed, nowhere in the specification is it noted either how one might select a temperature for annealing that might lead to an olivine crystal structure or any other aspect of the annealing step that needs to be controlled/selected in order to insure olivine crystal structure. Nor does the specification provide any details on how one might control the synthetic method to ensure any lithium salt deposits on the nanotube surface in a crystalline form of any type.

10. Regarding claim 9, the instant disclosure provides only one related example, Example 9. This example absolutely fails to describe a product obtained from the method as having crystalline lithium salt attached to the surface of the carbon nanotubes or provide any data from which such crystallinity may be assessed. Indeed, the specification is silent regarding any important aspects of the method that must be controlled in order to ensure that crystals of the lithium salt, rather than just layers, are deposited onto the surface of the carbon nanotube. Moreover, Example is silent

regarding any annealing step during or after drying which might lead to an olivine crystal structure, and the specification as a whole is silent any details regarding such method, including selection of a temperature at which an olivine crystal structure may be obtained.

11. Regarding claims 14-21, all three of the above Examples, relate to those claims because they are the only examples including a lithium salt on the carbon nanotube surface. However, none of those examples are described as having a crystalline lithium salt, much less an olivine crystal structure. Moreover, nowhere in the present disclosure are any details regarding how one might ensure crystallinity or olivine crystallinity discussed.

(vii) The quantity of experimentation needed to make or use the invention based on the content of the disclosure:

12. The person of ordinary skill in the art at the time of invention would be faced with discovering an annealing process that successfully leads to olivine crystalline structure for any of a very wide range of lithium salt and/or lithium ion active materials. Importantly, the lithium salt and/or lithium ion active materials are in an attached state on the surface of a discrete, separated individual carbon nanotube, and are present in small amounts providing layer thickness on the order to tens of nanometers. The annealing process must leave the material in-tact, without removing the lithium salt/active material from the carbon nanotube surface, causing agglomeration of the carbon nanotubes, or otherwise destroying the structure of the discrete coated carbon nanotube materials. Given the novelty of the materials containing the lithium salt/active material, the small amount of lithium salt/active material present on any one carbon

nanotube surface, the general instability of discrete carbon nanotubes and the general unpredictability in the chemical arts, the person of ordinary skill in the art at the time of invention would be facing considerable research to provide a useful annealing step as required by claims 8, 9, and possibly 14-21, or any other means of arriving at a material having a crystalline or olivine crystal structure of the lithium salt attached to the carbon nanotube surface as required by claims 14-21.

(viii) Conclusion

13. Here, given the lack of any guidance whatsoever regarding how to arrive at an olivine crystal structure, particularly through an annealing process; the novelty of the materials disclosed requiring such crystal structure; and the highly unpredictable nature of this specific art, the Office concludes that enablement of claims 8, 9, and 14-21 would require undue experimentation. Accordingly, those claims are rejected under section 112, first paragraph for lack of enablement commensurate in scope with the claims.

B. Written Description

14. Claims 8, 9, and 14-21 are further rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The written description requirement is separate and distinct from the enablement requirement, and examination of claims with respect to each of these requirements involves a separate and distinct

analysis. MPEP 2161; *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 94 USPQ2d 1161, 1167 (Fed. Cir. 2010). In the present case, the claims do not meet either requirement.

15. A specification adequately describes an invention when it “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad*, 94 USPQ2d at 1171. The original claims of a disclosure do not necessarily constitute such reasonable conveyance, and more description of the claimed invention may therefore be required to satisfy the written description requirement. *Id.* at 1170.

16. Claims 8 and 9 are directed to a method of making “discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface”. Similarly, claims 14-21 cover a composition comprising “discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface.” Importantly, claims 8 and 9 each provide methods that utilize as the lithium ion active material a lithium salt. Similarly, claims 14-21 each require the lithium ion active material to comprise a lithium salt. As noted above, the present disclosure fails to describe any specific example material comprising discrete carbon nanotube having crystalline lithium salt attached to its surface, much less the olivine crystal structure required by claim 15. Similarly, although the present disclosure provides methods of synthesizing discrete carbon nanotubes having lithium salt attached to its surface, in no way does the disclosure describe any of those materials produced from those methods as having *crystalline* lithium salt attached to their discrete carbon nanotubes, as required by claims 8 and 9. Thus, the Office finds the specification fails to establish that

Applicant was in possession of a material comprising, or a method of making a material comprising, discrete carbon nanotubes having crystals of lithium salt attached to their surface. For this reason, claims 8, 9, and 14-21 are rejected under section 112 for lack of written description.

17. Further regarding claims 8 and 9, as discussed above the claims require an annealing step involving selection of a temperature that leads to formation of an olivine crystal structure. Yet the specifics of such a step are nowhere discussed in the specification. The Office notes that “a mere wish or plan for obtaining the claimed invention is not adequate written description.” *Centocor Ortho Biotech, Inc. v. Abbott Labs*, 636 F.3d 1341, 1348 (Fed. Cir. 2011). Thus, Applicant’s mere assertion in the specification that the invention includes such an annealing step is not sufficient written description of the step, since it in no way shows that Applicant was in possession of a specific method step actually capable of leading to the required outcome. For this additional reason, claims 8 and 9 are rejected under section 112, first paragraph, for lack of written description.

II. Rejections Under 112, Second Paragraph

18. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

19. Claims 8 and 9

20. are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

21. Regarding claims 8 and 9, the term "high boiling point" is a relative term which renders the claim indefinite. The term is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For this reason, claims 8 and 9 are found indefinite.

22. Further, claim 8 recites the limitation "the solid discrete carbon nanotube salts". There is insufficient antecedent basis for this limitation in the claim. The Office also notes that if Applicant intends this term to refer to solid discrete carbon nanotubes having lithium salt attached thereto, it is suggested that the method identify when/where in the recited method such a structure is made and/or provided.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WYATT MCCONNELL whose telephone number is (571)270-7531. The examiner can normally be reached on Monday to Friday, 9am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571)272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/W. M./
Examiner, Art Unit 1726

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1726

<i>Search Notes</i> 	Application/Control No. 14325414	Applicant(s)/Patent Under Reexamination BOSNYAK ET AL.
	Examiner WYATT MCCONNELL	Art Unit 1726

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Reviewed search in 14/128,392	7/27/2014	/W.M./

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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Receipt date: 07/08/2014

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

14325414 - GAU: 1726

Approved for use through 07/31/2012. OMB 0651-0031

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		00000000	
	Filing Date		2014-07-08	
	First Named Inventor	Clive P. Bosnyak		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		DENA-0008WO/US/D1	

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	1	20110104551		2011-05-05	Yang, et al.			
	2	20110311876		2011-12-22	Sturgeon et al.			
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	1	2010/117392	WO		2010-10-14	Bosnyak, et al.		☐
	2	2009/155267	WO		2009-12-23	Mysticmd, Inc.		☐

Receipt date: 07/08/2014 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		00000000	14325414 - GAU: 1726
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	Art Unit			
	Examiner Name			
	Attorney Docket Number		DENA-0008WO/US/D1	

	3	2012/083358	WO		2012-06-28	Commonwealth Scientific and Ind. Res. Organisation		☐
	4	2013/011516	WO		2013-01-24	Vulcan Automotive Industries Ltd. et al.		☐
	5	1665446	EP		2012-03-21	Commonwealth Scientific and Ind. Res. Organisation		☐

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	1	European Patent Office, International Search Report and Written Opinion, PCT Application No. PCT/US2012/043534, October 5, 2012	☐
	2	European Patent Office, Response to Written Opinion and Demand, PCT Application No. PCT/US2012/043534, April 23, 2013	☐
	3	European Patent Office, Second Written Opinion, PCT Application No. PCT/US2012/043534, June 19, 2013	☐
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EXAMINER SIGNATURE

Examiner Signature	/Wyatt McConnell/	Date Considered	07/27/2014
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		00000000 14325414 - GAU: 1726
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	First Named Inventor	Clive P. Bosnyak	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		DENA-0008WO/US/D1

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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	Filing Date		2014-07-08
	First Named Inventor	Clive P. Bosnyak	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		DENA-0008WO/US/D1

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/T. Ling Chwang/	Date (YYYY-MM-DD)	2014-07-08
Name/Print	T. Ling Chwang	Registration Number	33590

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 14/325,414	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(j))	10	minus 20 = *	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x	=	OR
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x	=	OR
	Application Size Fee (37 CFR 1.16(s))						OR
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						OR
TOTAL ADD'L FEE						OR	TOTAL ADD'L FEE
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x	=	OR
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x	=	OR
	Application Size Fee (37 CFR 1.16(s))						OR
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						OR
TOTAL ADD'L FEE						OR	TOTAL ADD'L FEE
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.							



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
14/325,414	07/08/2014	1726	730	DENA-0008WO/US/D1	10	3

CONFIRMATION NO. 3135

117364

Molecular Rebar Design, LLC
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202

FILING RECEIPT



OC000000069690678

Date Mailed: 07/21/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Clive P. Bosnyak, Dripping Springs, TX;
Kurt W. Swogger, Austin, TX;

Applicant(s)

Molecular Rebar Design, LLC, Austin, TX

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a DIV of 14/128,392 12/20/2013 *
which is a 371 of PCT/US12/43534 06/21/2012
which claims benefit of 61/500,560 06/23/2011
(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 07/18/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/325,414**

Projected Publication Date: 10/30/2014

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

Preliminary Class

429

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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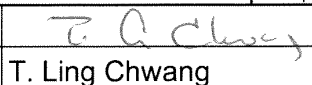
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UTILITY PATENT APPLICATION TRANSMITTAL <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Attorney Docket No.	DENA-0008WO/US/D1
	First Named Inventor	Clive P. Bosnyak
	Title	LITHIUM ION BATTERIES USING DISCRETE...
	Express Mail Label No.	n/a

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents.</i>	Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
1. ☐ Fee Transmittal Form (PTO/SB/17 or equivalent) 2. ☒ Applicant asserts small entity status. See 37 CFR 1.27 3. ☐ Applicant certifies micro entity status. See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent. 4. ☒ Specification [Total Pages <u>15</u>] Both the claims and abstract must start on a new page. (See MPEP § 608.01(a) for information on the preferred arrangement) 5. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>3</u>] 6. ☒ Inventor's Oath or Declaration [Total Pages <u>2</u>] (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e)) a. ☒ Newly executed (original or copy) b. ☐ A copy from a prior application (37 CFR 1.63(d)) 7. ☒ Application Data Sheet * See note below. See 37 CFR 1.76 (PTO/AIA/14 or equivalent) 8. CD-ROM or CD-R in duplicate, large table, or Computer Program (Appendix) ☐ Landscape Table on CD 9. Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. – c. are required) a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies	ACCOMPANYING APPLICATION PAPERS 10. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 11. ☐ 37 CFR 3.73(c) Statement ☐ Power of Attorney (when there is an assignee) 12. ☐ English Translation Document (if applicable) 13. ☒ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☐ Copies of citations attached 14. ☒ Preliminary Amendment 15. ☐ Return Receipt Postcard (MPEP § 503) (Should be specifically itemized) 16. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed) 17. ☐ Nonpublication Request Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 18. ☐ Other: _____ _____ _____ _____
*Note: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 must be included in an Application Data Sheet (ADS). (2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).	

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LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM

[0001] This application claims priority to U.S. Provisional Patent Application Serial No. 61/500,560, entitled "LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM," filed on June 23, 2011, the entire content of which is hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to the field of improved technologies for lithium batteries. In some embodiments, the invention relates to discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface.

BACKGROUND

[0003] Lithium batteries are used extensively for portable electronic equipment and are increasingly being used to provide electrical back-up for wind and solar energy. The commercially used lithium ion (Li-ion) rechargeable batteries based on cobalt, nickel or manganese oxides for the cathode materials are known for their poor electrical conductivity and poor electrochemical stability which results in poor cycling (charge/discharge) ability. Olivine structures such as lithium iron phosphate, LiFePO_4 or lithium manganese phosphate, LiMnPO_4 , operate at higher charge and discharge rates, but are still limited by low electrical conductivity and the kinetics of Li-ion diffusion.

[0004] Attempts to overcome the above deficiencies have included synthesis of nano-sized crystals, termed nanocrystals, of lithium salts as well as mixtures of lithium salts and carbon nanotubes. Even though the mixtures of carbon nanotubes and nanocrystals of lithium salts show improvements in charge/discharge rates, the carbon nanotubes previously employed are not considered to be essentially discrete, i.e., individual uniformly dispersed tubes. Carbon nanotubes as conventionally made by gas phase reaction result in a tangled bundle of tubes with particle diameters ranging from 50 to 200 micrometers. Also, the lithium nanocrystals are not ionically or covalently attached to the surface of the discrete carbon nanotubes to provide for intimate electron transfer and enhanced mechanical strength

of the active material. During charging and discharging of conventional lithium ion batteries, the nanocrystals expand and contract. Over a number of cycles, this leads to microcrack formation in the layer of active material and hence to higher internal resistance and decline of the battery performance. With crystals bound to and interconnected with discrete carbon nanotubes the microcrack formation due to severe mechanical vibration, bending, or expansion and contraction will be retarded.

[0005] Lithium salts have also been carbon coated with very thin coatings on the nanometer scale to enhance inter-particle electrical conductivity, but the carbon coating can slow the Lithium ion transport and may also react unfavorably with electrolytes over time. The carbon coating is considered to be amorphous in structure and is more likely to react with electrolyte than the crystalline carbon structure of the carbon nanotubes. Likewise, carbon particles have been added to the crystals of lithium salts to enhance inter-particle conductivity but these generally reduce the mechanical strength of dried pastes in the battery leading to cracking and reduced performance over time.

[0006] The present invention overcomes the difficulties of low electrical conduction, particularly due to expansion and contraction of the material during charging and discharging of the battery, improved lithium ion transport and mitigation of potentially damaging chemical side reactions by attaching nanosized crystals or nanosized layers of lithium ion active material to the surface of discrete, functionalized and well dispersed carbon nanotubes.

[0007] Likewise, for the lithium battery anode materials, active anode materials, such as carbon particles, tin oxide or silicon, can be attached to the discrete carbon nanotube surfaces to provide numerous benefits such as improved capacity, electron and ion conductivity and mechanical strength.

[0008] In addition to the discrete carbon nanotube network providing support and spatial stabilization of nanosized particles or layers for cathode or anode material of the lithium battery, other benefits include improved heat transfer media to avoid thermally-induced runaway, structural strength to the paste during manufacturing and high surface area per weight of lithium ion active material to provide good energy density. The uniform dispersion of discrete tubes will also provide a more uniform voltage gradient across the

cathode or anode layer, therefore reducing the probability of locally high electrically resistive regions that can cause accelerated decay of performance in that local region.

SUMMARY

[0009] One aspect of the invention is a composition useful for lithium ion batteries, comprising discrete carbon nanotubes having attached to their surface lithium ion active materials in the form of nanometer sized crystals or layers. For a cathode, the lithium ion active material comprises a lithium metal salt which may further comprise iron, manganese, cobalt, copper, nickel, vanadium, titanium, or mixtures thereof. The composition can further comprise the lithium metal salt with an olivine crystal structure. For an anode, the lithium ion active material may comprise carbon, tin, silicon, copper, antimony, aluminum, germanium, titanium or mixtures thereof. The discrete carbon nanotubes of the composition preferably have an aspect ratio of 10 to 500 and oxidation levels from 1 to 15 weight percent of the carbon nanotube. The composition can further comprise graphene or oxygenated graphene. In one embodiment, the weight ratio of grapheme to carbon nanotube is in the range of 0.1:99.9 to 99.9:0.1.

[0010] Yet another aspect of this invention is a process for the production of discrete carbon nanotubes having attached to their surface lithium ion active materials in the form of nanometer sized crystals or layers, comprising the steps of:

- a) selecting carbon nanotubes of aspect ratio 10 to 500 and oxidation level 1 to 15 weight percent,
- b) mixing the carbon nanotubes with a high boiling point liquid, optionally with a non-ionic surfactant,
- c) optionally sonicating the carbon nanotube liquid mixture,
- d) adding reagents in correct balance to synthesize the desired lithium salt,
- e) reacting the mixture at the desired temperature to form the lithium salt while sonicating the mixture
- f) separating the solid salts from the liquid; and
- g) drying and annealing under an inert atmosphere the solid discrete carbon nanotubes with attached lithium salts at sufficient temperature to obtain the olivine crystal structure.

[0011] A further aspect of the invention is a process for the production of the discrete carbon nanotubes having attached to their surface lithium ion active materials in the form of nanometer sized crystals or layers, comprising the steps of:

- a) selecting carbon nanotubes of aspect ratio 10 to 500 and oxidation level 1 to 15 weight percent,
- b) mixing the carbon nanotubes and desired lithium salt in a liquid with surfactant,
- c) sonicating the carbon nanotube/lithium salt liquid mixture,
- d) separating the solid salts from the liquid,
- e) drying and annealing under an inert atmosphere the solid discrete carbon nanotubes with attached lithium salts at sufficient temperature to obtain the olivine crystal structure.

[0012] An additional aspect of this invention is a composition useful for lithium ion batteries comprising discrete carbon nanotubes having attached to their surface lithium ion active materials in the form of nanometer sized crystals or layers wherein the carbon nanotubes are in a weight ratio of carbon nanotubes to lithium salts of 0.1% to 10%.

[0013] Yet another aspect of this invention useful for lithium ion batteries is a composition comprising oxidized carbon nanotubes having attached to their surface lithium ion active materials in the form of nanometer sized crystals or layers wherein the carbon nanotubes are uniformly dispersed without clustering on a dimension scale less than one micrometer.

[0014] A further aspect of this invention is a composition useful for lithium ion batteries comprising uniformly dispersible oxidized carbon nanotubes having lithium ion active materials attached to their surface, whether ionically or chemically.

BRIEF DESCRIPTION OF THE FIGURES

[0015] Figure 1 depicts lithium salt coated as a nanolayer on discrete carbon nanotubes.

[0016] Figure 2 shows LiMnO_4 with 5% oxidized carbon nanotubes of this invention.

[0017] Figure 3 shows titanium dioxide crystals attached to discrete carbon nanotubes.

DETAILED DESCRIPTION

[0018] The term “carbon nanotubes” as used herein refers to allotropes of carbon with a cylindrical nanostructure. The nanotubes may be single, double or multiwall.

[0019] The term “discrete carbon nanotubes” as used herein refers to carbon nanotubes capable of being separated to give individual tubes.

[0020] The term “graphene” as used herein refers to individual atomic thickness plates of carbon.

[0021] The term “oxidized graphene” as used herein refers to the products of oxidizing graphene plates. The oxidized species are generally at the edges of the graphene plates.

[0022] The term “oxidized carbon nanotubes” as used herein refers to the products of oxidizing the carbon nanotubes. Generally the oxidized species are carboxylic, ketone or hydroxyl functionalities.

[0023] The term “weight percent” or “percent weight” or “% by weight” as used herein is calculated by dividing the weight of a reagent by the total weight of a mixture to which it is added subsequent to the addition of the reagent. For example, adding 1 gram of a reagent A to 99 grams of a reagent B, thereby forming 100 grams of a mixture A+B would constitute adding 1 weight percent of the reagent A to the mixture.

[0024] During the process of making discrete carbon nanotubes (which can be single, double and multiwall configurations), the nanotubes are cut into segments and residual catalyst particles that are interior to the carbon nanotubes as received from the manufacturer are dissolved. This cutting of the tubes helps with exfoliation. The cutting of the tubes reduces the length of the tubes into carbon nanotube segments that are defined here as Molecular Rebar. Proper selection of the carbon nanotube feed stock related to catalyst particle type and distribution in the carbon nanotubes allows more control over the resulting individual tube lengths and overall tube length distribution. A preferred selection is where the internal catalyst sites are evenly spaced and where the catalyst is most efficient. The selection can be evaluated using electron microscopy and determination of the exfoliated tube

distribution. Molecular Rebar gives advantageous mechanical and transport properties when added to other materials compared to materials with no Molecular Rebar.

Types of migratable ions and ion active materials

[0025] The ion active material which can be attached to the discrete carbon nanotubes is defined here as meaning an ion can migrate into or out of the ion active material thereby exchanging electrons. The migrating ion is preferably lithium ion, and is preferably 50 percent by mole of the available migratable ions, more preferably 75 mole percent or higher, most preferably 95 mole percent or higher and can be as high as 100 mole percent of the total migratable ions. Other migratable ions can include magnesium, aluminium, iron, zinc, manganese, sodium, potassium, lead, mercury, silver, gold, nickel, cadmium and the like.

[0026] Examples of ion active materials are lithium iron phosphate, lithium manganese phosphate, lithium cobalt oxide, silica, manganese dioxide, cadmium, titanium dioxide and carbon.

[0027] The ion active materials can be the same or comprise different active materials. Further, ion species in these ion active materials can be the same, or they can be different. When using a mixture of migratable ions, it is preferred that the lithium ions comprise the majority of the ions of the mixture. Mixtures of migratable ions, when used, can be of 2 different ions, or can be three or more different ions in various proportions. In addition, the ion mixture can be varying valence (or oxidation) states of the same ion, such as Fe^{2+} or Fe^{3+} .

[0028] When mixing ion active materials for attachment to the carbon nanotubes, the mixture may be merely accidental, such as that resulting from either natural states of the ion active material compounds, or the mixture can be an intentional mixing of the different ion active materials, including those in differing chemical or physical state. In some cases comprising migratable ion mixture using lithium ion, the lithium ion may comprise the minority ionic component, of the mix, although this is not usually the preferred configuration. When more than one ion is used, then the ratio of Li ion to other total ions is preferably at least 2:1, or 3:1 or 10:1 and can be as high as 25:1 (mole ratios).

[0029] The ion active material attached to the discrete carbon nanotubes can also be useful for applications such as fuel cells, sensors, capacitors, photovoltaics and catalysts.

Experimental Examples

[0030] The following experimental examples are included to demonstrate particular aspects of the present disclosure. It should be appreciated by those of ordinary skill in the art that the methods described in the examples that follow merely represent illustrative embodiments of the disclosure. Those of ordinary skill in the art should, in light of the present disclosure, appreciate that many changes can be made in the specific embodiments described and still obtain a like or similar result without departing from the spirit and scope of the present disclosure.

EXAMPLE 1

Discrete carbon nanotubes with attached copper oxide nanoparticles suitable for a lithium ion battery anode material

[0031] 102 mg of multi-wall carbon nanotubes (CNano, grade C9000) oxidized to about 8 weight percent and aspect ratio about 60 are added to 100 mg copper sulfate, 640 mg sodium EDTA, 15 mg of polyethylene glycol, 568 mg of sodium sulfate and 60 mL of deionized water. The mixture is sonicated for 10 minutes and then heated to 40°C. 3 mL of formaldehyde (37% solution) and 500 mg of sodium hydroxide is added to bring the pH to 12.2. The mixture is stirred for 30 minutes at 85°C and then filtered using a 5 micron PVDF filter and washed with 200 mL of deionized water. The resultant coated multiwall tubes show a coppery hue color. An electron micrograph shows copper oxide particles of diameter about 50 to 150 nm interconnected by well-dispersed carbon nanotubes.

EXAMPLE 2

Discrete carbon nanotubes with lithium iron phosphate coated on the surface of the tubes. suitable for a lithium ion battery cathode material

[0032] 0.2 grams of multi-wall carbon nanotubes (CNano, grade C9000) oxidized to about 8 weight percent and aspect ratio about 60 are added to 23.5 grams of diethylene glycol and sonicated for 15 minutes. The solution is grey. 1.16 grams of iron acetate dissolved in 4 ml of deionized water is added and the mixture heated under nitrogen, stirring and sonication. After 1 hour at 140°C a solution of 0.65 grams of lithium acetate and 0.74 grams of ammonium phosphate in 4.2 ml of deionized water is added. The temperature is raised to

about 185°C over 30 minutes, then held at 185°C for 4 hours. The mixture is cooled to 110°C and sonicated for 5 minutes followed by further cooling to ambient temperature while stirring. The solids are separated from the mixture by centrifugation followed by ethanol washing. The resultant powder is dried to constant weight *in vacuo*.

[0033] The resultant dried powder is determined to have a resistance of 2,000 ohm-cm compared to a commercially obtained sample determined as 19,000 ohm-cm.

EXAMPLE 3

[0034] Lithium iron phosphate obtained commercially is ground with multiwall carbon nanotubes (CNano, grade C9000) oxidized to about 8 weight percent and of aspect ratio about 60, in a mortar and pestle at weight ratios of 5:1 and 1:1 lithium salt to carbon nanotube. Sodium dodecyl sulfate (SDS) is then added at a weight ratio of 0.7:1 compared to the carbon nanotube and deionized water added to resultant mixture to give a 0.5 weight percent solution of carbon nanotubes in the presence of lithium salt and surfactant. The mixture is sonicated for 1 hour, then the solids filtered using a polyvinylidene fluoride filter (0.2 micron), washed with deionized water and dried. A micrograph of the discrete carbon nanotubes coated with lithium iron phosphate is shown in Figure 1. The results of the resistance of the powders are given in Table 1, units of resistance are ohm-cm.

Table 1

Material	5:1 Weight ratio Lithium salt:carbon nanotube	1:1 Weight ratio Lithium salt:carbon nanotube
Dry mix	860	26
Coated	46.2	6.9
Improvement of coating	18.6 X	3.8X

EXAMPLE 4

Preparation of lithium manganese phosphate in the presence of five percent by weight oxidized carbon nanotubes

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[0035] 37.439g manganese II acetate is dissolved in 5.0ml of water and added to 589mL of diethylene glycol (DEG) already in the reaction vessel. The mixture is then heated to a target temperature of 140°C, under stirring and gentle nitrogen flow to distill off the water. 1.119g of oxidized carbon nanotubes (originally CNano, grade C9000, average diameter 13 nm) nanotubes having an oxidation of 4% and average aspect ratio of 60 are dispersed in 222.2 mL diethylene glycol (0.5% w/v) using sonication while stirring for 30 minutes. Additionally, 14.4434g lithium acetate and 16.4497g ammonium dihydrogen phosphate are dissolved in 90 mL of water. The dispersion of oxidized carbon nanotubes, lithium acetate and ammonium dihydrogen phosphate are added to the reaction medium while stirring, and with sonication. Heating is increased to maintain a target temperature of 180 degrees centigrade for 3 hours, while maintaining constant nitrogen flow. Following the end of the reaction, heating and sonication are turned off while stirring and nitrogen are maintained as the system cools to room temperature.

[0036] The product is a highly viscous, dark-grey colored fluid. The carbon nanotube coated with lithium manganese phosphate is centrifuged and the solids washed with anhydrous ethanol three times. An electron micrograph of the product is shown in Figure 2. In figure 2 the majority of tubes are shown to have coatings of lithium manganese phosphate about 20-40nm thick. The coatings are not smooth as seen in Example 1.

EXAMPLE 5

A composition useful as an anode active material in lithium batteries - *In situ* synthesis of TiO₂-oxidized carbon nanotube composition from titanium isopropoxide as a precursor

[0037] 0.179g of carbon nanotubes (originally CNano, grade C-9000) oxidized to about 4 % by weight and aspect ratio about 60 is added to 27.3ml NMP and 2.7ml RO water and sonicated for 1 hour to obtain a fully exfoliated solution. A 19% v/v solution is prepared by adding 3.41ml of titanium isopropoxide (Sigma-Aldrich) to 18ml of isopropanol (Ultra Pure Solutions, Inc.) and is added dropwise with stirring to the exfoliated carbon nanotube dispersion while under sonication. The reaction vessel is then sealed and gently heated to slightly above room temperature for 1 hour. Sonication and a medium stirring speed are maintained over the entire duration of the reaction. The reaction products are obtained by

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filtering with a Buchner filter under vacuum, washing with ethanol to remove NMP and drying *in vacuo* to constant weight. An electron micrograph, Figure 3, shows crystals of titanium dioxide of scale 50-100nm bound to discrete well-dispersed carbon nanotubes.

CLAIMS

What is claimed is the following:

1. A composition useful for lithium ion batteries comprising:
discrete carbon nanotubes, the discrete carbon nanotubes having crystals or layers of lithium ion active material attached to their surface.
2. The composition of claim 1, wherein the crystals or layers of lithium ion active material comprise a lithium metal salt and an element selected from the group consisting of: iron, manganese, cobalt, copper, nickel, vanadium, titanium, and mixtures thereof.
3. The composition of claim 2, wherein the lithium metal salt has an olivine crystal structure.
4. The composition of claim 1, wherein the crystals or layers of lithium ion active material comprise tin, silicon, copper, antimony, aluminum, germanium, titanium, or mixtures thereof.
5. The composition of claim 1, wherein the discrete carbon nanotubes have an aspect ratio of 10 to 500 and oxidation levels from 1% to 15% by weight of the carbon nanotube.
6. The composition of claim 1, further comprising graphene or oxygenated graphene.
7. The composition of claim 6, wherein the weight ratio of graphene to carbon nanotube is in the range of 0.1:99.9 to 99.9:0.1.
8. A process for the production of the discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface, comprising the steps of:
 - a) selecting carbon nanotubes of aspect ratio 10 to 500 and oxidation level 1% to 15% percent by weight;
 - b) mixing the carbon nanotubes with a high boiling point liquid;
 - c) adding reagents in correct balance to synthesize a lithium salt;
 - d) reacting the mixture at a temperature to form the lithium salt while sonicating the mixture;

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- e) separating the solid discrete carbon nanotube salts from the liquid; and
 - f) drying and annealing the solid discrete carbon nanotube salts under an inert atmosphere at sufficient temperature to obtain an olivine crystal structure.
9. A process for the production of the discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface, comprising the steps of:
- a) selecting carbon nanotubes of aspect ratio 10 to 500 and oxidation level of 1% to 15% by weight;
 - b) mixing the carbon nanotubes and a lithium salt in a liquid with surfactant;
 - c) sonicating the liquid carbon nanotube/lithium salt mixture;
 - d) separating the solid salts from the liquid; and
 - e) drying and annealing the solid discrete carbon nanotubes with attached lithium salts under an inert atmosphere at sufficient temperature to obtain an olivine crystal structure.
10. A composition useful for lithium ion batteries, comprising discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface, wherein the carbon nanotubes are in a weight ratio of carbon nanotubes to lithium salts of 0.1% to 10%.
11. A composition useful for lithium ion batteries, comprising oxidized carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface, wherein the carbon nanotubes are uniformly dispersed without clustering on a dimension scale less than 1 micrometer
12. A composition useful for lithium ion batteries, comprising uniformly dispersible oxidized carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface.
13. The composition of claim 12, wherein the crystals or layers of lithium ion active materials are chemically attached to the surface of the dispersible oxidized carbon nanotubes.

ABSTRACT

[0038] Compositions, and methods of obtaining them, useful for lithium ion batteries comprising discrete oxidized carbon nanotubes having attached to their surface lithium ion active materials in the form of nanometer sized crystals or layers. The composition can further comprise graphene or oxygenated graphene.

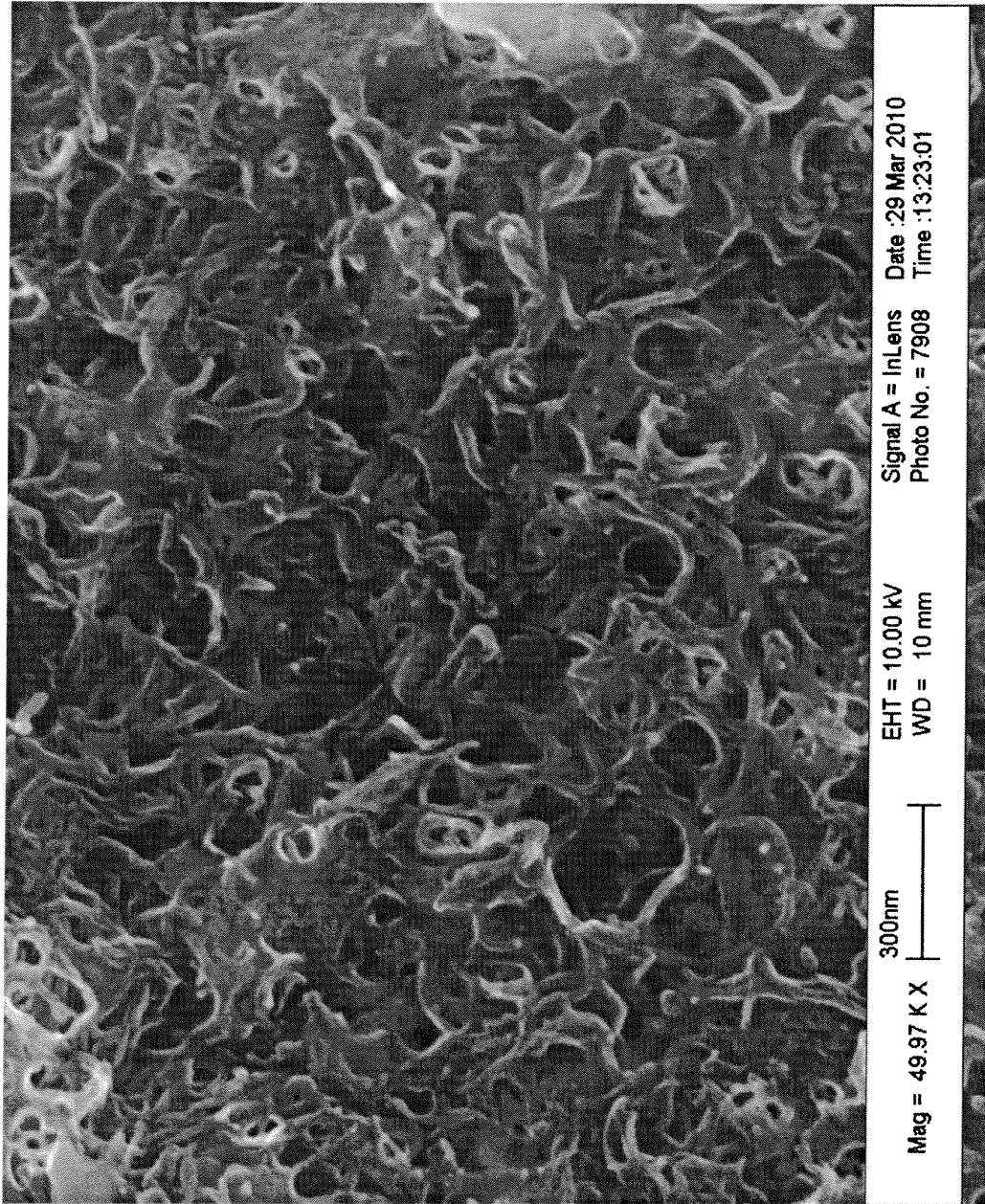


Figure 1

8237993v.1

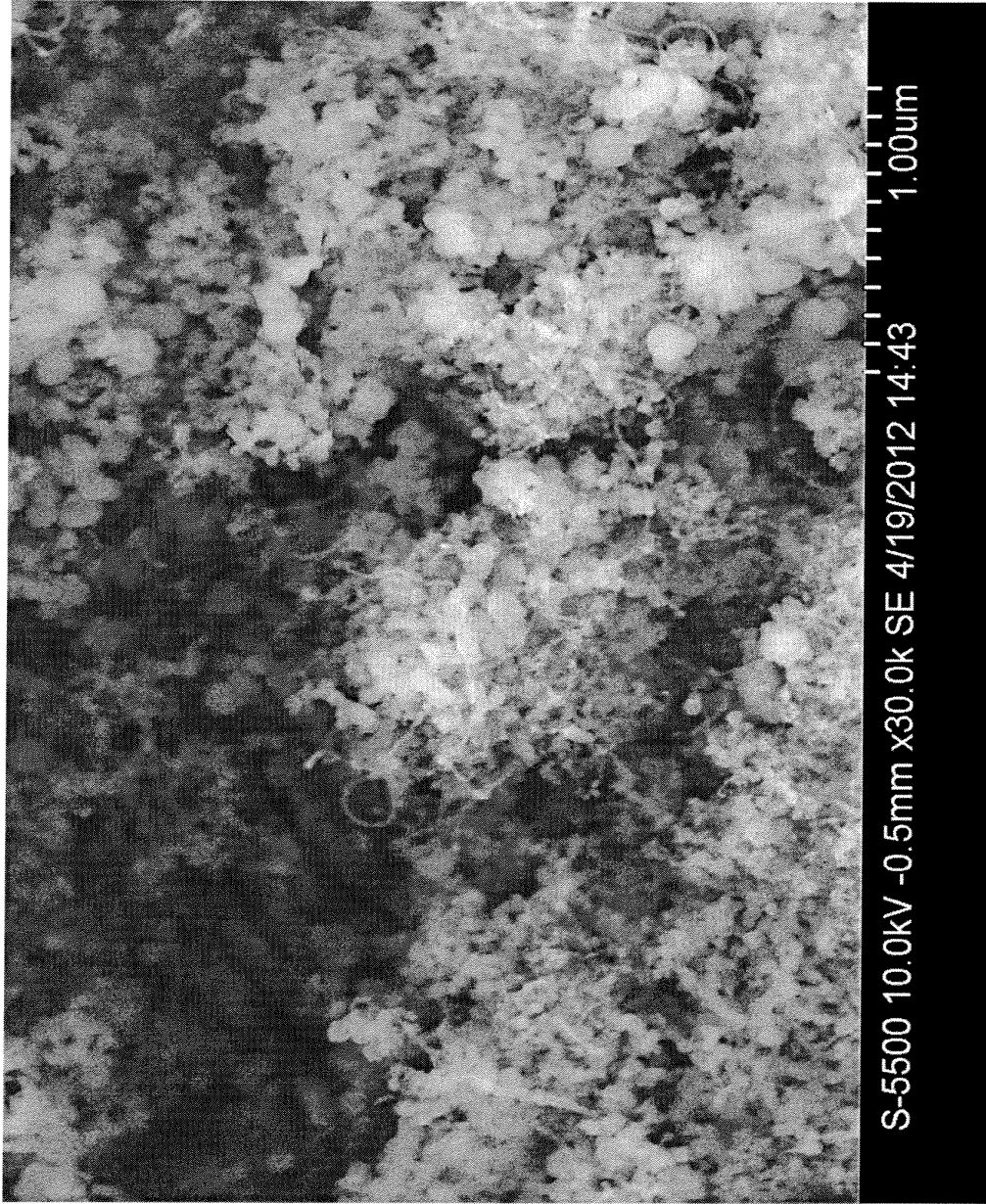


Figure 2

8237993v.1

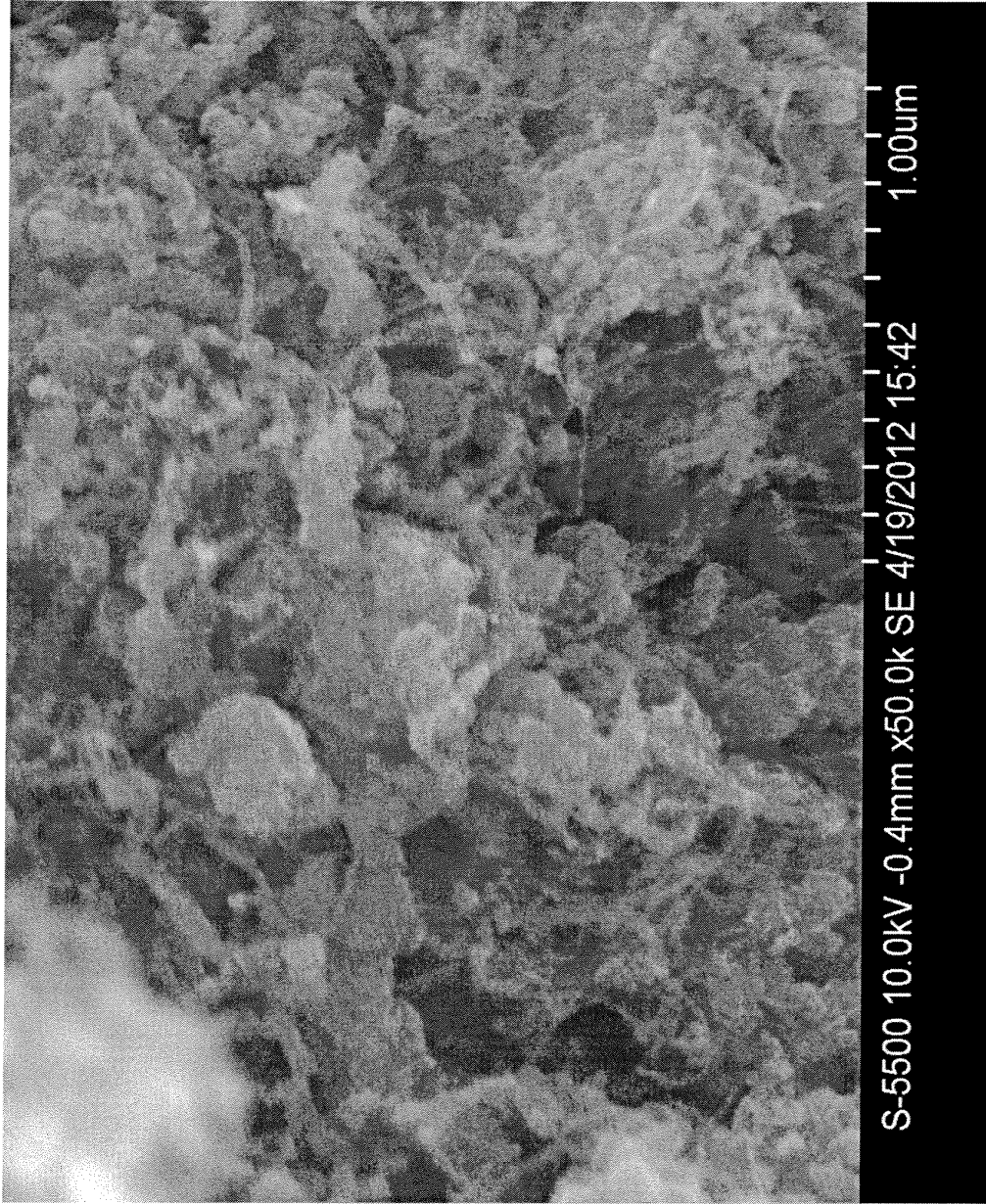


Figure 3

8237993v.1

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
---------------------------	--

As the below named inventor, I hereby declare that:

This declaration
is directed to:



The attached application, or



United States application or PCT international application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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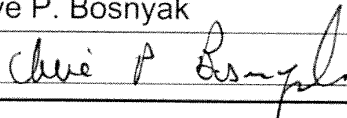
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Inventor: **Clive P. Bosnyak**

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Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
---------------------------	--

As the below named inventor, I hereby declare that:

This declaration is directed to:



The attached application, or



United States application or PCT international application number _____
filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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LEGAL NAME OF INVENTOR

Inventor:

Kurt W. Swogger

Date (Optional):

July 7, 2014

Signature:

Kurt W. Swogger

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

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Inventor 1					Remove	
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Prefix	Given Name	Middle Name	Family Name	Suffix		
	Clive	P.	Bosnyak			
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

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Title of the Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		
Attorney Docket Number	DENA-0008WO/US/D1	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	3	Suggested Figure for Publication (if any)	

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Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
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Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

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When referring to the current application, please leave the application number blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Division of	14128392	2012-06-21
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14128392	a 371 of international	PCT/US12/43534	2012-06-21
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US12/43534	Claims benefit of provisional	61500560	2011-06-23
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
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Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. ☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
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Applicant Information:

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DENA-0008WO/US/D1
		Application Number	
Title of Invention	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		

Applicant 1				Remove	
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.					
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Signature	/T. Ling Chwang/		Date (YYYY-MM-DD)	2014-07-08
First Name	T. Ling	Last Name	Chwang	Registration Number
			33590	

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This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

DOCKET No.: DENA-0008WO/US/D1

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Bosnyak, et al.

Serial No.: Not yet assigned

Filed:

Art Unit: Not yet assigned

Confirmation No. Not yet assigned

Examiner: Not yet assigned.

For: LITHIUM ION BATTERIES USING DISCRETE CARBON
NANOTUBES, METHODS FOR PRODUCTION THEREOF AND
PRODUCTS OBTAINED THEREFROM

PRELIMINARY AMENDMENT

Sir:

Prior to examination, please amend the above-identified application as follows:

In the Specification:

Please amend Paragraph [0001] as follows:

[0001] This application is a divisional of and claims priority to U.S. Patent Application Serial No. 14/128,392, entitled “LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM,” filed on December 20, 2013 as a 371 application of PCT/US2012/043534, which claims priority to U.S. Provisional Patent Application Serial No. 61/500,560, entitled “LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM,” filed on June 23, 2011, the entire content of which is hereby incorporated by reference.

In the Claims:

Claims 1-7. Cancelled.

8. (Currently Amended) A process for the production of ~~the~~ discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface, comprising the steps of:

- a) selecting carbon nanotubes of aspect ratio 10 to 500 and oxidation level 1% to 15% percent by weight;
- b) mixing the carbon nanotubes with a high boiling point liquid;
- c) adding reagents in correct balance to synthesize a lithium salt;
- d) reacting the mixture at a temperature to form the lithium salt while sonicating the mixture;
- e) separating the solid discrete carbon nanotube salts from the liquid; and
- f) drying and annealing the solid discrete carbon nanotube salts under an inert atmosphere at sufficient temperature to obtain an olivine crystal structure.

9. (Currently Amended) A process for the production of ~~the~~ discrete carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface, comprising the steps of:

- a) selecting carbon nanotubes of aspect ratio 10 to 500 and oxidation level of 1% to 15% by weight;
- b) mixing the carbon nanotubes and a lithium salt in a liquid with surfactant;
- c) sonicating the liquid carbon nanotube/lithium salt mixture;
- d) separating the solid salts from the liquid; and
- e) drying and annealing the solid discrete carbon nanotubes with attached lithium salts under an inert atmosphere at sufficient temperature to obtain an olivine crystal structure.

Claims 10-13. Cancelled.

14. (New) A composition useful for lithium ion batteries comprising:

discrete carbon nanotubes having crystals or layers of lithium ion active material attached to their surface, wherein the discrete carbon nanotubes have an aspect ratio of 10 to 500 and oxidation levels from 1% to 15% by weight of the carbon nanotube, and wherein the crystals or layers of lithium ion active material comprise a lithium metal salt and an element selected from the group consisting of: iron, manganese, cobalt, copper, nickel, vanadium, titanium, and mixtures thereof.
15. (New) The composition of claim 14, wherein the lithium metal salt has an olivine crystal structure.
16. (New) The composition of claim 14, further comprising graphene or oxygenated graphene.
17. (New) The composition of claim 16, wherein the weight ratio of grapheme to carbon nanotube is in the range of 0.1:99.9 to 99.9:0.1.
18. (New) The composition of claim 14, wherein the carbon nanotubes are present in a weight percentage of 0.1% to 10% by weight of the lithium ion active material.
19. (New) The composition of claim 14, comprising oxidized carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface, wherein the carbon nanotubes are uniformly dispersed without clustering on a dimension scale less than 1 micrometer.
20. (New) The composition of claim 14, comprising uniformly dispersible oxidized carbon nanotubes having crystals or layers of lithium ion active materials attached to their surface.
21. (New) The composition of claim 20, wherein the crystals or layers of lithium ion active materials are chemically attached to the surface of the dispersible oxidized carbon nanotubes.

REMARKS

The present application is a divisional of and claims priority to U.S. Patent Application Serial No. 14/128,392, which received a Notice of Allowance on June 12, 2014, and for which the issue fee has been paid. Claims 14 and 17-23 were allowed in U.S. Patent Application Serial No. 14/128,392. Certain of the claims presented in this amendment correspond to claims previously pending in the parent, U.S. Patent Application Serial No. 14/128,392. Claims 8 and 9 correspond to Claims 8 and 9 of the parent application. Current Claims 14 and 15 correspond to Claims 15 and 16 of the parent application. Applicant respectfully notes that Claims 8, 9, 15, and 16 of U.S. Patent Application Serial No. 14/128,392 were previously rejected for lacking enablement.

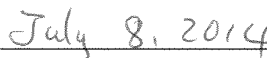
Applicant respectfully asserts that all of the claims in the application are fully supported and enabled by the specification.

A prompt examination and allowance of the pending claims is earnestly solicited.

Respectfully Submitted,



T. Ling Chwang
Reg. No. 33,590
Jackson Walker L.L.P.
901 Main Street, Suite 6000
Dallas, TX 75202
Tel: (214) 953-5959
Fax: (214) 661-6870



Dated

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		00000000	
	Filing Date		2014-07-08	
	First Named Inventor	Clive P. Bosnyak		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		DENA-0008WO/US/D1	

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	1	20110104551		2011-05-05	Yang, et al.			
	2	20110311876		2011-12-22	Sturgeon et al.			
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	1	2010/117392	WO		2010-10-14	Bosnyak, et al.		☐
	2	2009/155267	WO		2009-12-23	Mysticmd, Inc.		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		00000000	
	Filing Date		2014-07-08	
	First Named Inventor	Clive P. Bosnyak		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		DENA-0008WO/US/D1	

	3	2012/083358	WO		2012-06-28	Commonwealth Scientific and Ind. Res. Organisation		☐
	4	2013/011516	WO		2013-01-24	Vulcan Automotive Industries Ltd. et al.		☐
	5	1665446	EP		2012-03-21	Commonwealth Scientific and Ind. Res. Organisation		☐

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	1	European Patent Office, International Search Report and Written Opinion, PCT Application No. PCT/US2012/043534, October 5, 2012	☐
	2	European Patent Office, Response to Written Opinion and Demand, PCT Application No. PCT/US2012/043534, April 23, 2013	☐
	3	European Patent Office, Second Written Opinion, PCT Application No. PCT/US2012/043534, June 19, 2013	☐
	4	European Patent Office, International Preliminary Report on Patentability, PCT Application No. PCT/US2012/043534, September 24, 2013	☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	00000000
	Filing Date	2014-07-08
	First Named Inventor	Clive P. Bosnyak
	Art Unit	
	Examiner Name	
	Attorney Docket Number	DENA-0008WO/US/D1

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	00000000
	Filing Date	2014-07-08
	First Named Inventor	Clive P. Bosnyak
	Art Unit	
	Examiner Name	
	Attorney Docket Number	DENA-0008WO/US/D1

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/T. Ling Chwang/	Date (YYYY-MM-DD)	2014-07-08
Name/Print	T. Ling Chwang	Registration Number	33590

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Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM		
First Named Inventor/Applicant Name:		Clive P. Bosnyak		
Filer:		T. Ling Chwang/Debra Pepper		
Attorney Docket Number:		DENA-0008WO/US/D1		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				730

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EFS ID:	19513060
Application Number:	14325414
International Application Number:	
Confirmation Number:	3135
Title of Invention:	LITHIUM ION BATTERIES USING DISCRETE CARBON NANOTUBES, METHODS FOR PRODUCTION THEREOF AND PRODUCTS OBTAINED THEREFROM
First Named Inventor/Applicant Name:	Clive P. Bosnyak
Customer Number:	117364
Filer:	T. Ling Chwang/Debra Pepper
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Attorney Docket Number:	DENA-0008WO/US/D1
Receipt Date:	08-JUL-2014
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Time Stamp:	09:14:32
Application Type:	Utility under 35 USC 111(a)

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Payment was successfully received in RAM	\$730
RAM confirmation Number	9077
Deposit Account	100096
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1	Transmittal of New Application	DENA0008WOUSD1SIGNEDTRANSMITTAL.pdf	106835	no	1
			a5863b8f8162da11a37ff4e655edda66acce9230		
Warnings:					
Information:					
2		DENA0008WOAPPLICATION.pdf	886223	yes	15
			100c5b6410c0ab9cd72ea4e8f87793988e800032		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	12	
	Claims		13	14	
	Abstract		15	15	
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3	Drawings-only black and white line drawings	DENA0008WODWGS.pdf	2850970	no	3
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Warnings:					
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4	Oath or Declaration filed	DENA0008WOUSD1BOSNYAKDECL.pdf	185602	no	1
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Warnings:					
Information:					
5	Oath or Declaration filed	DENA0008WOUSD1SWOggerDECL.pdf	189459	no	1
			9c7c5dbc539d2337428f397e93731a977056d5cc		
Warnings:					
Information:					
6	Application Data Sheet	DENA0008WOUSD1ADS.pdf	1560938	no	7
			8a864b2a7a17a19786e08d491fc8f6b442936d5		
Warnings:					
Information:					
7	Preliminary Amendment	DENA0008WOUSD1PREAMDT.pdf	196879	no	5
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Warnings:					
Information:					
8	Information Disclosure Statement (IDS) Form (SB08)	DENA0008WOUSD1IDS.pdf	612346 33ee13fba14ee336b792724d0fc220311c4d986e	no	5
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	33435 ab8c550525f1d432f5afaf64dda0f4e12b453add	no	2
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 14/325,414		Filing Date 07/08/2014		☐ To be Mailed		
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO										
APPLICATION AS FILED – PART I										
		(Column 1)		(Column 2)						
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)		
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A				
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =		*		X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL				
APPLICATION AS AMENDED – PART II										
		(Column 1)		(Column 2)		(Column 3)				
AMENDMENT	07/08/2014		CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		* 10	Minus	** 20	= 0		X \$40 =	0	
	Independent (37 CFR 1.16(h))		* 3	Minus	***3	= 0		X \$210 =	0	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
	TOTAL ADD'L FEE								0	
		(Column 1)		(Column 2)		(Column 3)				
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		*	Minus	**	=		X \$ =		
	Independent (37 CFR 1.16(h))		*	Minus	***	=		X \$ =		
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
	TOTAL ADD'L FEE									
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

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/CHRISTINE MOLLISH/

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