

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4485533

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
ARTHUR J. ESSWEIN	05/13/2016
STEVEN Y. REECE	06/19/2017
EVAN R. KING	08/07/2012
JOHN GOELTZ	05/31/2017
DESIREE D. AMADEO	05/30/2017
RECEIVING PARTY DATA	
Name:	LOCKHEED MARTIN ADVANCED ENERGY STORAGE, LLC
Street Address:	6801 ROCKLEDGE DRIVE
City:	BETHESDA
State/Country:	MARYLAND
Postal Code:	20817-1877
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15162470
CORRESPONDENCE DATA	
Fax Number:	(949)851-9348
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	949.851.0633
Email:	MWEIPDocket@mwe.com, apennington@mwe.com
Correspondent Name:	MARK J. ITRI
Address Line 1:	MCDERMOTT WILL & EMERY LLP
Address Line 2:	4 PARK PLAZA, SUITE 1700
Address Line 4:	IRVINE, CALIFORNIA 92614
ATTORNEY DOCKET NUMBER:	086735-0494
NAME OF SUBMITTER:	MARK J. ITRI, REG. NO. 36,171
SIGNATURE:	/Mark J. Itri/
DATE SIGNED:	06/29/2017
Total Attachments: 23	

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ASSIGNMENT

WHEREAS I/We, the undersigned, have made a certain invention as set forth in an application for United States Letters Patent, entitled AQUEOUS REDOX FLOW BATTERIES FEATURING IMPROVED CELL DESIGN CHARACTERISTICS, filed on May 23, 2016, and identified by United States Patent Application No. 15/162,470, and I/We, the undersigned, authorize and request the practitioners of McDermott Will & Emery LLP to insert the filing date and application number of the application, when known;

AND WHEREAS, Lockheed Martin Advanced Energy Storage, LLC (the "Entity"), a corporation of Maryland and having an address of 6801 Rockledge Drive, Bethesda, Maryland 20817-1877, is desirous of acquiring the entire rights, title and interests in and to said invention and in and to any and all Letters Patent and certificates of the United States, foreign countries and all regions worldwide which may be obtained therefor;

NOW, THEREFORE, for good and valuable consideration, the receipt for and sufficiency of which is hereby acknowledged, I/We, the undersigned, do hereby sell, assign, transfer and set over unto the Entity, its legal representatives, successors, and assigns, the entire rights, title and interests in and to said application and said invention worldwide, including the right to claim priority, including any applications worldwide based in whole or in part on said application and/or in whole or in part on said invention, including any international applications filed under any international patent law treaty, including the Patent Cooperation Treaty, and including any provisionals, non-provisionals, continuations, continuations-in-part, divisions, reissues, re-examinations, inter partes reviews, post grant reviews, covered business methods, national stages, regional stages and extensions thereof, and in and to any and all patents and certificates of the United States, foreign countries and all regions worldwide which may be issued based in whole or in part on said application and/or in whole or in part on said invention, including the right to enforce such patents and certificates, including the right to sue for injunctions and recover damages and attorney fees for past, present and future infringements;

UPON SAID CONSIDERATIONS, I/We, the undersigned, hereby agree with said assignee that I/We, the undersigned, will not execute any writing or do any act whatsoever conflicting with these presents, and that I/We, the undersigned, will, at any time upon request, without further or additional consideration but at the expense of said assignee, execute such additional assignments and other writings and do such additional acts as said assignee may deem necessary or desirable to perfect said assignee's enjoyment of this grant, and render all necessary assistance in making application for and obtaining original, provisional, non-provisional, continuation, continuation-in-part, divisional, reissue, re-examination, inter partes review, post grant review, covered business method, national stage, regional stage and extension Letters Patent and certificates of the United States and/or of any and all foreign countries and regions based in whole or in part on said application and/or in whole or in part on said invention, and in enforcing any rights or choses in action accruing as a result of such applications, patents or certificates, by giving testimony in any proceedings or transactions involving such applications, patents or certificates, and by executing preliminary statements and other affidavits, it being understood that the foregoing covenant and agreement shall bind, and inure to the benefit of heirs, executors, administrators, assigns and legal representatives of said assignor and assignee;

AND I/We, the undersigned, request the Commissioner for Patents and Trademarks to issue any Letters Patent and certificates of the United States which may be issued for said invention to the Entity, its legal representatives, successors or assigns, as the sole owner of the entire rights, title and interests in and to said patents, said certificates and said invention covered thereby.

5/13/2016
Date



Arthur J. ESSWEIN
1930 Grove Street
Apartment 4
San Francisco, California 94117

6-19-2017

Date


Steven Y. REECE

~~106 Henry Street~~

Cambridge, Massachusetts 02139

138 Weston Rd
Lincoln, MA 01773

Date

Evan R. KING

59 Faxon Park Road

Quincy, Massachusetts 02169

Date

John GOELTZ

340 Corona Road

Carmel, California 93923

Date

Desiree D. AMADEO

48 Meadow Lane

Lunenburg, Massachusetts 01462

Docket No.: 086735-0494

Date

Steven Y. REECE
106 Henry Street
Cambridge, Massachusetts 02139

Date

Evan R. KING
59 Faxon Park Road
Quincy, Massachusetts 02169

May 31, 2017

Date

John GOELTZ
340 Corona Road
Carmel, California 93923

Date

Desiree D. AMADEO
48 Meadow Lane
Lunenburg, Massachusetts 01462

Date

Steven Y. REECE
106 Henry Street
Cambridge, Massachusetts 02139

Date

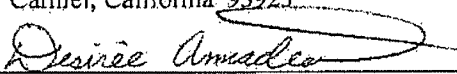
Evan R. KING
59 Faxon Park Road
Quincy, Massachusetts 02169

Date

John GOELTZ
340 Corona Road
Carmel, California 93923

5/30/2017

Date


Desiree D. AMADEO
48 Meadow Lane
Lunenburg, Massachusetts 01462

SUN CATALYTIX CORPORATION

EMPLOYEE NONDISCLOSURE, NONCOMPETITION AND ASSIGNMENT OF INTELLECTUAL PROPERTY AGREEMENT

In consideration and as a condition of my employment by Sun Catalytix Corporation, a Delaware corporation (the "Company"), and of the compensation to be paid to me, and in recognition of the fact that as an employee of the Company I will or may have access to confidential information, I agree with the Company as follows:

1. Performance; Prior Obligations.

(a) I agree to perform my assigned duties diligently, conscientiously, and with reasonable skill, and shall comply with all rules, procedures and standards promulgated from time to time by the Company with regard to my conduct and my access to and use of the Company's property, equipment and facilities. Among such rules, procedures and standards are those governing ethical and other professional standards for dealing with customers, government agencies, vendors, competitors, consultants, fellow employees, and the public-at-large, security provisions designed to protect Company property and the personal security of Company employees, rules respecting attendance, punctuality, and hours of work, and rules and procedures designed to protect the confidentiality of proprietary information. The Company agrees to make reasonable efforts to inform me of such rules, standards and procedures as are in effect from time to time.

(b) I hereby represent, warrant and agree (i) that I have the full right to enter into this Agreement and perform the services required of me hereunder, without any restriction whatsoever; (ii) that in the course of performing services hereunder, I will not violate the terms or conditions of any agreement between me and any third party or infringe or wrongfully appropriate any patents, copyrights, trade secrets or other intellectual property rights of any person or entity anywhere in the world; (iii) that I have not and will not disclose or use during my employment by the Company any confidential information that I acquired as a result of any previous employment or consulting arrangement or under a previous obligation of confidentiality; and (iv) that I have disclosed to the Company in writing any and all continuing obligations to previous employers or others that require me not to disclose any information to the Company.

2. Confidential Information. While employed by the Company and thereafter, I shall not, directly or indirectly, use any Confidential Information (as hereinafter defined) other than pursuant to my employment by and for the benefit of the Company, or disclose any Confidential Information to anyone outside of the Company, whether by private communication, public address, publication or otherwise, or disclose any Confidential Information to anyone within the Company who has not been authorized to receive such information, except as directed in writing by an authorized representative of the Company. The term "Confidential Information" as used throughout this Agreement shall mean all trade secrets, proprietary information, know-how, data, designs, specifications, processes, customer lists and other technical or business information (and any tangible evidence, record or representation thereof), whether prepared, conceived or

developed by a consultant or employee of the Company (including myself) or received by the Company from an outside source, which is in the possession of the Company (whether or not the property of the Company), which in any way relates to the present or future business of the Company, which is maintained in confidence by the Company, or which might permit the Company or its customers to obtain a competitive advantage over competitors who do not have access to such trade secrets, proprietary information, or other data or information. Without limiting the generality of the foregoing, Confidential Information shall include:

(a) any idea, improvement, invention, innovation, development, concept, technical data, design, formula, device, pattern, sequence, method, process, composition of matter, computer program or software, source code, object code, algorithm, model, diagram, flow chart, product specification or design, plan for a new or revised product, sample, compilation of information, or work in process, or parts thereof, and any and all revisions and improvements relating to any of the foregoing (in each case whether or not reduced to tangible form); and

(b) the name of any customer, supplier, employee, prospective customer, sales agent, supplier or consultant, any sales plan, marketing material, plan or survey, business plan or opportunity, product or development plan or specification, business proposal, financial record, or business record or other record or information relating to the present or proposed business of the Company.

Notwithstanding the foregoing, the term Confidential Information shall not apply to information which the Company has voluntarily disclosed to the public without restriction, or which has otherwise lawfully entered the public domain.

I understand that the Company from time to time has in its possession information (including product and development plans and specifications) which is claimed by customers and others to be proprietary and which the Company has agreed to keep confidential. I agree that all such information shall be Confidential Information for purposes of this Agreement.

3. Ownership and Assignment of Intellectual Property.

(a) I agree that all originals and all copies of all manuscripts, drawings, prints, manuals, diagrams, letters, notes, notebooks, reports, models, records, files, memoranda, plans, sketches and all other documents and materials containing, representing, evidencing, recording, or constituting any Confidential Information (as defined in Section 2 above), however and whenever produced (whether by myself or others) during the course of my employment, shall be the sole property of the Company.

(b) I agree that all Confidential Information and all other discoveries, inventions, ideas, concepts, trademarks, service marks, logos, processes, products, formulas, computer programs or software, source codes, object codes, algorithms, machines, apparatuses, items of manufacture or composition of matter, or any new uses therefor or improvements thereon, or any new designs or modifications or configurations of any kind, or works of authorship of any kind, including, without limitation, compilations and derivative works, whether or not patentable or copyrightable, conceived, developed, reduced to practice or

otherwise made by me, either alone or with others, and in any way related to the business of the Company or to tasks assigned to me during the course of my employment, whether or not made during my regular working hours, whether or not conceived, developed, reduced to practice or made on the Company's premises and whether or not disclosed by me to the Company (collectively "Inventions"), and any and all services and products which embody, emulate or employ any such Invention or Confidential Information shall be the sole property of the Company and all copyrights, patents, patent rights, trademarks and reproduction rights to, and other proprietary rights in, each such Invention or Confidential Information, whether or not patentable or copyrightable, shall belong exclusively to the Company.

(c) I agree to, and hereby do, assign to the Company all my right, title and interest throughout the world in and to all Inventions and to anything tangible which evidences, incorporates, constitutes, represents or records any Invention. I agree that all Inventions shall constitute works made for hire under the copyright laws of the United States and hereby assign and, to the extent any such assignment cannot be made at present, I hereby agree to assign to the Company all copyrights, patents and other proprietary rights I may have in any Inventions, together with the right to file for and/or own wholly without restriction United States and foreign patents, trademarks, and copyrights. I agree to waive, and hereby waive, all moral rights or proprietary rights in or to any Inventions and, to the extent that such rights may not be waived, agree not to assert such rights against the Company or its licensees, successors or assigns.

(d) I hereby certify that Exhibit A sets forth any and all confidential information and intellectual property that I claim as my own or otherwise intend to exclude from this Agreement because it was developed by me prior to the date of this Agreement. I understand that after execution of this Agreement I shall have no right to exclude Confidential Information or Inventions from this Agreement.

4. Employee's Obligation to Keep Records. I shall make and maintain adequate and current written records of all Inventions, including notebooks and invention disclosures, which records shall be available to and remain the property of the Company at all times. I shall disclose all Inventions promptly, fully and in writing to the Company immediately upon production or development of the same and at any time upon request.

5. Employee's Obligation to Cooperate. I will, at any time during my employment, or after it terminates, upon request of the Company, execute all documents and perform all lawful acts which the Company considers necessary or advisable to secure its rights hereunder and to carry out the intent of this Agreement. Without limiting the generality of the foregoing, I will assist the Company in any reasonable manner to obtain for its own benefit patents or copyrights in any and all countries with respect to all Inventions assigned pursuant to Section 3, and I will execute, when requested, patent and other applications and assignments thereof to the Company, or persons designated by it, and any other lawful documents deemed necessary by the Company to carry out the purposes of this Agreement, and I will further assist the Company in every way to enforce any patents and copyrights obtained, including, without limitation, testifying in any suit or proceeding involving any of said patents or copyrights or executing any documents deemed necessary by the Company, all without further consideration than provided for herein. It is understood that reasonable out-of-pocket expenses of my assistance incurred at the request of the Company under this Section will be reimbursed by the Company. In the event the Company

is unable after reasonable effort to obtain my signature on any document which I may be required to sign pursuant to this Agreement, whether because of my physical or mental incapacity or for any other reason whatsoever, I hereby irrevocably appoint each of the President and the Secretary of the Company (whether now or hereafter in office) as my attorney-in-fact to execute any such document on my behalf.

6. Noncompetition and Non-solicitation. During my employment with the Company I shall devote my full working time, skill, energy and efforts to the Company. During my employment with the Company and for a period of twelve (12) months after the termination of my employment with the Company for any reason, I shall not, on my own behalf, or as owner, manager, member, stockholder, consultant, director, officer, or employee of any business entity (except as a holder of not more than one (1%) percent of the stock of a publicly held company) participate, directly or indirectly, in any capacity, in any business or activity involving (a) research and development in the Field (as defined below) or (b) the sale or manufacture of products that compete directly, or could reasonably be expected to compete directly in the future, in the marketplace with one or more of the Company's products (including products under development). The "Field" shall mean the field of the generation of oxygen and/or hydrogen from water.

During my employment with the Company and for a period of twelve (12) months after the termination of my employment with the Company for any reason, I shall not solicit, induce, attempt to hire, or hire any employee of the Company (or any person who may have been employed by the Company during the term of my employment with the Company), or assist in such hiring by any other person or business entity or encourage any such employee to terminate his or her employment with the Company.

7. Return of Property. Upon termination of my employment with the Company, or at any other time upon request of the Company, I shall return promptly any and all customer or prospective customer lists, other customer or prospective customer information or related materials, computer programs, software, electronic data, specifications, drawings, blueprints, data storage devices, reproductions, sketches, notes, notebooks, memoranda, reports, records, proposals, business plans, or copies of them, other documents or materials, tools, equipment, or other property belonging to the Company or its customers which I may then possess or have under my control. I further agree that upon termination of employment I shall not take with me any documents or data in any form or of any description containing or pertaining to Confidential Information or Inventions.

8. Other Obligations. I acknowledge that the Company from time to time may have agreements with other persons, including the government of the United States or other countries and agencies thereof, which impose obligations or restrictions on the Company regarding inventions made during the course of work thereunder or regarding the confidential nature of such work. I agree to be bound by all such obligations and restrictions and to take all action necessary to discharge the obligations of the Company thereunder.

9. Miscellaneous

(a) This Agreement contains the entire and only agreement between me and the Company with respect to the subject matter hereof, superseding any previous oral or written communications, representations, understandings, or agreements with the Company or any officer or representative hereof. In the event of any inconsistency between this Agreement and any other contract between me and the Company, the provisions of this Agreement shall prevail.

(b) My obligations under this Agreement shall survive the termination of my employment with the Company regardless of the manner of or reasons for such termination, and regardless of whether such termination constitutes a breach of any other agreement I may have with the Company. My obligations under this Agreement shall be binding upon my heirs, assigns, executors, administrators and representatives, and the provisions of this Agreement shall inure to the benefit of and be binding on the successors and assigns of the Company.

(c) If any provision of this Agreement shall be determined to be unenforceable by any court of competent jurisdiction by reason of its extending for too great a period of time or over too large a geographic area or over too great a range of activities, it shall be interpreted to extend only over the maximum period of time, geographic area or range of activities as to which it may be enforceable. If, after application of the immediately preceding sentence, any provision of this Agreement shall be determined to be invalid, illegal or otherwise unenforceable by any court of competent jurisdiction, the validity, legality and enforceability of the other provisions of this Agreement shall not be affected thereby. Except as otherwise provided in this paragraph, any invalid, illegal or unenforceable provision of this Agreement shall be severable, and after any such severance, all other provisions hereof shall remain in full force and effect.

(d) I acknowledge and agree that violation of this Agreement by me would cause irreparable harm to the Company not adequately compensable by money damages alone, and I therefore agree that, in addition to all other remedies available to the Company at law, in equity or otherwise, the Company shall be entitled to injunctive relief to prevent an actual or threatened violation of this Agreement and to enforce the provisions hereof, without showing or proving any actual damage to the Company or posting any bond in connection therewith.

(e) No failure by the Company to insist upon strict compliance with any of the terms, covenants, or conditions hereof, and no delay or omission by the Company in exercising any right under this Agreement, will operate as a waiver of such terms, covenants, conditions or rights. A waiver or consent given by the Company on any one occasion is effective only in that instance and will not be construed as a bar to or waiver of any right on any other occasion.

(f) This Agreement may not be changed, modified, released, discharged, abandoned, or otherwise amended, in whole or in part, except by an instrument in writing signed by me and the Company.

(g) This Agreement shall be governed by, and construed and enforced in accordance with, the laws of The Commonwealth of Massachusetts, without regard to its principles of conflicts of laws. This Agreement is executed under seal.

BY PLACING MY SIGNATURE HEREUNDER, I ACKNOWLEDGE THAT I HAVE READ ALL THE PROVISIONS OF THIS EMPLOYEE NONDISCLOSURE, NONCOMPETITION AND ASSIGNMENT OF INTELLECTUAL PROPERTY AGREEMENT AND THAT I AGREE TO ALL OF ITS TERMS.

Effective Date: 8/7/12

EMPLOYEE:

Evan R King
Employee's Signature
Name: Evan R King
Address: 59 Foxw Park Rd
Quincy, MA 02169

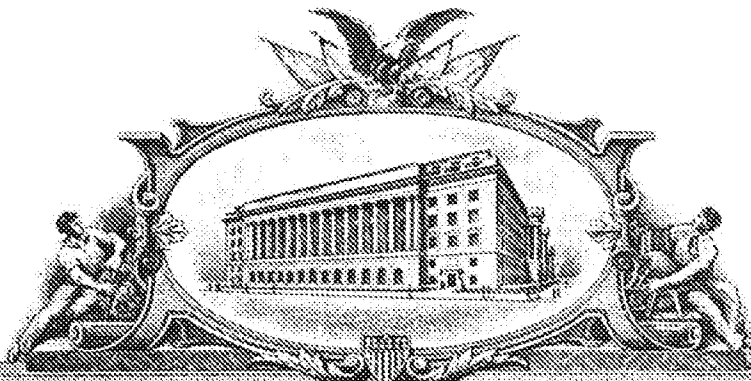
Accepted and Agreed:

SUN CATALYTIX CORPORATION

Michael P Decker
By: Michael P Decker
Name: Michael P Decker
Title: President + CEO

EXHIBIT A

Excluded Confidential Information and Inventions



A. 7079000

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

April 13, 2016

THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE
RECORDS OF THIS OFFICE OF A DOCUMENT RECORDED ON
JANUARY 23, 2015.

By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office



T. LAWRENCE
Certifying Officer

PATENT

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT3194518

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	ASSIGNMENT	
CONVEYING PARTY DATA		
Name		Execution Date
SUN CATALYTIX CORPORATION		08/21/2014
RECEIVING PARTY DATA		
Name:	LOCKHEED MARTIN ADVANCED ENERGY STORAGE, LLC	
Street Address:	6801 ROCKLEDGE ROAD	
City:	BETHESDA	
State/Country:	MARYLAND	
Postal Code:	20817	
PROPERTY NUMBERS Total: 21		
Property Type	Number	
Application Number:	61898635	
Application Number:	61891483	
Application Number:	61904492	
Application Number:	61881041	
Application Number:	13796004	
PCT Number:	US2013051767	
Application Number:	13949324	
Application Number:	61896750	
PCT Number:	US2013051790	
PCT Number:	US2013051802	
PCT Number:	US2013051774	
Application Number:	13949373	
Application Number:	13949486	
Application Number:	13949530	
PCT Number:	US2013030430	
Application Number:	13887461	
Application Number:	13795878	
Application Number:	13948497	
PCT Number:	US2013051606	
Application Number:	14164839	

Property Type	Number
Application Number:	61882324

CORRESPONDENCE DATA

Fax Number: (215)568-3439

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 2155683100

Email: assignments@woodcock.com

Correspondent Name: BAKER & HOSTETLER LLP

Address Line 1: 2929 ARCH STREET

Address Line 2: 12TH FLOOR, CIRA CENTRE

Address Line 4: PHILADELPHIA, PENNSYLVANIA 19104

ATTORNEY DOCKET NUMBER:	101349.000106 ET AL.
NAME OF SUBMITTER:	FAITH A. POORE
SIGNATURE:	/Faith A. Poore/
DATE SIGNED:	01/23/2015

Total Attachments: 9

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PATENT
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PATENT
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PATENT ASSIGNMENT

This PATENT ASSIGNMENT is made as of this 21st day of August 2014, by and between SUN CATALYTIX CORPORATION, a Delaware corporation ("Assignor"), and LOCKHEED MARTIN ADVANCED ENERGY STORAGE, LLC, a Delaware limited liability company ("Assignee").

WITNESSETH:

WHEREAS, Assignor is the owner of the entire right, title and interest in, to and under all of the patents and patent applications set forth on Schedule A attached hereto and has the unrestricted right to sell, assign and transfer such patents and patent applications; and

WHEREAS, pursuant to the terms of an Asset Purchase Agreement dated as of August 15, 2014 (the "Asset Purchase Agreement"), by and between Assignor and Lockheed Martin Corporation, a Maryland corporation and affiliate of Assignee, Assignor has agreed, among other things, to transfer to Assignee said patents and patent applications;

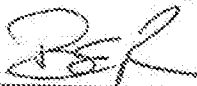
NOW, THEREFORE, for good and valuable consideration paid by Assignee to Assignor, the receipt and sufficiency of which is hereby acknowledged, Assignor hereby sells, assigns, transfers and sets over to Assignee, its successors and permitted assigns, Assignor's entire right, title and interest in, to and under the patents and patent applications set forth on Schedule A hereto, including (without limitation) all divisions, reissues, substitutions, continuations and extensions thereof, all priority rights in any country or countries foreign to the United States under the International Convention for the Protection of Industrial Property for every member country (and any other international convention, treaty or law), any and all Letters Patent of the United States and reissues and extensions thereof granted thereon and any and all rights corresponding to any of the foregoing throughout the world and any and all accounts, contract rights, warranties, litigation claims and rights, including the right to sue for and collect upon all claims for profits and damages as a result of past infringement, if any, and other general intangibles of Assignor related to any of the foregoing, in each case whether now existing or hereafter acquired or created, whether owned, leased or licensed beneficially or of record and whether owned, leased or licensed individually, jointly or otherwise, together with the products and proceeds thereof (including license royalties and the proceeds of infringement suits), all payments and other distributions with respect thereto and any divisions, reissues, substitutions, continuations and extensions of any and all of the foregoing (all of the foregoing herein collectively referred to as the "Patents").

Assignor further agrees that it shall on the date hereof and from time to time thereafter, at the request of Assignee, perform or cause to be performed such acts and execute, acknowledge and deliver at the request of Assignee, such documents as may reasonably be required to evidence or effectuate the sale, conveyance, assignment, transfer and delivery to Assignee of the Patents or for the performance by Assignor of any of its obligations hereunder.

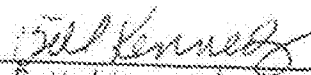
[Signature page follows]

IN WITNESS WHEREOF, Assignor has executed this Patent Assignment as of the date
above written.

SUN CATALYTIX CORPORATION

By: 
Name: BRUCE E. ROGOFF
Title: CEO

LOCKHEED MARTIN ADVANCED ENERGY
STORAGE, LLC

By: 
Name: BILL KENNEDY
Title: LM AES CEO

SCHEDULE A

Patents and Patent Applications

System Diagnostics Cases

Title	Country	App. No.	Filing Date	Reference No.	Summary
Apparatus And Method For Determining State Of Charge In A Redox Flow Battery Via Limiting Currents	US	61/898,635	11/1/2013	101349.000106	Directed toward determining ratio of oxidized and reduced forms of a redox couple in a solution
Method And Apparatus For Measuring Transient State-Of-Charge Using Inlet/Outlet Potentials	US	61/891,483	10/16/2013	101349.000108	Flow cells having electrodes configured to allow determination of the state of charge of the electrolyte in the flow cell
Methods For Determining State Of Charge And Calibrating Reference Electrodes In A Redox Flow Battery	US	61/904,492	11/15/2013	101349.000111	Methods of determining state of charge of a half-cell by measuring rate of change in equilibrium half-cell reduction potential and correlating rate of change with state of charge of the half-cell
Insoluble Or Immiscible pH Control	US	Not yet filed	n/a	101349.000131	Buffered redox flow batteries wherein at least one electrolyte contacts a material that is substantially insoluble in the electrolyte at normal operating pH but the material is also at least partially soluble in the electrolyte when the electrolyte pH is outside normal range
Invention Disclosure: Spectroscopic Device And Method To Determine State Of Charge In A Redox Flow Battery That Utilizes Strongly Light-Absorbing Active Materials	US	Not yet filed	n/a	101349.000132	Spectroscopic device and method to determine state of charge in a redox flow battery that utilizes strongly light-absorbing active materials

Electrochemical Cell Engineering Cases

Title	Country	App No.	Filing Date	Ref. No.	Summary
Bipolar Plate Design With Non-Conductive Picture Frame	US	61/381,041	09/23/2013	101349.000078	Bipolar fluid flow assembly, comprising a non-conductive element framing a conductive element
Aqueous Redox Flow Batteries Featuring Improved Cell Design Characteristics	US	13/796,804	3/12/2013	101349.000100	Flow batteries including MLCCs having charge sign in both oxidized and reduced forms that is same as net charge sign of the ionomer membrane - GRANTED - as US 8,691,413
Aqueous Redox Flow Batteries Comprising Matched Ionomer Membranes	PCT	PCT/US2013/051767	7/24/2013	101349.000114	Expansion of 103349.000100 US case
Aqueous Redox Flow Batteries Comprising Matched Ionomer Membranes	US	13/949,324	07/24/2013	101349.000115	Expansion of 103349.000100 US case
Driven Electrochemical Cell For Electrolyte State Of Charge Balance In Energy Storage Devices	US	61/098,750	11/1/2013	101349.000116	Balancing cells of redox flow batteries having (1) positive electrode maintained at potential more positive than potential for hydrogen evolution and (2) second electrode, contacting negative electrolyte, that is maintained at a potential sufficiently negative to reduce the negative electrolyte
Electrochemical Energy Storage Systems And Methods Featuring Large Negative Half-Cell Potentials	PCT	PCT/US2013/051790	7/24/2013	101349.000118	Flow batteries having a first half-cell having a half-cell potential equal to or more negative than about -0.3 V relative to RHE, neutral pH and being capable of capable of operating at current density of at least about 25 mA/cm ²

Electrochemical Energy Storage Systems And Methods Featuring Optimal Membrane Systems	PCT	PCT/US2013/051802	7/24/2013	101349.000120	Flow batteries having separator thickness of 100 microns or less and capable of operating with a current efficiency of at least 85% with a current density of at least about 100 mA/cm ²
Electrochemical Energy Storage Systems And Methods Featuring High Open Circuit Potential	PCT	PCT/US2013/051774	7/24/2013	101349.000121	Flow batteries having an open circuit potential of at least about 1.4 V and being capable of operating or are operating at a current density of at least 30 mA/cm ²
Electrochemical Energy Storage Systems And Methods Featuring High Open Circuit Potential	US	13/949,373	7/24/2013	101349.000123	Equivalent to 101349.000121 case
Electrochemical Energy Storage Systems And Methods Featuring Large Negative Half-Cell Potentials	US	13/949,486	7/24/2013	101349.000124	Equivalent to 101349.000118 case
Electrochemical Energy Storage Systems And Methods Featuring Optimal Membrane Systems	US	13/949,530	7/24/2013	101349.000125	Equivalent to 101349.000120 case

Electrolyte Solution Formulation Cases

Title	Country	App. No.	Filing Date	Ref. No.	Summary
High Solubility Iron Hexacyanides	PCT	PCT/US2013/030430	3/12/2013	101349.000103	Iron hexacyanide complex having enhanced solubility in presence of mixed cations
High Solubility Iron Hexacyanides	US	13/887,461	3/6/2013	101349.000103	Iron hexacyanide complexes having enhanced solubility in presence of mixed cations
Invention Disclosure: Solution Additives To Improve Separator Conductivity In An Electrochemical Cell	US	Not yet filed	n/a	101349.000134	Optimized solvent addition to an aqueous battery with a separator sees a significant improvement in performance; a combination of membrane swelling, improved membrane conductivity, and improved electrode wettability contribute to improvement in battery performance
Invention Disclosure: Lamella Clarifier For Energy Storage	US	Not yet filed	n/a	101349.000135	Lamella clarifier for energy storage; a suspension of solids in a liquid is flowed over a series of inclined plates; the solids accumulate progressively in the series of plates, and the liquid becomes more and more clarified/free of solids, colloids, and dense phases
Invention Disclosure: Weakly Ionizing Buffer For pH Control	US	Not yet filed	n/a	101349.000138	Materials that are modestly soluble at the pH of normal operation, for example, a flow battery operating at pH 12, but with a rapidly increasing solubility and/or buffer capacity in pH regions that are undesirable for a given application; used for pH control

Active Materials Cases

Title	Country	App. No.	Filing Date	Ref. No.	Summary
Aqueous Redox Flow Batteries Comprising Metal Ligand Coordination Compounds	US	13/795,878	3/12/2013	101349.000099	Flow batteries having metal ligand coordination compounds (MLCCs), at least one of formula $M(L_1)_3-x-y(L_2)_x(L_3)_y$ m having ascorbate, a catecholate, a pyrogallate, lactate, gluconate, and or citrate ... GRANTED as US 8,753,761
Aqueous Redox Flow Batteries Comprising Metal Ligand Coordination Compounds	US	13/948,497	7/23/2013	101349.000104	Flow batteries comprising MLCCs; expansion of 101349.000099 case
Aqueous Redox Flow Batteries Comprising Metal Ligand Coordination Compounds	PCT	PCT/US2013/051606	7/23/2013	101349.000119	Equivalent to 101349.000104 case
Aqueous Redox Flow Batteries Featuring Improved Cell Design Characteristics	US	14/164,839	01/27/2014	101349.000133	Compositions having the formula $MnTi(L_1)(L_2)(L_3)$ where the "L" moieties include at least one catecholate

Systems Engineering Cases

Title	Country	App. No.	Filing Date	Ref. No.	Summary
Electrolyte Balancing Strategies For Flow Batteries	US	61/882,324	9/25/2013	101349.000110	Redox flow batteries comprising a balancing cell, the balancing cell operating by catalyzing O2 generation
Invention Disclosure: Flow Battery Charging Method	US	Not yet filed	n/a	101349.000128	Charging a redox flow battery with intermittent (pulse) current; the current could be employed at the end of charging at high state of charge or at the end of discharge at low state of charge; direct current would be interrupted for brief period of time allowing diffusion of liquid reactants to an electrode
Invention Disclosure: Flow Battery Balancing Cell Comprising A Bipolar Membrane	US	Not yet filed	n/a	101349.000141	Flow battery balancing cell that includes a bipolar membrane

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