PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1 Stylesheet Version v1.2 EPAS ID: PAT5468260

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
DU T. NGUYEN	04/20/2017
ROGER D. AINES	03/27/2017
SARAH E. BAKER	03/29/2017
WILLIAM L. BOURCIER	03/27/2017
ERIC B. DUOSS	04/14/2017
JAMES S. OAKDALE	04/13/2017
MEGAN M. SMITH	04/20/2017
WILLIAM L. SMITH	03/27/2017
JOSHUAH K. STOLAROFF	04/20/2017
CONGWANG YE	04/16/2017

RECEIVING PARTY DATA

Name:	LAWRENCE LIVERMORE NATIONAL SECURITY, LLC	
Street Address:	2300 FIRST STREET	
City:	LIVERMORE	
State/Country:	CALIFORNIA	
Postal Code:	94550	

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16380648

CORRESPONDENCE DATA

Fax Number: (925)423-8259

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.

Correspondent Name: LAWRENCE LIVERMORE NATIONAL SECURITY, LLC

Address Line 1: 7000 EAST AVENUE PO BOX 808, L-703

Address Line 4: LIVERMORE, CALIFORNIA 94551-0808

ATTORNEY DOCKET NUMBER: | IL-13106C

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REEL: 048850 FRAME: 0618

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/MARK H. LOUGH/		
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DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, Du T. Nguyen, hereby declare that:

the attached United State	n is directed to: application identified as Attor as application or PCT internation	onal application number.		1 <u>3/24/2017</u>
and identified as As	Attorney Docket No. <u>IL-13106</u> amended on	<u> </u>		
2. I believe I am application ident	the original inventor or an orig ified in Section 1 ("Patent App	ginal joint inventor of a clolication").	laimed invention in th	ie patent
3. I made or auth	orized to make the Patent App	lication.		
4. I have reviewe	ed and understand the contents	of the Patent Application	n including the claims	š.
5. I am aware of me to be materia	the duty to disclose to the U.S It to patentability as defined in	. Patent and Trademark (37 CFR §1.56.	Office all information	known to
6. I hereby acknowledge of the USC §1001 by f	owledge that any willful false sine or imprisonment of not mo	statement made in this de ore than five (5) years, or	claration is punishab both.	le under 18
assign, transfer, having its admir	NT d and valuable consideration the and convey to Lawrence Liver histrative offices located at 230 I representatives and assigns (of world in and to the following (of	rmore National Security, 00 First Street, Suite 204, collectively, "Assignee")	Livermore, CA 9455	0, and its
any	inventions and improvements of and all divisional, continuation Patent Application.	claimed and/or disclosed in, continuation-in-part, a	in the Patent Applicated and substitute applicated	tion and in ions based on
(b) the sub	Patent Application and any an stitute applications based on the	d all divisional, continua ne Patent Application (co	tion, continuation-in- Hectively, "Related A	part, and applications")
and	and all patent(s) which may be a possessions, for the invention plications, for the full term or t	is and improvements clair	men sumon macroaco	ependencies in the Relate

- (d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.
- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Du T. Nguyen

4/20/2017 Date

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, Roger D. Aines, hereby declare that:
This declaration is directed to: the attached application identified as Attorney Docket No. United States application or PCT international application number 15/468 297 filed on 03/24/2017
and identified as Attorney Docket No. <u>IL-13106</u> As amended on (if applicable).
2. I believe I am the original inventor or an original joint inventor of a claimed invention in the patent application identified in Section I ("Patent Application").
3. I made or authorized to make the Patent Application.
4. I have reviewed and understand the contents of the Patent Application including the claims.
5. I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.
6. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.
7. ASSIGNMENT
For good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell assign, transfer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation having its administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its successors, legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest throughout the world in and to the following (collectively, "Rights"):
(a) all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based of the Patent Application.
(b) the Patent Application and any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application (collectively, "Related Applications"

(c) any and all patent(s) which may be granted in the United States, its territories, dependencies and possessions, for the inventions and improvements claimed and/or disclosed in the Related

Applications, for the full term or terms for which the same may be granted.

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(d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.

- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Roger D Aines

 $\frac{3/27/17}{Date}$

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, Sarah E. I	Baker, hereby declare that:
the atta	laration is directed to: lached application identified as Attorney Docket No. d States application or PCT international application number 15/468,297 filed on 03/24/2017 lied as Attorney Docket No. IL-13106 As amended on(if applicable).
	I am the original inventor or an original joint inventor of a claimed invention in the patent identified in Section I ("Patent Application").
3. I made or	r authorized to make the Patent Application.
4. I have re-	viewed and understand the contents of the Patent Application including the claims.
	are of the duty to disclose to the U.S. Patent and Trademark Office all information known to aterial to patentability as defined in 37 CFR §1.56.
	acknowledge that any willful false statement made in this declaration is punishable under 18 by fine or imprisonment of not more than five (5) years, or both.
assign, tran- having its a successors,	IMENT r good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell, is fer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest the world in and to the following (collectively, "Rights"):
(a)	all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based of the Patent Application.
(b)	the Patent Application and any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application (collectively, "Related Applications"
(c)	any and all patent(s) which may be granted in the United States, its territories, dependencies and possessions, for the inventions and improvements claimed and/or disclosed in the Relate Applications, for the full term or terms for which the same may be granted.

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(d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.

- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Sarah E. Baker

3/21//7

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, William L. Bourcier, hereby declare that:
1. This declaration is directed to: the attached application identified as Attorney Docket No United States application or PCT international application number 15/468,297 filed on 03/24/2017 and identified as Attorney Docket No. IL-13106 As amended on (if applicable).
2. I believe I am the original inventor or an original joint inventor of a claimed invention in the patent application identified in Section 1 ("Patent Application").
3. I made or authorized to make the Patent Application.
4. I have reviewed and understand the contents of the Patent Application including the claims.
5. I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.
6. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.
7. ASSIGNMENT For good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell, assign, transfer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation having its administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its successors, legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest throughout the world in and to the following (collectively, "Rights"):
(a) all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based of the Patent Application.
(b) the Patent Application and any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application (collectively, "Related Applications")
(c) any and all patent(s) which may be granted in the United States, its territories, dependencies and possessions, for the inventions and improvements claimed and/or disclosed in the Relate

Applications, for the full term or terms for which the same may be granted.

(d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.

- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

William L. Bourcier

3/27/247-

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, Eric B. D	<u>Duoss</u> , hereby declare that:			
s most de la	late to discuss day.			
	claration is directed to:	The Box Ma		
the att	tached application identified as Atto	omey Docket No	1 184466.00	**************************************
United	d States application or PCT internat	tional application n	umber <u>13/468,29</u>	7 med on <u>03/24/2017</u>
	ied as Attorney Docket No. <u>IL-1310</u>			
	As amended on	(if applicable)),	
2. I believe	e I am the original inventor or an ori	ginal joint inventor	of a claimed inv	ention in the patent
	identified in Section 1 ("Patent Ap			
•••				
3. I made or	or authorized to make the Patent App	plication.		
	,, was a second of the second	22		
4. I have rev	eviewed and understand the contents	s of the Patent App	lication including	the claims.
5 I am awa	are of the duty to disclose to the U.S	Patent and Trade	mark Office all is	oformation known to
	naterial to patentability as defined in		istorial Ottob only to	110000000000000000000000000000000000000
me to oc me	raterial to paternaomity as octines in	S SEE SEEDS		
6. I hereby	acknowledge that any willful false I by fine or imprisonment of not mo	statement made in	this declaration is	s punishable under 18
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7. ASSIGN	. 19. ATTA FO			
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assign, tran having its a successors,	or good and valuable consideration the start of the start	rmore National Sec 30 First Street, Suit collectively, "Assig	curity, LLC., a De e 204, Livermore (nee"), the entire	claware corporation , CA 94550, and its
(n)) all inventions and improvements of	daimed and/or dice	locad in the Potes	nt has actional in
(a)				
	any and all divisional, continuation	n, commuanon-m-	pait, airi suosiiu	ie aliburanions pasea oi
	the Patent Application.			
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(b)	 the Patent Application and any and substitute applications based on th 	d all divisional, coi se Patent Application	ntinuation, conting on (collectively, "	uation-in-part, and 'Related Applications")
(c)	any and all patent(s) which may be and possessions, for the inventions Applications, for the full term or to	s and improvement	s claimed and/or	disclosed in the Related

JTv10-12

- (d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.
- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Eric B. Duoss

4/14/2017-

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, <u>James S. Oakdale</u> , hereby declare that:
1. This declaration is directed to: the attached application identified as Attorney Docket No. United States application or PCT international application number 15/468,297 filed on 03/24/2017 and identified as Attorney Docket No. IL-13106
As amended on(if applicable).
2. I believe I am the original inventor or an original joint inventor of a claimed invention in the patent application identified in Section I ("Patent Application").
3. I made or authorized to make the Patent Application.
4. I have reviewed and understand the contents of the Patent Application including the claims.
5. I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.
6. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.
7. ASSIGNMENT
For good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell, assign, transfer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation having its administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its successors, legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest throughout the world in and to the following (collectively, "Rights"):
(a) all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based of the Patent Application.
(b) the Patent Application and any and all divisional continuation continuation-in-part, and

substitute applications based on the Patent Application (collectively, "Related Applications").

(c) any and all patent(s) which may be granted in the United States, its territories, dependencies and possessions, for the inventions and improvements claimed and/or disclosed in the Related

Applications, for the full term or terms for which the same may be granted.

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(d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.

- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

lames S. Oakdale

04/13/17 Date

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR \$1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, Megan M. Smith, hereby declare that:

1. This declaration is directed to: the attached application identified as Attorney Docket No. United States application or PCT international application number 15/468,297 filed on 03/24/2017 and identified as Attorney Docket No. IL-13106 As amended on (if applicable).
2. I believe I am the original inventor or an original joint inventor of a claimed invention in the patent application identified in Section 1 ("Patent Application").
3. I made or authorized to make the Patent Application.
4. I have reviewed and understand the contents of the Patent Application including the claims.
5. I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.
6. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.
7. ASSIGNMENT For good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell, assign, transfer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation having its administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its successors, legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest throughout the world in and to the following (collectively, "Rights"):
(a) all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application.

(b) the Patent Application and any and all divisional, continuation, continuation-in-part, and

Applications, for the full term or terms for which the same may be granted.

(c) any and all patent(s) which may be granted in the United States, its territories, dependencies and possessions, for the inventions and improvements claimed and/or disclosed in the Related

substitute applications based on the Patent Application (collectively, "Related Applications").

JTv10-12

(d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.

- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Megan M/Smith

20 April 2017
Date

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I, William L. Smith, hereby declare that:
1. This declaration is directed to: the attached application identified as Attorney Docket No. United States application or PCT international application number 15/468,297 filed on 03/24/2017 and identified as Attorney Docket No. IL-13106 As amended on (if applicable).
2. I believe I am the original inventor or an original joint inventor of a claimed invention in the patent application identified in Section 1 ("Patent Application").
3. I made or authorized to make the Patent Application.
4. I have reviewed and understand the contents of the Patent Application including the claims.
5. I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.
6. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.
7. ASSIGNMENT For good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell, assign, transfer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation having its administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its successors, legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest throughout the world in and to the following (collectively, "Rights"):
(a) all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application.

(b) the Patent Application and any and all divisional, continuation, continuation-in-part, and

Applications, for the full term or terms for which the same may be granted.

(c) any and all patent(s) which may be granted in the United States, its territories, dependencies and possessions, for the inventions and improvements claimed and/or disclosed in the Related

substitute applications based on the Patent Application (collectively, "Related Applications").

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(d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.

- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

William L. Smith

Date

27/2017

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION, PURIFICATION, AND REACTION

I. Joshuah K. Stolaroff, hereby declare that:
I. This declaration is directed to: the attached application identified as Attorney Docket No. United States application or PCT international application number 15/468,297 filed on 03/24/2017 and identified as Attorney Docket No. IL-13106 As amended on(if applicable).
2. I believe I am the original inventor or an original joint inventor of a claimed invention in the patent application identified in Section I ("Patent Application").
3. I made or authorized to make the Patent Application.
4. I have reviewed and understand the contents of the Patent Application including the claims.
5. I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.
6. Thereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.
7. ASSIGNMENT For good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell assign, transfer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation having its administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its successors, legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest throughout the world in and to the following (collectively, "Rights"):
 (a) all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based of the Patent Application.
(b) the Patent Application and any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application (collectively, "Related Applications")
(c) any and all patent(s) which may be granted in the United States, its territories, dependencies and possessions, for the inventions and improvements claimed and/or disclosed in the Relat Applications, for the full term or terms for which the same may be granted.

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- (d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.
- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
- (g) the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights.

In addition, I hereby confirm the sale, assignment, transfer and conveyance to the Assignee of the entire right, title and interest throughout the world in the Rights, including the inventions and improvements, that occurred by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, transfer and convey any right, title and interest I may have in said inventions and improvements anywhere in the world to the Assignee.

I hereby represent and coverant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with this assignment.

I further covenant to provide reasonable assistance to the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application, said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I hereby authorize and request the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models, or other governmental grants or issuances, and any reissue or extension thereof, that may be granted upon any of the Rights in the name of the Assignee, as the assignee to the entire interest therein.

8. Lam competent to execute the above declaration and assignment. Thereby have duly executed the declaration and assignment below with my name.

Joshuah K. Stolaroff

Date

DECLARATION AND ASSIGNMENT BY INVENTOR UNDER 37 CFR §1.63

Title of Invention: **COMPOSITE 3D-PRINTED REACTORS FOR GAS ABSORPTION**, **PURIFICATION**, **AND REACTION**

I, <u>Congwang Ye</u> , hereby declare that:
1. This declaration is directed to: the attached application identified as Attorney Docket No
2. I believe I am the original inventor or an original joint inventor of a claimed invention in the patent application identified in Section 1 ("Patent Application").
3. I made or authorized to make the Patent Application.
4. I have reviewed and understand the contents of the Patent Application including the claims.
5. I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.
6. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.
7. ASSIGNMENT For good and valuable consideration the receipt of which is hereby acknowledged, I hereby sell, assign, transfer, and convey to Lawrence Livermore National Security, LLC., a Delaware corporation having its administrative offices located at 2300 First Street, Suite 204, Livermore, CA 94550, and its successors, legal representatives and assigns (collectively, "Assignee"), the entire right, title and interest throughout the world in and to the following (collectively, "Rights"):
(a) all inventions and improvements claimed and/or disclosed in the Patent Application and in any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application.
(b) the Patent Application and any and all divisional, continuation, continuation-in-part, and substitute applications based on the Patent Application (collectively, "Related Applications").
(c) any and all patent(s) which may be granted in the United States, its territories, dependencies

and possessions, for the inventions and improvements claimed and/or disclosed in the Related

Applications, for the full term or terms for which the same may be granted.

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(d) any and all patent(s) resulting from extension, renewal, reinstatement, reissue or reexamination, or any interference, opposition, or judicial proceeding, directed to any of the Related Applications or any patent described above, for the full term or terms for which the same may be granted.

- (e) any foreign equivalent or counterpart of any of the Related Applications or of any of the patent(s) described above, including without limitation, certificates of invention, utility models, and design registrations.
- (f) the right to claim priority based on the filing dates of the Related Applications or any of the patent(s) described above, under, but not limited to, the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes.
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8. I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Congwang Ye

RECORDED: 04/10/2019

JTv10-12

PATENT REEL: 048850 FRAME: 0639

6/14/2017