

PATENT ASSIGNMENT COVER SHEET

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 Stylesheet Version v1.2

EPAS ID: PAT2750199

SUBMISSION TYPE:	NEW ASSIGNMENT																		
NATURE OF CONVEYANCE:	ASSIGNMENT																		
CONVEYING PARTY DATA																			
<table border="1"> <thead> <tr> <th>Name</th> <th>Execution Date</th> </tr> </thead> <tbody> <tr> <td>QIANG LIU</td> <td>01/14/2014</td> </tr> <tr> <td>YU YAO</td> <td>02/18/2014</td> </tr> <tr> <td>ANTHONY J. HOFFMAN</td> <td>02/13/2014</td> </tr> <tr> <td>MATTHEW ESCARRA</td> <td>01/08/2014</td> </tr> <tr> <td>KALE J. FRANZ</td> <td>02/14/2014</td> </tr> <tr> <td>WILLIAM O. CHARLES</td> <td>01/03/2014</td> </tr> <tr> <td>JIANXIN CHEN</td> <td>02/15/2014</td> </tr> <tr> <td>CLAIRE F. GMACHL</td> <td>01/02/2014</td> </tr> </tbody> </table>		Name	Execution Date	QIANG LIU	01/14/2014	YU YAO	02/18/2014	ANTHONY J. HOFFMAN	02/13/2014	MATTHEW ESCARRA	01/08/2014	KALE J. FRANZ	02/14/2014	WILLIAM O. CHARLES	01/03/2014	JIANXIN CHEN	02/15/2014	CLAIRE F. GMACHL	01/02/2014
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JIANXIN CHEN	02/15/2014																		
CLAIRE F. GMACHL	01/02/2014																		
RECEIVING PARTY DATA																			
Name:	PRINCETON UNIVERSITY																		
Street Address:	4 NEW SOUTH BUILDING																		
City:	PRINCETON																		
State/Country:	NEW JERSEY																		
Postal Code:	08540																		
PROPERTY NUMBERS Total: 1																			
<table border="1"> <thead> <tr> <th>Property Type</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td>Application Number:</td> <td>12795954</td> </tr> </tbody> </table>		Property Type	Number	Application Number:	12795954														
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Application Number:	12795954																		
CORRESPONDENCE DATA																			
Fax Number:	(215)563-4044																		
Phone:	215-563-4100																		
Email:	rdolan@ddhs.com																		
<i>Correspondence will be sent via US Mail when the email attempt is unsuccessful.</i>																			
Correspondent Name:	NIELS HAUN, PH.D.																		
Address Line 1:	1601 MARKET ST., SUITE 2400																		
Address Line 2:	DANN DORFMAN HERRELL & SKILLMAN, PC																		
Address Line 4:	PHILADELPHIA, PENNSYLVANIA 19103-2307																		

ATTORNEY DOCKET NUMBER:	4682-P04867US1
NAME OF SUBMITTER:	NIELS HAUN
Signature:	/NIELS HAUN/
Date:	03/03/2014
<p>Total Attachments: 19</p> <p>source=Executed Assignment_PU#page1.tif source=Executed Assignment_PU#page2.tif source=Executed Assignment_PU#page3.tif source=Executed Assignment_PU#page4.tif source=Executed Assignment_PU#page5.tif source=Executed Assignment_PU#page6.tif source=Executed Assignment_PU#page7.tif source=Executed Assignment_PU#page8.tif source=Executed Assignment_PU#page9.tif source=Executed Assignment_PU#page10.tif source=Executed Assignment_PU#page11.tif source=Executed Assignment_PU#page12.tif source=Executed Assignment_PU#page13.tif source=Executed Assignment_PU#page14.tif source=Executed Assignment_PU#page15.tif source=Executed Assignment_PU#page16.tif source=Executed Assignment_PU#page17.tif source=Executed Assignment_PU#page18.tif source=Executed Assignment_PU#page19.tif</p>	

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "**HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS**" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010 , and

WHEREAS, PRINCETON UNIVERSITY, a corporation engaged in business at 4 New South Building, Princeton, NJ US 08540, hereinafter referred to as ASSIGNEE, is desirous of acquiring the said invention and any and all applications for Letters Patent and any and all Letters Patent of the United States and foreign countries that may be issued therefor;

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

ASSIGNOR covenants that ASSIGNOR has full right to convey the entire interest herein assigned, and that ASSIGNOR has not executed and will not execute any agreement that will conflict with the terms of this assignment. Further, ASSIGNOR hereby authorizes and requests the Commissioner of the U.S. Patent and Trademark Office, and any official of any country foreign to the United States whose duty is to issue patents, design registrations, inventors certificates or the like, to issue any and all Letters Patent, registration or certificate for such invention to ASSIGNEE, its successors and assigns, as the owner of all right, title and interest therein.

And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

IN WITNESS WHEREOF, this Assignment has been executed on the day and month indicated below.

Date

Jan. 14, 2014

Signature


QIANG LIU

YU YAO

ANTHONY J. HOFFMAN

MATTHEW ESCARRA

Page Two

KALE J. FRANZ

WILLIAM O. CHARLES

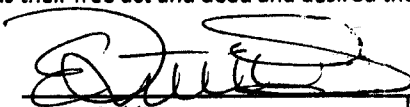
JIANXIN CHEN

CLAIRE F. GMACHL

COUNTY OF _____
STATE OF _____

SWISS CONFEDERATION
CANTON AND CITY OF ZÜRICH
CONSULAR AGENCY OF THE
UNITED STATES OF AMERICA } SS

Before me, the undersigned, a notary public, in and for the county aforesaid, on this 14 day of JANUARY, 2014, personally appeared **Qiang Liu**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.


Notary Public

Ellen A. Frick-Delman
Consular Agent of the
United States of America

My commission does not expire

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2014, personally appeared **Yu Yao**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2014, personally appeared **Anthony J. Hoffman**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "**HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS**" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010, and

WHEREAS, PRINCETON UNIVERSITY, a corporation engaged in business at 4 New South Building, Princeton, NJ US 08540, hereinafter referred to as ASSIGNEE, is desirous of acquiring the said invention and any and all applications for Letters Patent and any and all Letters Patent of the United States and foreign countries that may be issued therefor;

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

ASSIGNOR covenants that ASSIGNOR has full right to convey the entire interest herein assigned, and that ASSIGNOR has not executed and will not execute any agreement that will conflict with the terms of this assignment. Further, ASSIGNOR hereby authorizes and requests the Commissioner of the U.S. Patent and Trademark Office, and any official of any country foreign to the United States whose duty is to issue patents, design registrations, inventors certificates or the like, to issue any and all Letters Patent, registration or certificate for such invention to ASSIGNEE, its successors and assigns, as the owner of all right, title and interest therein.

And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

IN WITNESS WHEREOF, this Assignment has been executed on the day and month indicated below.

Date

Signature

Feb 18th

QIANG LIU

[Signature]

YU YAO

ANTHONY J. HOFFMAN

MATTHEW ESCARRA

KALE J. FRANZ

WILLIAM O. CHARLES

JIANXIN CHEN

CLAIRE F. GMACHL

COUNTY OF _____
STATE OF _____

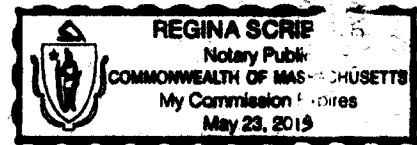
Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Qiang Liu**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF Middlesex
STATE OF Massachusetts

Before me, the undersigned, a notary public, in and for the county aforesaid, on this 18 day of February, 2013, personally appeared **Yu Yao**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Regina Scrie
Notary Public



COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Anthony J. Hoffman**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "**HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS**" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010 , and

WHEREAS, PRINCETON UNIVERSITY, a corporation engaged in business at 4 New South Building, Princeton, NJ US 08540, hereinafter referred to as ASSIGNEE, is desirous of acquiring the said invention and any and all applications for Letters Patent and any and all Letters Patent of the United States and foreign countries that may be issued therefor;

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

ASSIGNOR covenants that ASSIGNOR has full right to convey the entire interest herein assigned, and that ASSIGNOR has not executed and will not execute any agreement that will conflict with the terms of this assignment. Further, ASSIGNOR hereby authorizes and requests the Commissioner of the U.S. Patent and Trademark Office, and any official of any country foreign to the United States whose duty is to issue patents, design registrations, inventors certificates or the like, to issue any and all Letters Patent, registration or certificate for such invention to ASSIGNEE, its successors and assigns, as the owner of all right, title and interest therein.

And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

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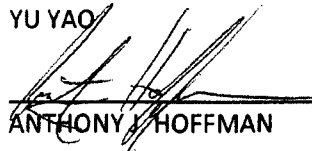
Date

Signature

QIANG LIU

YU YAO

2/13/2014


ANTHONY J. HOFFMAN

MATTHEW ESCARRA

KALE J. FRANZ

WILLIAM O. CHARLES

JIANXIN CHEN

CLAIRE F. GMACHL

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Qiang Liu**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Yu Yao**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF St. Joseph County, In.
STATE OF Indiana

Before me, the undersigned, a notary public, in and for the county aforesaid, on this 13 day of February, 2014, personally appeared **Anthony J. Hoffman**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Elizabeth Kovacs
Notary Public

ELIZABETH KOVACS
NOTARY PUBLIC
ST. JOSEPH COUNTY, IN
COMMISSION EXPIRES
March 20. 2015

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010, and

WHEREAS, PRINCETON UNIVERSITY, a corporation engaged in business at 4 New South Building, Princeton, NJ US 08540, hereinafter referred to as ASSIGNEE, is desirous of acquiring the said invention and any and all applications for Letters Patent and any and all Letters Patent of the United States and foreign countries that may be issued therefor;

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

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And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

IN WITNESS WHEREOF, this Assignment has been executed on the day and month indicated below.

Date

Signature

QIANG LIU

YU YAO

1/8/14

ANTHONY J. HOFFMAN



MATTHEW ESCARRA

~~PARISH~~
COUNTY OF ORLEANS
STATE OF LOUISIANA

Before me, the undersigned, a notary public, in and for the county aforesaid, on this 8th day of JANUARY, ~~2013~~, 2014, personally appeared Matthew Escarra, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

M. Eagan
Notary Public

MICHELE EAGAN
NOTARY PUBLIC No. 67484
Parish of Jefferson, State of Louisiana
My Commission is Issued for Life

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Kale J. Franz, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared William O. Charles, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Jianxin Chen, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "**HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS**" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010 , and

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NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

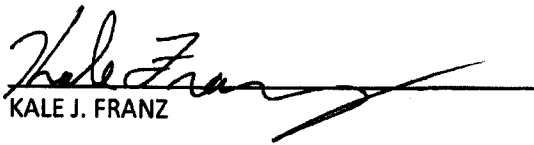
ASSIGNOR covenants that ASSIGNOR has full right to convey the entire interest herein assigned, and that ASSIGNOR has not executed and will not execute any agreement that will conflict with the terms of this assignment. Further, ASSIGNOR hereby authorizes and requests the Commissioner of the U.S. Patent and Trademark Office, and any official of any country foreign to the United States whose duty is to issue patents, design registrations, inventors certificates or the like, to issue any and all Letters Patent, registration or certificate for such invention to ASSIGNEE, it successors and assigns, as the owner of all right, title and interest therein.

And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

IN WITNESS WHEREOF, this Assignment has been executed on the day and month indicated below.

Date	Signature
_____	_____ QIANG LIU
_____	_____ YU YAO
_____	_____ ANTHONY J. HOFFMAN
_____	_____ MATTHEW ESCARRA

02/14/2014


KALE J. FRANZ

WILLIAM O. CHARLES

JIANXIN CHEN

CLAIRE F. GMACHL

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ___ day of _____, 2013, personally appeared **Qiang Liu**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ___ day of _____, 2013, personally appeared **Yu Yao**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ___ day of _____, 2013, personally appeared **Anthony J. Hoffman**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

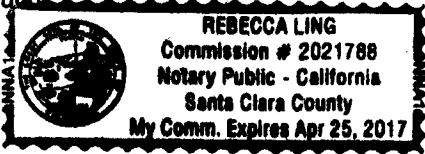
COUNTY OF _____
STATE OF _____

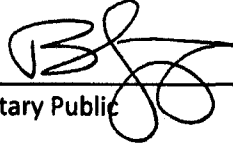
Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Matthew Escarra**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF SANTA CLARA
STATE OF CALIFORNIA

Before me, the undersigned, a notary public, in and for the county aforesaid, on this 14 day of Feb, ²⁰¹⁴~~2013~~, personally appeared **Kale J. Franz**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.





Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **William O. Charles**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Jianxin Chen**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "**HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS**" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010 , and

WHEREAS, PRINCETON UNIVERSITY, a corporation engaged in business at 4 New South Building, Princeton, NJ US 08540, hereinafter referred to as ASSIGNEE, is desirous of acquiring the said invention and any and all applications for Letters Patent and any and all Letters Patent of the United States and foreign countries that may be issued therefor;

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

ASSIGNOR covenants that ASSIGNOR has full right to convey the entire interest herein assigned, and that ASSIGNOR has not executed and will not execute any agreement that will conflict with the terms of this assignment. Further, ASSIGNOR hereby authorizes and requests the Commissioner of the U.S. Patent and Trademark Office, and any official of any country foreign to the United States whose duty is to issue patents, design registrations, inventors certificates or the like, to issue any and all Letters Patent, registration or certificate for such invention to ASSIGNEE, it successors and assigns, as the owner of all right, title and interest therein.

And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

IN WITNESS WHEREOF, this Assignment has been executed on the day and month indicated below.

Date	Signature
_____	_____ QIANG LIU
_____	_____ YU YAO
_____	_____ ANTHONY J. HOFFMAN
_____	_____ MATTHEW ESCARRA

1/03/2014

KALE J. FRANZ

William O. Charles

WILLIAM O. CHARLES

JIANXIN CHEN

CLAIRE F. GMACHL

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Qiang Liu, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Yu Yao, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Anthony J. Hoffman, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Matthew Escarra**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

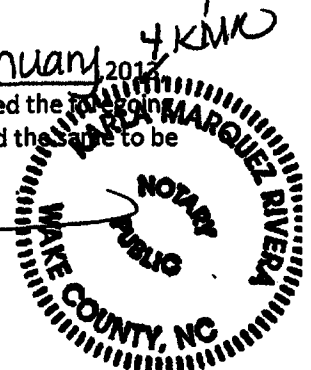
Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Kale J. Franz**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF Wake
STATE OF North Carolina

Before me, the undersigned, a notary public, in and for the county aforesaid, on this 3 day of January, 2013, personally appeared **William O. Charles**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Karla Marquez
Notary Public



COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Jianxin Chen**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "**HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS**" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010 , and

WHEREAS, PRINCETON UNIVERSITY, a corporation engaged in business at 4 New South Building, Princeton, NJ US 08540, hereinafter referred to as ASSIGNEE, is desirous of acquiring the said invention and any and all applications for Letters Patent and any and all Letters Patent of the United States and foreign countries that may be issued therefor;

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

ASSIGNOR covenants that ASSIGNOR has full right to convey the entire interest herein assigned, and that ASSIGNOR has not executed and will not execute any agreement that will conflict with the terms of this assignment. Further, ASSIGNOR hereby authorizes and requests the Commissioner of the U.S. Patent and Trademark Office, and any official of any country foreign to the United States whose duty is to issue patents, design registrations, inventors certificates or the like, to issue any and all Letters Patent, registration or certificate for such invention to ASSIGNEE, it successors and assigns, as the owner of all right, title and interest therein.

And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

IN WITNESS WHEREOF, this Assignment has been executed on the day and month indicated below.

Date	Signature
_____	_____ QIANG LIU
_____	_____ YU YAO
_____	_____ ANTHONY J. HOFFMAN
_____	_____ MATTHEW ESCARRA

KALE J. FRANZ

WILLIAM O. CHARLES

Feb. 15 / 2014

Jianxin Chen

JIANXIN CHEN

CLAIRE F. GMACHL

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Qiang Liu, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Yu Yao, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared Anthony J. Hoffman, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

ASSIGNMENT

WHEREAS, Qiang Liu, Yu Yao, Anthony J. Hoffman, Matthew Escarra, Kale J. Franz, William O. Charles, Jianxin Chen and Claire F. Gmachl, and each one of them, hereinafter referred to as ASSIGNOR, is a named inventor of an invention entitled: "**HIGHLY POWER-EFFICIENT AND BROADBAND QUANTUM CASCADE LASERS**" described and claimed in U.S. Appl. No.12/795,954, filed June 8, 2010 , and

WHEREAS, PRINCETON UNIVERSITY, a corporation engaged in business at 4 New South Building, Princeton, NJ US 08540, hereinafter referred to as ASSIGNEE, is desirous of acquiring the said invention and any and all applications for Letters Patent and any and all Letters Patent of the United States and foreign countries that may be issued therefor;

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree that, in consideration of good and valuable consideration paid to ASSIGNOR by ASSIGNEE, the receipt of which is hereby acknowledged, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, his or her entire right, title and interest for, to and within the United States and all foreign countries, in and to the aforesaid invention and the application identified above, including any and all provisional applications, continuations, divisionals, continuations-in-part, reissues and re-examinations thereof, and in and to any and all Letters Patent that may issue therefor in the United States and in any and all foreign countries (including related rights such as utility model registrations, inventors' certificates and the like). In addition, ASSIGNOR has sold, assigned and set over and hereby does sell, assign and set over, unto ASSIGNEE, its successors and assigns, the right to claim priority in any and all foreign applications, including applications filed under the Patent Cooperation Treaty, to the above-referenced application and any and all provisional, continuation, divisional, and continuation-in-part applications for the invention.

ASSIGNOR covenants that ASSIGNOR has full right to convey the entire interest herein assigned, and that ASSIGNOR has not executed and will not execute any agreement that will conflict with the terms of this assignment. Further, ASSIGNOR hereby authorizes and requests the Commissioner of the U.S. Patent and Trademark Office, and any official of any country foreign to the United States whose duty is to issue patents, design registrations, inventors certificates or the like, to issue any and all Letters Patent, registration or certificate for such invention to ASSIGNEE, it successors and assigns, as the owner of all right, title and interest therein.

And for said consideration, it is hereby covenanted and agreed that at the request and expense of ASSIGNEE, its successors and assigns, ASSIGNOR will execute any further papers and do such other acts and things as may be necessary and proper to permit ASSIGNEE, its successors and assigns, to procure and enforce Letters Patent for said invention in the United States and in such foreign countries as ASSIGNEE, its successors and assigns may elect, and vest the full title thereto in ASSIGNEE, its successors and assigns.

IN WITNESS WHEREOF, this Assignment has been executed on the day and month indicated below.

Date	Signature
_____	_____ QIANG LIU
_____	_____ YU YAO
_____	_____ ANTHONY J. HOFFMAN
_____	_____ MATTHEW ESCARRA

KALE J. FRANZ

WILLIAM O. CHARLES

JIANXIN CHEN

01/02/2014

[Signature]

CLAIRE F. GMACHL

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Qiang Liu**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Yu Yao**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

COUNTY OF _____
STATE OF _____

Before me, the undersigned, a notary public, in and for the county aforesaid, on this ____ day of _____, 2013, personally appeared **Anthony J. Hoffman**, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Notary Public

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COUNTY OF MERCER
STATE OF NEW JERSEY

Before me, the undersigned, a notary public, in and for the county aforesaid, on this 2 day of January, ~~2013~~²⁰¹⁴, personally appeared Claire F. Gmachl, to me known to be the person described in and who executed the foregoing instrument and who acknowledged that they executed the same as their free act and deed and desired the same to be recorded as such.

Frederica Ventulera
Notary Public
ID# 2341751
Exp. 3/24/2016