#### 504519445 08/25/2017

# PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1 Stylesheet Version v1.2 EPAS ID: PAT4566150

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

### **CONVEYING PARTY DATA**

Name	Execution Date
HENRY YU	10/19/2011
THOMAS E. RICHARDSON	10/18/2011
THOMAS FRANCIS NELSON HAXELL	10/18/2011
ROBERT JAMES FOGLESONG	11/01/2011
LIZBETH CELESTE DESELM	10/14/2011
ANDREAS GOUTOPOULOS	10/13/2011

## **RECEIVING PARTY DATA**

Name:	Merck Patent GmbH	
Street Address:	Frankfurter Strasse 250	
City:	Darmstadt	
State/Country:	GERMANY	
Postal Code:	64293	

### **PROPERTY NUMBERS Total: 1**

Property Type	Number
Application Number:	15342550

# **CORRESPONDENCE DATA**

Fax Number: (781)681-2946

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

Phone: (978)-294-1573

ipus@emdserono.com Email:

DWIGHT D. KIM **Correspondent Name:** 

Address Line 1: ONE TECHNOLOGY PLACE

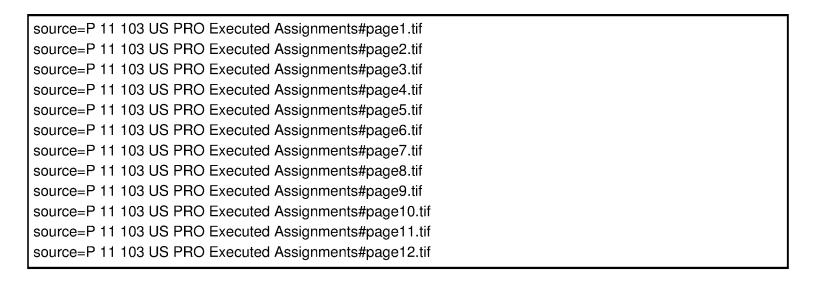
Address Line 4: ROCKLAND, MASSACHUSETTS 02370

T	
DATE SIGNED:	08/25/2017
SIGNATURE:	/Dwight D. Kim, Reg. No. 57665/
NAME OF SUBMITTER:	DWIGHT D. KIM
ATTORNEY DOCKET NUMBER:	P 11/103 US CNT2

Total Attachments: 12

**PATENT** REEL: 043401 FRAME: 0066

504519445



G. Same

WHEREAS, Vu. Henry, a citizen of CANADA, residing at 173 Cedar Street, WELLESLEY, MA 02481 (UNITED STATES OF AMERICA) (hereinafter, "Assignor") has invented certain new and useful improvements relating to (hereinafter, the "Invention") as described in U.S. Provisional Patent Application No. 61/503,694, filed on JUL/01/2011 (hereinafter, the "Application"); and

WHEREAS, Merck Patent GmbH, an entity organized and existing under the laws of the State of GERMANY having a place of business in Frankfurter Strasse 250, 64293 Darmstadt (GERMANY), together with any successors, assigns and legal representatives thereof (hereinafter, called the "Assignee") is desirous of acquiring the entire right, title and interest, for all countries, in and to said Invention and Application.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, each Assignor hereby sells, assigns, transfers and conveys unto Assignee the entire right, title and interest of such Assignor in and to said Invention and Application, and all divisions, renewals and continuations thereof, and any and all Letters Patent of the United States which may be granted thereon, and all reissues, reexaminations, and extensions thereof, and all priority rights under all available international agreements, treaties and conventions for the protection of intellectual property in its various forms in every participating country, and all applications for Letters Patent or other grants of protection of proprietary rights including, but not limited to, inventor's certificate, utility model, utility certificate, patent of importation, registration of patent and industrial design registration which may be filed, and which may be granted, upon said inventions in any countries or regions foreign to the United States, and all reissues, renewals and extensions thereof; and each Assignor hereby authorizes and requests the Commissioner for Patents and Trademarks of the United States, and all officials of countries or regions foreign to the United States having authority so to do, to issue all such Letters Patent or other grants of protection upon said inventions to the Assignee or to such nominees as it may designate;

AND each Assignor hereby authorizes and empowers the Assignee or nominees to invoke and claim for any application for such Letters Patent or other grants of protection for said inventions filed by it or them, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by a convention which may henceforth be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from such Assignor;

AND each Assignor hereby consents that a copy of this Assignment shall be deemed a full and formal equivalent of any assignment, consent to file or like document which may be required in any country or region for any purpose and more particularly in proof of the right of the Assignee or nominees to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it;

AND each Assignor hereby covenants that such Assignor has the full right to convey the right, title and interest herein assigned and that such Assignor has not executed and will not execute any agreement in conflict herewith:

AND each Assignor hereby covenants and agrees that such Assignor will communicate to Assignee or nominees all facts known to such Assignor pertaining to the Invention, and testify in all legal proceedings, sign all lawful papers, execute all divisional, continuation, substitute and reissue applications, make all rightful oaths and declarations and in general perform all lawful acts necessary or proper to aid Assignee or nominee in obtaining, maintaining and enforcing all lawful patent or other grants of protection of the Invention in any and all countries and regions.

[remainder of page intentionally left blank]

IN TESTIMONY WHEREOF, this Assignment is executed by Assignor on the date opposite the signature of Assignor.

(Lu, Henry

0/19/2011

State of

Massachusetts

County of The

585

On this 16 day of O(\$6.00.201), before me personally appeared Yu, Henry, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person named in and who executed the foregoing instrument and thereupon acknowledged to me that they executed the same of their own free will for the purposes set forth, and for a valuable consideration.

Notary Public



MEATHER L. RANDHAHN Notary Public Commission of Massachusens My Commission Expires January 19, 2012

[SIGNATURE PAGE TO ASSIGNMENT]

ar .

WHEREAS, Richardson, Thomas E., a citizen of UNITED STATES OF AMERICA, residing at 1220 Caribou Crossing, DURHAM, NC 27713 (UNITED STATES OF AMERICA) (hereinafter, "Assignor") has invented certain new and useful improvements relating to (hereinafter, the "Invention") as described in U.S. Provisional Patent Application No. 61/503,694, filed on JUL/01/2011 (hereinafter, the "Application"); and

WHEREAS, Merck Patent GmbH, an entity organized and existing under the laws of the State of GERMANY having a place of business in Frankfurter Strasse 250, 64293 Darmstadt (GERMANY), together with any successors, assigns and legal representatives thereof (hereinafter, called the "Assignee") is desirous of acquiring the entire right, title and interest, for all countries, in and to said Invention and Application.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, each Assignor hereby sells, assigns, transfers and conveys unto Assignee the entire right, title and interest of such Assignor in and to said Invention and Application, and all divisions, renewals and continuations thereof, and any and all Letters Patent of the United States which may be granted thereon, and all reissues, reexaminations, and extensions thereof, and all priority rights under all available international agreements, treaties and conventions for the protection of intellectual property in its various forms in every participating country, and all applications for Letters Patent or other grants of protection of proprietary rights including, but not limited to, inventor's certificate, utility model, utility certificate, patent of importation, registration of patent and industrial design registration which may be filled, and which may be granted, upon said inventions in any countries or regions foreign to the United States, and all reissues, renewals and extensions thereof; and each Assignor hereby authorizes and requests the Commissioner for Patents and Trademarks of the United States, and all officials of countries or regions foreign to the United States having authority so to do, to issue all such Letters Patent or other grants of protection upon said inventions to the Assignee or to such nominees as it may designate;

AND each Assignor hereby authorizes and empowers the Assignee or nominees to invoke and claim for any application for such Letters Patent or other grants of protection for said inventions filed by it or them, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by a convention which may henceforth be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from such Assignor;

AND each Assignor bereby consents that a copy of this Assignment shall be deemed a full and formal equivalent of any assignment, consent to file or like document which may be required in any country or region for any purpose and more particularly in proof of the right of the Assignee or nominees to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it;

AND each Assignor hereby covenants that such Assignor has the full right to convey the right, title and interest herein assigned and that such Assignor has not executed and will not execute any agreement in conflict herewith:

AND each Assignor hereby covenants and agrees that such Assignor will communicate to Assignee or nominees all facts known to such Assignor pertaining to the Invention, and testify in all legal proceedings, sign all lawful papers, execute all divisional, continuation, substitute and reissue applications, make all rightful ouths and declarations and in general perform all lawful acts necessary or proper to aid Assignee or nominee in obtaining, maintaining and enforcing all lawful patent or other grants of protection of the Invention in any and all countries and regions.

[remainder of page intentionally left blank]

IN TESTIMONY WHEREOF, this Assignment is executed by Assignor on the date opposite the signature of Assignor.

Richardson, Thomas E

State of North Carolina

County of Dark Karry

On this 12 day of 20029, 2011, before me personally appeared Richardson, Thomas E., personally known to me (or proved to me on the basis of satisfactory evidence) to be the person named in and who executed the foregoing instrument and thereupon acknowledged to me that they executed the same of their own free will for the purposes set forth, and for a valuable consideration.

Notary Public

2015

[SIGNATURE PAGE TO ASSIGNMENT]

Docket No. P 11/103

# ASSIGNMENT

WHEREAS, Haxell, Thomas Francis Nelson, a citizen of UNITED KINGDOM, residing at 532 Abbey Fields Loop, MORRISVILLE, NC 27560 (UNITED STATES OF AMERICA) (hereinafter, "Assignor") has invented certain new and useful improvements relating to (hereinafter, the "Invention") as described in U.S. Provisional Patent Application No. 61/503,694, filed on JUL/01/2011 (hereinafter, the "Application"); and

WHEREAS, Merck Patent GmbH, an entity organized and existing under the laws of the State of GERMANY having a place of business in Frankfurter Strasse 250, 64293 Darmstadt (GERMANY), together with any successors, assigns and legal representatives thereof (hereinafter, called the "Assignee") is desirous of acquiring the entire right, title and interest, for all countries, in and to said Invention and Application.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, each Assignor hereby sells, assigns, transfers and conveys unto Assignee the entire right, title and interest of such Assignor in and to said Invention and Application, and all divisions, renewals and continuations thereof, and any and all Letters Patent of the United States which may be granted thereon, and all reissues, reexaminations, and extensions thereof, and all priority rights under all available international agreements, treaties and conventions for the protection of intellectual property in its various forms in every participating country, and all applications for Letters Patent or other grants of protection of proprietary rights including, but not limited to, inventor's certificate, utility model, utility certificate, patent of importation, registration of patent and industrial design registration which may be filed, and which may be granted, upon said inventions in any countries or regions foreign to the United States, and all reissues, renewals and extensions thereof, and each Assignor hereby authorizes and requests the Commissioner for Patents and Trademarks of the United States, and all officials of countries or regions foreign to the United States having authority so to do, to issue all such Letters Patent or other grants of protection upon said inventions to the Assignee or to such nominees as it may designate;

AND each Assignor hereby authorizes and empowers the Assignee or nominees to invoke and claim for any application for such Letters Patent or other grants of protection for said inventions filed by it or them, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by a convention which may henceforth be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from such Assignor;

AND each Assignor hereby consents that a copy of this Assignment shall be deemed a full and formal equivalent of any assignment, consent to file or like document which may be required in any country or region for any purpose and more particularly in proof of the right of the Assignee or nominees to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it:

AND each Assignor hereby covenants that such Assignor has the full right to convey the right, title and interest herein assigned and that such Assignor has not executed and will not execute any agreement in conflict herewith:

AND each Assignor hereby covenants and agrees that such Assignor will communicate to Assignee or nominees all facts known to such Assignor pertaining to the Invention, and testify in all legal proceedings, sign all lawful papers, execute all divisional, continuation, substitute and reissue applications, make all rightful oaths and declarations and in general perform all lawful acts necessary or proper to aid Assignee or nominee in obtaining, maintaining and enforcing all lawful patent or other grants of protection of the Invention in any and all countries and regions.

fremainder of page intentionally left blank]

Haxell, Thomas Francis Nelson

Date

State of North Carolina

County of Duckary SS:

On this 18 day of are personally appeared Haxell, Thomas Francis Nelson, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person named in and who executed the foregoing instrument and thereupon acknowledged to me that they executed the same of their own free will for the purposes set forth, and for a valuable consideration.

Notary Public Shericultures.

IN TESTIMONY WHEREOF, this Assignment is executed by Assignor on the date opposite the

2015

signature of Assignor.

[SIGNATURE PAGE TO ASSIGNMENT]

WHEREAS, Foglesong, Robert James, a citizen of UNITED STATES OF AMERICA, residing at 6 Hazen Court, DURHAM NC 27712 (UNITED STATES OF AMERICA), (hereinafter, "Assignor") has invented certain new and useful improvements relating to (hereinafter, the "Invention") as described in U.S. Provisional Patent Application No. 61/503,694, filed on JUL/01/2011 (hereinafter, the "Application"); and

WHEREAS, Merck Patent GmbH, an entity organized and existing under the laws of the State of GERMANY having a place of business in Frankfurter Strasse 250, 64293 Darmstadt (GERMANY), together with any successors, assigns and legal representatives thereof (hereinafter, called the "Assignee") is desirous of acquiring the entire right, title and interest, for all countries, in and to said invention and Application.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, each Assignor hereby sells, assigns, transfers and conveys unto Assignee the entire right, title and interest of such Assignor in and to said Invention and Application, and all divisions, renewals and continuations thereof, and any and all Letters Patent of the United States which may be granted thereon, and all reissues, reexaminations, and extensions thereof, and all priority rights under all available international agreements, treaties and conventions for the protection of intellectual property in its various forms in every participating country, and all applications for Letters Patent or other grants of protection of proprietary rights including, but not limited to, inventor's certificate, utility model, utility certificate, patent of importation, registration of patent and industrial design registration which may be filed, and which may be granted, upon said inventions in any countries or regions foreign to the United States, and all reissues, renewals and extensions thereof; and each Assignor hereby authorizes and requests the Commissioner for Patents and Trademarks of the United States, and all officials of countries or regions foreign to the United States having authority so to do, to issue all such Letters Patent or other grants of protection upon said inventions to the Assignee or to such nominees as it may designate;

AND each Assignor hereby authorizes and empowers the Assignee or nominees to invoke and claim for any application for such Letters Patent or other grants of protection for said inventions filed by it or them, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by a convention which may henceforth be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from such Assignor;

AND each Assignor hereby consents that a copy of this Assignment shall be deemed a full and formal equivalent of any assignment, consent to file or like document which may be required in any country or region for any purpose and more particularly in proof of the right of the Assignee or nominees to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it;

AND each Assignor hereby covenants that such Assignor has the full right to convey the right, title and interest herein assigned and that such Assignor has not executed and will not execute any agreement in conflict herewith;

AND each Assignor hereby covenants and agrees that such Assignor will communicate to Assignee or nominees all facts known to such Assignor pertaining to the Invention, and testify in all legal proceedings, sign all lawful papers, execute all divisional, continuation, substitute and reissue applications, make all rightful oaths and declarations and in general perform all lawful acts necessary or proper to aid Assignee or nominee in obtaining, maintaining and enforcing all lawful patent or other grants of protection of the Invention in any and all countries and regions.

[remainder of page intentionally left blank]

State of North Carolina

County of Dir Yarr

On this day of North continue

SS:

On this day of North continue

SS:

On this day of North continue

SS:

IN TESTIMONY WHEREOF, this Assignment is executed by Assignor on the date opposite the

2015

signature of Assignor.

[SIGNATURE PAGE TO ASSIGNMENT]

WHEREAS, DeSelm, Lizbeth Celeste, a citizen of UNITED STATES OF AMERICA, residing at 33A South High Street, MELROSE, MA 02176 (UNITED STATES OF AMERICA) (hereinafter, "Assignor") has invented certain new and useful improvements relating to (hereinafter, the "Invention") as described in U.S. Provisional Patent Application No. 61/503,694, filed on IUL/01/2011 (hereinafter, the "Application"); and

WHEREAS, Merck Patent GmbH, an entity organized and existing under the laws of the State of GERMANY having a place of business in Frankfurter Strasse 250, 64293 Darmstadt (GERMANY), together with any successors, assigns and legal representatives thereof (hereinafter, called the "Assignee") is desirous of acquiring the entire right, title and interest, for all countries, in and to said Invention and Application.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, each Assignor hereby sells, assigns, transfers and conveys unto Assignee the entire right, title and interest of such Assignor in and to said Invention and Application, and all divisions, renewals and continuations thereof, and any and all Letters Patent of the United States which may be granted thereon, and all reissues, reexaminations, and extensions thereof, and all priority rights under all available international agreements, treaties and conventions for the protection of intellectual property in its various forms in every participating country, and all applications for Letters Patent or other grants of protection of proprietary rights including, but not limited to, inventor's certificate, utility model, utility certificate, patent of importation, registration of patent and industrial design registration which may be filed, and which may be granted, upon said inventions in any countries or regions foreign to the United States, and all reissues, renewals and extensions thereof; and each Assignor hereby authorizes and requests the Commissioner for Patents and Trademarks of the United States, and all officials of countries or regions foreign to the United States having authority so to do, to issue all such Letters Patent or other grants of protection upon said inventions to the Assignee or to such nominees as it may designate:

AND each Assignor hereby authorizes and empowers the Assignee or nominees to invoke and claim for any application for such Letters Patent or other grants of protection for said inventions filed by it or them, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by a convention which may henceforth be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from such Assignor;

AND each Assignor hereby consents that a copy of this Assignment shall be deemed a full and formal equivalent of any assignment, consent to file or like document which may be required in any country or region for any purpose and more particularly in proof of the right of the Assignee or nominees to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it;

AND each Assignor hereby covenants that such Assignor has the full right to convey the right, title and interest herein assigned and that such Assignor has not executed and will not execute any agreement in conflict herewith:

AND each Assignor hereby covenants and agrees that such Assignor will communicate to Assignee or nominees all facts known to such Assignor pertaining to the Invention, and testify in all legal proceedings, sign all lawful papers, execute all divisional, continuation, substitute and reissue applications, make all rightful oaths and declarations and in general perform all lawful acts necessary or proper to aid Assignee or nominee in obtaining, maintaining and enforcing all lawful patent or other grants of protection of the Invention in any and all countries and regions.

[remainder of page intentionally left blank]

IN TESTIMONY WHEREOF, this Assignment is executed by Assignor on the date opposite the signature of Assignor.

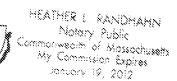
DeSelm, Lizbeth Celeste

Massachusetts
Madesec ss:

County of

On this 14 day of 2014, before me personally appeared DeSeim, Lizheth Celeste, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person named in and who executed the foregoing instrument and thereupon acknowledged to me that they executed the same of their own free will for the purposes set forth, and for a valuable consideration. Weather J. Randhalm

Notary Public



[SIGNATURE PAGE TO ASSIGNMENT]

\* \* \* \* \*

WHEREAS, Goutopoulos, Andreas, a citizen of GREECE, residing at 73 Worcester St., Apt 5, BOSTON, MA 02118 (UNITED STATES OF AMERICA) (hereinafter, "Assignor") has invented certain new and useful improvements relating to (hereinafter, the "Invention") as described in U.S. Provisional Patent Application No. 61/503,694, filed on IUL/01/2011 (hereinafter, the "Application"); and

WHEREAS, Merck Patent GmbH, an entity organized and existing under the laws of the State of GERMANY having a place of business in Frankfurter Strasse 250, 64293 Darmstadt (GERMANY), together with any successors, assigns and legal representatives thereof (hereinafter, called the "Assignee") is desirous of acquiring the entire right, title and interest, for all countries, in and to said Invention and Application.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, each Assignor hereby sells, assigns, transfers and conveys unto Assignee the entire right, title and interest of such Assignor in and to said Invention and Application, and all divisions, renewals and continuations thereof, and any and all Letters Patent of the United States which may be granted thereon, and all reissues, reexaminations, and extensions thereof, and all priority rights under all available international agreements, treaties and conventions for the protection of intellectual property in its various forms in every participating country, and all applications for Letters Patent or other grants of protection of proprietary rights including, but not limited to, inventor's certificate, utility model, utility certificate, patent of importation, registration of patent and industrial design registration which may be filed, and which may be granted, upon said inventions in any countries or regions foreign to the United States, and all reissues, renewals and extensions thereof; and each Assignor hereby authorizes and requests the Commissioner for Patents and Trademarks of the United States, and all officials of countries or regions foreign to the United States having authority so to do, to issue all such Letters Patent or other grants of protection upon said inventions to the Assignee or to such nominees as it may designate;

AND each Assignor hereby authorizes and empowers the Assignee or nominees to invoke and claim for any application for such Letters Patent or other grams of protection for said inventions filed by it or them, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by a convention which may henceforth be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from such Assignor;

AND each Assignor hereby consents that a copy of this Assignment shall be deemed a full and formal equivalent of any assignment, consent to file or like document which may be required in any country or region for any purpose and more particularly in proof of the right of the Assignee or nominees to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it;

AND each Assignor hereby covenants that such Assignor has the full right to convey the right, title and interest herein assigned and that such Assignor has not executed and will not execute any agreement in conflict herewith:

AND each Assignor hereby covenants and agrees that such Assignor will communicate to Assignee or nominees all facts known to such Assignor pertaining to the Invention, and testify in all legal proceedings, sign all lawful papers, execute all divisional, continuation, substitute and reissue applications, make all rightful oaths and declarations and in general perform all lawful acts necessary or proper to aid Assignee or nominee in obtaining, maintaining and enforcing all lawful patent or other grants of protection of the Invention in any and all countries and regions.

[remainder of page intentionally left blank]

IN TESTIMONY WHEREOF, this Assignment is executed by Assignor on the date opposite the signature of Assignor.

Goutopoulos, Andreas

0 chaber 13,2011

Date

State of

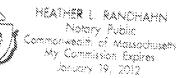
Massachusetts

County of

**SS**:

On this Maday of Column, 2011, before me personally appeared Goutopoulos, Andreas, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person named in and who executed the foregoing instrument and thereupon acknowledged to me that they executed the same of their own free will for the purposes set forth, and for a valuable consideration.

Notary Public



[SIGNATURE PAGE TO ASSIGNMENT]

PATENT REEL: 043401 FRAME: 0079

RECORDED: 08/25/2017