

FORM PTO-1615A  
Expires 06/30/09  
OMB 0951-0027

**FAXED**

2-28-06

U.S. Department of Commerce  
Patent and Trademark Office  
**PATENT**

S-160,791

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Name (line 1) **VIPPERMAN, Jeffrey S.**

Execution Date  
Month Day Year  
**01/27/2004**

Name (line 2)

**Second Party**

Name (line 1) **CLARK, William W.**

Execution Date  
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Name (line 1) **United States Department of Energy**

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Address (line 1) **GC-62, MS 6F-067 (FORSTL)**

Address (line 2) **1000 Independence Avenue, S.W.**

Address (line 3) **Washington**

**D.C.**

**20585-0162**

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**PATENT**

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FORM PTO-1619R  
Expires 09/30/06  
OMB 0651-2027

Page 2

U.S. Department of Commerce  
Patent and Trademark Office  
PATENT

## Correspondent Name and Address

Area Code and Telephone Number

202-586-2810

Name Betty Winchester

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Address (line 4) Washington, D.C. 20583-0162

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Patent Application Number(s)

Patent Number(s)

10/706477

If this document is being filed together with a new Patent Application, enter the date the patent application  
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## Patent Cooperation Treaty (PCT)

Enter PCT application number  
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PATENT

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U. S. DEPARTMENT OF ENERGY  
PATENT ASSIGNMENT FORM

10/706,477


WHEREAS, we, Jeffrey S. Vipperman and William W. Clark, citizens of the United States, residing in Pittsburgh, County of Allegheny, State of Pennsylvania; and in Wexford, County of Allegheny, State of Pennsylvania, respectively, have invented certain new and useful improvements in **PIEZOELECTRIC AXIAL FLOW MICROVALVE**, for which we have filed an application for United States Letters Patent identified as S-100,791 and which was executed by us on January 27, 2004, respectively, and;

WHEREAS, the Government of the United States of America desires to acquire the entire right, title and interest in and to said invention and in and to any Letters Patents wherever they may be issued thereon;

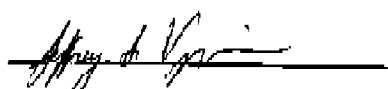
NOW, THEREFORE, to all whom it may concern, be it known that for and in consideration of the sum of One Dollar to us in hand paid by the Government of the United States, and for other good and valuable consideration, the receipt of which is hereby acknowledged, we by these presents do sell, assign, and transfer unto the said Government of the United States, as represented by the United States Department of Energy, the entire right, title, and interest in and to the said invention and in and to any and all Letters Patents wherever they may be granted thereon as well as reissues and extensions of said Letters Patent, the same to be held and enjoyed by the said Government of the United States or its assigns to the full end of the term or terms for which Letters Patents are or may be granted, reissued, or extended, as fully and entirely as the same would have been held or enjoyed by us had this assignment not been made.

We agree to make, execute, and deliver unto the Government of the United States, as represented by the United States Department of Energy, any and all papers, documents, affidavits, renewal, divisional and reissue applications, statements, or other instruments in such usual or other forms, with terms and contents as may be required by the United States Department of Energy, or its duly authorized representative, in or incident to the prosecution or conduct of any and all applications, before as well as after, the issuance of any Letters Patent thereon, or in the adjustment or settlement of any interferences or other actions or proceedings that said applications may encounter or in which they may become involved, and we agree that we will aid the Government of the United States in every way in protecting the invention as may be requested by the United States Department of Energy, except that any expenses arising through extending such assistance will be paid for by proper arrangement with the Government of the United States.

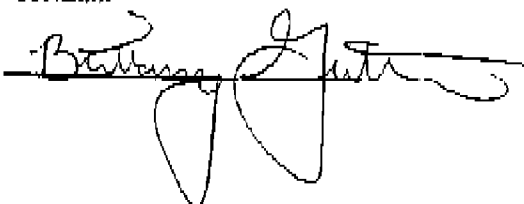
WITNESS:



INVENTOR:

 (SEAL)
DATE 1-27-2004

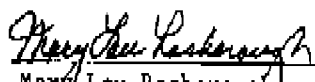
WITNESS:

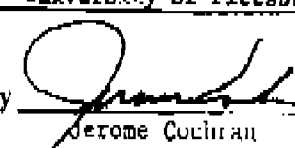


INVENTOR:

 (SEAL)
DATE 1-27-04Approved and consented to this 6<sup>th</sup> day of February, 2004

ATTEST:


  
 Mary Lou Rosborough  
 Executive Associate Secretary  
 (SEAL) of the Board of Trustees

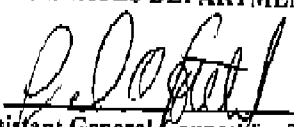
University of Pittsburgh  
 By   
 Jerome Cochran  
 Its Executive Vice Chancellor

Accepted for the Benefit of the Government of the United States.

UNITED STATES DEPARTMENT OF ENERGY

WITNESS:



By   
 Assistant General Counsel for Technology Transfer  
 and Intellectual Property