PATENT ASSIGNMENT

Electronic Version v1.1
Stylesheet Version v1.1

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	Corrective Recordation regarding transposition of Assignor and Assignee at Reel/Frame: 011523/0078

CONVEYING PARTY DATA

Name	Execution Date
On-Line Technologies, Inc.	01/19/2001

RECEIVING PARTY DATA

Name:	MKS Instruments, Inc.
Street Address:	Six Shattuck Road
City:	Andover
State/Country:	MASSACHUSETTS
Postal Code:	01810

PROPERTY NUMBERS Total: 19

Property Type	Number
Patent Number:	4652755
Patent Number:	4985858
Patent Number:	4824790
Patent Number:	5136154
Patent Number:	5170223
Patent Number:	5196902
Patent Number:	5239488
Patent Number:	5285167
Patent Number:	5349438
Patent Number:	5403433
Patent Number:	5432336
Patent Number:	5440143
Patent Number:	5473429
Patent Number:	5486917

OP $760.00 4652755

Patent Number:	5513828
Patent Number:	5588632
Patent Number:	5604581
Patent Number:	5675412
Patent Number:	5900633

CORRESPONDENCE DATA

Fax Number: (617)526-5000
Correspondence will be sent via US Mail when the fax attempt is unsuccessful.
Phone: 617-526-6448
Email: huelinh.tran@wilmerhale.com
Correspondent Name: Michael J. Bevilacqua, Esq.
Address Line 1: Wilmer Cutler Pickering Hale and DorrLLP
Address Line 2: 60 State Street
Address Line 4: Boston, MASSACHUSETTS 02109

ATTORNEY DOCKET NUMBER:	105690136
NAME OF SUBMITTER:	Michael J. Bevilacqua

Total Attachments: 13
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FORM PTO-1595 (MODIFIED)
(Rev. 6-93)
OMB No. 0651-0011 (exp. 4/94)

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

To the Honorable Commissioner of Patents ched original documents or copy thereof.

1. Name of conveying party(ies): 2·6·01
MKS Instruments, Inc.
Six Shattuck Road
Andover, Massachusetts 01810

Additional name(s) of conveying party(ies) attached? ☐ Yes ☒ No

3. Nature of conveyance:
☐ Assignment ☐ Merger
☒ Security Agreement ☐ Change of Name
☐ Other

Execution Date: January 19, 2001

2. Name and address of receiving party(ies):
Name: On-Line Technologies, Inc.
Internal Address:

Address 87 Church Street

City: East Hartford State: CT Zip: 06108

Additional name(s) and address(es) attached?
☐ Yes ☒ No

4. Application number(s) or patent number(s):
If this document is being filed together with a new application, the execution date of the application is :

A. Patent Application No. (s)

B. Patent No.(s)
See attached list

Additional numbers attached? ☒ Yes ☐ No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Michael J. Bevilacqua, Esquire
Internal Address: Hale and Dorr LLP
Street Address: 60 State Street

City: Boston State: MA Zip: 02109

6. Total number of applications and patents involved:
19

7. Total Fee (37 CFR 3.41) $760.00
☐ Enclosed
☒ Charge fees to Deposit Account

Charge any additional fees associated with this paper or during the pendency of this application, or credit any overpayment, to deposit account.

8. Deposit account number:
08-0219
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Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document

Michael J. Bevilacqua, Esquire — Name of Person Signing

Signature

February 1, 2001 — Date

Total number of pages including cover sheet, attachments, and document: 13

Mail documents to be recorded with required cover sheet information to:
Commissioner of Patents & Trademarks, Box Assignments
Washington, D.C. 20231

105.690.130
Hale and Dorr LLP Docket Number

02/21/2001 AAHNED1 00000126 080219 4652755
FC:581 760.00 CH

U.S.Patents	Issue Date	Title
4,652,755 (AFR)	3/24/87	**Method and Apparatus for Analyzing Particle-Containing Gaseous Suspensions** APPLICATIONS -This patent covers the methodology for in-situ analysis of hot reactive gas mixtures which contain particles. The method provides data on gas composition and temperature, as well as particle sizes, concentration and temperature. It has been applied to measure coal combustion and black liquor combustion. It is a broad fundamental patent with application to FUTURE GAS ANALYSIS PRODUCTS.
4,985,858 (AFR)	1/15/91	**Method and Apparatus for Temperature Determination** APPLICATIONS - This patent covers a unique method employing the Christiansen dip for measuring the surface temperature of glass, ceramics and other dielectrics. It provides a very accurate, non contact method which does not require prior knowledge of the emissivity. It is particularly useful in situations were there is stray radiation. It will have application for the in-situ measurement of dielectric coatings in semiconductor fabrication for FUTURE PROCESS ANALYSIS PRODUCTS.
4,824,790 (AFR)	4/25/89	**System and Method for Thermogravimetric Analysis** SENSOR – This patent covers a method to couple a thermogravimetric analysis (TGA) apparatus with an FTIR to analyze evolved products. It permits an analysis of the tars which are often produced with hydrocarbons so that a complete material balance can be obtained. It has application outside the semiconductor industry for ANALYTICAL INSTRUMENTATION.
5,136,154	8/4/92	**Method and System for Photoconductive Detector Signal Correction** FTIR –An important patent for all of FTIR-based products using photoconductive detectors such as MCT. It linearizes the detector so that the measurements from all instruments are identical. This is essential for quantitative analysis. It has application in CURRENT WAFER AND GAS ANALYSIS PRODUCTS.
5,170,223	12/8/92	**Device for Blocking of Divergent Radiation as in Spectroscopy and Instrument and Method Utilizing Same** SENSOR – This patent allows the Bomem FTIR or an FTIR with a similar interferometer to operate simultaneously in the emission and transmission mode.
5,196,902	3/23/93	**Two-Beam Interferometer Apparatus and Method, and Spectrometer and Instrument Utilizing the Same** FTIR-This patent covers some of the original unique features of our original prototypes. It has been superseded by subsequent patents.
5,239,488	8/24/93	**Apparatus and Method for Determining High Temperature Surface Emissivity Through Reflectance and Radiance Measurements** SENSOR – This patent covers a method to simultaneously measure the emissivity and temperature of a surface. It is the basis for a new ASTM method and for the On-Line HIGH TEMPERATURE EMISSOMETER.
5,285,167	2/8/94	**Method and Apparatus for Signal Compression** FTIR- This patent covers methods for improving the dynamic range of the A to D converter in the FTIR electronics. It is not presently used in our products.
5,349,438	9/20/94	**Structure for the Dynamic Support of a Reflective Element and Interferometer Comprising the Same** FTIR – This patent covers On-Line's unique mirror translation system, which provides isolation from translational and rotational vibrations and the cross spring pivot structure used to construct the device. It is used in all FTIR-based CURRENT AND FUTURE METROLOGY AND GAS PRODUCTS.
5,403,433	4/4/95	**Method and Apparatus for Monitoring Layer Processing** ALGORITHMS – This is a fundamental patent covering methods of analysis for surface layer thickness composition and temperature. It is used in Tool ++ for CURRENT AND FUTURE METROLOGY PRODUCTS.
5,432,336	7/11/95	**Detector Signal Correction Method and System** FTIR- This is an improvement in the method of patent US 5,136,154. It is employed in all FTIR-based CURRENT AND FUTURE METROLOGY AND GAS PRODUCTS.
5,440,143	8/8/95	**Folded-Path Optical Analysis Gas Cell** SENSOR –This patent covers the 20/20 Multi-Pass Gas Cell. The unique design allows a higher optical throughput in a smaller cell than the standard White Cell. It is applied in the INDUCT and MULTI-GAS ANALYZERS.
		Method and Apparatus for Controlling the Reciprocating Translation of an Interferometer Reflector or

5,473,429	12/5/95	**Other Body** FTIR – This patent covers the fast mirror motion turn around circuitry. It is used in all FTIR-based CURRENT AND FUTURE METROLOGY AND GAS PRODUCTS.
5,486,917	1/23/96	**Flexture Plate Motion-Transfer Mechanism, Beam-Splitter Assembly, and Interferometer Incorporating the Same** FTIR – This patent covers many of the unique design features of On-Line's FTIR. It is used in all FTIR-based CURRENT AND FUTURE METROLOGY AND GAS PRODUCTS.
5,513,828	5/7/96	**Vibration Immunizing Dynamic Support Structure** FTIR – This patent covers the vibration isolating mirror motion system. It is used in all FTIR-based CURRENT AND FUTURE METROLOGY AND GAS PRODUCTS.
5,588,632	12/31/96	**Dynamic Support Structure** FTIR - This patent covers an early prototype.
5,604,581	2/18/97	**Film Thickness and Free Carrier Concentration Analysis Method and Apparatus** ALGORITHM – This patent covers the method for analyzing multi-layer structures to determine the thickness and composition. It is used in TOOL ++, EPI ON LINE and EPISCAN.
5,675,412	10/7/97	**System Including Unified Beamsplitter and Parallel Reflecting Element, And Retroreflecting Component** FTIR – This patent covers the very rugged interferometer design used in On-Line's 2100 FTIR. It is used in all FTIR-based CURRENT AND FUTURE METROLOGY AND GAS PRODUCTS.
5,900,633	5/4/99	**Spectrometric Method for Analysis of Film Thickness and Composition on a Patterned Sample** ALGORITHM – A method for analyzing films deposited on top of patterns. It will be the basis for INTEGRATED METROLOGY PRODUCTS.

INTELLECTUAL PROPERTY SECURITY AGREEMENT

This Intellectual Property Security Agreement is entered into as of January 19, 2001 between MKS Instruments, Inc. ("Lender") and On-Line Technologies, Inc. ("Grantor").

RECITALS

Lender has agreed to make certain advances of money and to extend certain financial accommodations to Grantor (the "Loans") in the amounts and manner set forth in that certain Loan and Security Agreement between Lender and Grantor dated of even date herewith (as the same may be amended, modified or supplemented from time to time, the "Loan Agreement"). Lender is willing to make the Loans to Grantor, but only upon the condition, among others, that Grantor shall grant to Lender a security interest in, among other things, certain Copyrights, Trademarks and Patents to secure the obligations of Grantor under the Loan Agreement. Capitalized terms not otherwise defined herein shall have the meanings ascribed to them in the Loan Agreement.

Pursuant to the terms of the Loan Agreement, Grantor has granted to Lender a security interest in all of Grantor's right, title and interest, whether presently existing or hereafter acquired, in, to and under all of the Collateral.

NOW, THEREFORE, for good and valuable consideration, receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound, as collateral security for the prompt and complete payment when due of its obligations under the Loan Agreement, Grantor hereby represents, warrants, covenants and agrees as follows:

AGREEMENT

To secure its obligations under the Loan Agreement, subject to all prior security interests of record, Grantor grants and pledges to Lender a security interest in all of Grantor's right, title and interest in, to and under its Intellectual Property Collateral (including without limitation those Copyrights, Patents and Trademarks listed on Schedules A, B and C hereto), together with all goodwill of the business symbolized by the Trademarks, the right to sue for past, present and future infringements, all rights corresponding thereto throughout the world and all re-issues, divisions, continuations, renewals, extensions and continuations-in-part thereof, and all proceeds of each of the foregoing (including, without limitation, all license royalties and proceeds of infringement suits).

This security interest is granted in conjunction with the security interest granted to Lender under the Loan Agreement. The rights and remedies of Lender with respect to the security interest granted hereby are in addition to those set forth in the Loan Agreement and the other Loan Documents, and those which are now or hereafter available to Lender as a matter of law or equity. Each right, power and remedy of Lender provided herein or in the Loan Agreement or any of the Loan Documents, or now or hereafter existing at law or in equity shall be cumulative and concurrent and shall be in addition to every right, power or remedy provided for herein and the exercise by Lender of any one or more of the rights, powers or remedies

provided for in this Intellectual Property Security Agreement, the Loan Agreement or any of the other Loan Documents, or now or hereafter existing at law or in equity, shall not preclude the simultaneous or later exercise by any person, including Lender, of any or all other rights, powers or remedies.

IN WITNESS WHEREOF, the parties have cause this Intellectual Property Security Agreement to be duly executed by its officers thereunto duly authorized as of the first date written above.

GRANTOR:

ON-LINE TECHNOLOGIES, INC.

Address of Grantor:

87 Church Street
East Hartford, CT 06108

By:_____
Name: Peter R. Solomon
Title: President

LENDER:

Address of Lender:

MKS INSTRUMENTS, INC.

Six Shattuck Road
Andover, MA 01810

By:_____
Name: Ronald C. Weigner
Title: Vice President & Chief Financial Officer

provided for in this Intellectual Property Security Agreement, the Loan Agreement or any of the other Loan Documents, or now or hereafter existing at law or in equity, shall not preclude the simultaneous or later exercise by any person, including Lender, of any or all other rights, powers or remedies.

IN WITNESS WHEREOF, the parties have cause this Intellectual Property Security Agreement to be duly executed by its officers thereunto duly authorized as of the first date written above.

GRANTOR:

ON-LINE TECHNOLOGIES, INC.

Address of Grantor:

87 Church Street
East Hartford, CT 06108

By:_____
Name: Peter R. Solomon
Title: President

LENDER:

Address of Lender:

MKS INSTRUMENTS, INC

Six Shattuck Road
Andover, MA 01810

By: Ronald C Weigner
Name: Ronald C. Weigner
Title: Vice President & Chief Financial Officer

STATE OF CONNECTICUT
COUNTY OF HARTFORD

The foregoing instrument was acknowledged this 26th day of January, 2001 by Peter R. Solomon, the President of On-Line Technologies, Inc. (the "Grantor"), to be his free act and deed in said capacity and the free act and deed of the Grantor, on behalf of said Grantor, before me,

~~Notary Public~~ COMMISSIONER OF THE SUPERIOR COURT
My ~~commission expires~~:

COMMONWEALTH OF MASSACHUSETTS
COUNTY OF SUFFOLK

The foregoing instrument was acknowledged this 26th day of January, 2001 by Ronald C. Weigner, the Vice President and Chief Financial Officer of MKS Instruments, Inc. (the "Lender"), to be his free act and deed in said capacity and the free act and deed of the Lender, on behalf of said Lender, before me,

Notary Public
My commission expires:

STATE OF CONNECTICUT
COUNTY OF _____

The foregoing instrument was acknowledged this 26th day of January, 2001 by Peter R. Solomon, the President of On-Line Technologies, Inc. (the "Grantor"), to be his free act and deed in said capacity and the free act and deed of the Grantor, on behalf of said Grantor, before me,

_____
Notary Public
My commission expires:

COMMONWEALTH OF MASSACHUSETTS
COUNTY OF SUFFOLK

The foregoing instrument was acknowledged this 26th day of January, 2001 by Ronald C. Weigner, the Vice President and Chief Financial Officer of MKS Instruments, Inc. (the "Lender"), to be his free act and deed in said capacity and the free act and deed of the Lender, on behalf of said Lender, before me,

_____
Notary Public Nancy J. Lail
My commission expires: 4/15/01

SCHEDULE A

Copyrights

Description	Registration/ Application Number	Registration/ Application Date

SCHEDULE B

Patents

Description	Registration/ Application Number	Registration/ Application Date

SCHEDULE C

Trademarks

Description	Registration/ Application Number	Registration/ Application Date