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UTILITY PATENT APPLICATION TRANSMITTAL <small>(Only for new nonprovisional applications under 37 CFR 1.53(b))</small>	Attorney Docket No.	071469-0314661
	First Inventor	MERRITT FUNK
	Title	See attached addendum
	Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. **Fee Transmittal Form** (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. **Applicant claims small entity status.**
See 37 CFR 1.27.
3. **Specification** [Total Pages 55]
Both the claims and abstract must start on a new page
(For information on the preferred arrangement, see MPEP 608.01 (a))
4. **Drawing(s)** (35 U.S.C. 113) [Total Sheets 12]
5. **Oath or Declaration** [Total Sheets _____]
 - a. Newly executed (original or copy)
 - b. Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 18 completed)
 - i. **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s)
name in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b).
6. **Application Data Sheet.** See 37 CFR 1.76
7. **CD-ROM or CD-R** in duplicate, large table or Computer Program (Appendix)
 - Landscape table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**
(if applicable, all necessary)
 - a. Computer Readable Form (CRF)
 - b. **Specification Sequence Listing on:**
 - i. CD-ROM or CD-R (2 copies); or
 - ii. Paper
 - c. Statements verifying identity of above copies

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ACCOMPANYING APPLICATION PARTS

9. **Assignment Papers** (cover sheet & document(s))
Name of Assignee _____
10. **37 CFR 3.73(b) Statement** **Power of Attorney**
(when there is an assignee)
11. **English Translation Document** (if applicable)
12. **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
 - Copies of Citations attached
13. **Preliminary Amendment**
14. **Return Receipt Postcard** (MPEP 503)
(Should be specifically itemized)
15. **Certified Copy of Priority Document(s)**
(if foreign priority is claimed)
16. **Nonpublication Request** under 35 U.S.C. 122 b)(2)(B)(i).
Applicant must attach form PTO/SB/35 or equivalent.
17. **Other:** _____

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

Continuation Divisional Continuation-in-part (CIP) of prior application No.: ..PCT/US03/29980

Prior application information: Examiner _____ Art Unit: _____

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This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Addendum

Invention Title

METHOD AND APPARATUS FOR THE MONITORING AND CONTROL OF A SEMICONDUCTOR MANUFACTURING PROCESS

APPLICATION UNDER UNITED STATES PATENT LAWS

Atty. Dkt. No. 071469-0314661

Invention: METHOD AND APPARATUS FOR THE MONITORING AND CONTROL OF A SEMICONDUCTOR MANUFACTURING PROCESS

Inventor (s): Merritt FUNK
Raymond PETERSON

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This is a:

- Provisional Application
- Regular Utility Application
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 The contents of the parent are incorporated by reference
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- Reissue Application
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- Substitute Specification
Sub. Spec Filed _____
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In App. No _____ / _____

SPECIFICATION

Method and Apparatus for the Monitoring and Control of a Semiconductor Manufacturing Process

Cross-reference to Related Applications

[0001] This is a Continuation Application of International Application No. PCT/US03/29980, filed September 25, 2003, which relies for priority upon U.S. Provisional Application No. 60/414,425, filed September 30, 2002, the contents of both of which are incorporated herein by reference in their entireties.

[0002] The present application is related to co-pending applications U.S. Continuation of PCT Application No. 10/951,161, filed on September 28, 2004, which relies for priority upon U.S. Provisional Application No. 60/368,162, filed on March 29, 2002; U.S. Continuation of PCT Application No. 10/966,112, filed October 18, 2004, which relies for priority upon U.S. Provisional Application No. 60/374,486, filed on April 23, 2002; U.S. Continuation of PCT Application No. 10/987,194, filed November 15, 2004, which relies for priority upon U.S. Provisional Application No. 60/383,619, filed on May 29, 2002; U.S. Continuation of PCT Application No. 11/025,227, filed December 30, 2004, which relies for priority upon U.S. Provisional Application No. 60/393,091, filed on July 3, 2002; and U.S. Continuation of PCT Application No. 11/025,396, filed December 30, 2004, which relies for priority upon U.S. Provisional Application No. 60/393,104, filed on July 3, 2002. Each of these applications is herein incorporated by reference in its entirety.

Field of the Invention

[0003] The present invention is related to semiconductor processing systems, particularly to semiconductor processing systems, which use Advanced Process Control (APC).

Background of the Invention

[0004] Computers are generally used to control, monitor, and initialize manufacturing processes. A computer is ideal for these operations given the complexities in a semiconductor manufacturing plant from the reentrant wafer flows, critical processing steps, and maintainability of the processes. Various input/output (I/O) devices are used to control and monitor process flows,

wafer states, and maintenance schedules. A variety of tools exist in a semiconductor manufacturing plant to complete these complicated steps from critical operations such as etching, to batch processing, and inspections. Most tool installations are accomplished using a display screen that is part of the graphical user interface (GUI) of a control computer containing the installation software. Installation of a semiconductor-processing tool is a time consuming procedure.

[0005] Semiconductor processing facilities require constant monitoring. Processing conditions change over time with the slightest changes in critical process parameters creating undesirable results. Small changes can easily occur in the composition or pressure of an etch gas, process chamber, or wafer temperature. In many cases, changes of process data reflecting deterioration of processing characteristics cannot be detected by simply referring to the process data displayed. It is difficult to detect early stage abnormalities and characteristic deterioration of a process. Oftentimes prediction and pattern recognition offered by advanced process control (APC) is necessary.

[0006] Facility control is often performed by a number of different control systems having a variety of controllers. Some of the control systems may have man-machine interfaces such as touch screens, while others may only collect and display one variable such as temperature. The monitoring system must be able to collect data tabulated for the process control system. The data collection of the monitoring system must handle univariate and multivariate data, the analysis and display of the data, and have the ability to select the process variables to collect. Various conditions in a process are monitored by different sensors provided in each of the process chambers, and data of the monitored conditions is transferred and accumulated in a control computer. If the process data is displayed and detected automatically, the optimum process conditions of a mass-production line can be set and controlled through statistical process control (SPC) charts. Inefficient monitoring of a facility can result in facility downtimes that add to the overall operational cost.

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