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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
REQUEST FOR FILING PROVISIONAL PATENT APPLICATION
Under 35 USC 111(b)
(Not for DESIGN cases)

Box:
PROVISIONAL
APPLICATION

Hon. Commissioner of Patents
Washington, D.C. 20231

PROVISIONAL APPLICATION
Under Rule 53(c)

00909

Sir:

Herewith is a PROVISIONAL APPLICATION
Title: METHOD AND APPARATUS FOR THE MONITORING
AND CONTROL OF A SEMICONDUCTOR
MANUFACTURING PROCESS

Atty. Dkt.	PW 292638	PC8001A
	M#	Client Ref

including: Date: September 30, 2002

1. Specification: __58__ pages   2. ☐ Specification in non-English language   3. ☒ Drawings: __11__ sheet(s)
4. The invention ☐ was ☒ was not made by, or under a contract with, an agency of the U.S. Government.
   If yes, Government agency/contact # = _____
5. ☐   Attached is an assignment and cover sheet. Please return the recorded assignment to the undersigned.
6.   Small Entity Status ➡   ☒ is Not claimed   ☐ is claimed (pre-filing confirmation required)
         NOTE: Do NOT File IDS!
7. ☐   Attached:

8.   This application is made by the following named inventor(s) (Double check instructions for accuracy.):

(1) Inventor	Merritt		FUNK	
	First	Middle Initial	Family Name	
Residence	Austin	Texas	USA	
	City	State/Foreign Country	Country of Citizenship	

(2) Inventor				
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Residence				
	City	State/Foreign Country	Country of Citizenship	

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	City	State/Foreign Country	Country of Citizenship	

(4) Inventor				
	First	Middle Initial	Family Name	
Residence				
	City	State/Foreign Country	Country of Citizenship	

(5) Inventor				
	First	Middle Initial	Family Name	
Residence				

9. NOTE: FOR ADDITIONAL INVENTORS, check box ☐ and attach sheet (PAT102A) with same information regarding additional inventors.

	Large/Small Entity		Fee Code
10. Filing Fee	$160/$80	+160	114/214
11. If "assignment" box 5 is X'd, add recording fee.	$40	+0	581
12.		TOTAL FEE =	$160

PLEASE CHARGE OUR DEP. ACCT.

Our Deposit Account No. 03-3975

Our Order No.   71469 | 292638

                C#   **M#**

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CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-17 (missing or insufficient fee only) now or hereafter relative to this application or credit any overpayment, to our Account/Order Nos. shown in the heading hereof for which purpose a duplicate copy of this sheet is attached.

Pillsbury Winthrop LLP
Intellectual Property Group
By Atty: Dale S. Lazar   Reg. No.   28872

Sig: Fax: (703) 905-2500

Atty/Sec: DSL/JRH   Tel: (703) 905-2126

NOTE: File in duplicate with 2 post card receipts (PAT-103) & attachments

APPLICATION UNDER UNITED STATES PATENT LAWS

Atty. Dkt. No. ___PW 292638_____

(M#)

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

Inventor (s): Merritt FUNK

For correspondence Address

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Pillsbury Winthrop LLP

This is a:

☒ Provisional Application

☐ Regular Utility Application

☐ Continuing Application
  ☐ The contents of the parent are incorporated by reference

☐ PCT National Phase Application

☐ Design Application

☐ Reissue Application

☐ Plant Application

☐ Substitute Specification
  Sub. Spec Filed _____
  in App. No. _____/_____

☐ Marked up Specification re
  Sub. Spec. filed _____
  In App. No _____/_____

SPECIFICATION

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

Cross-reference to Related Applications

[0001] The present application is related to co-pending applications US Provisional Application No. 60/368,162, entitled "Method For Interaction With Status and Control Apparatus", filed on March 29, 2002; US Provisional Application No. 60/374,486, entitled "Method and Apparatus for Simplified System Configuration", filed on April 23, 2002; US Provisional Application No. 60/383,619, entitled "Method and Apparatus For Monitoring Tool Performance", filed on May 29, 2002; US Provisional Application No. 60/393,091, entitled "Method for Dynamic Sensor Configuration and Runtime Execution", filed on July 3, 2002; and US Provisional Application No. 60/393,104, entitled "Method and Apparatus for Automatic Sensor Installation", filed on July 3, 2002. Each of these applications is herein incorporated by reference in its entirety.

Field of the Invention

[0002] The present invention is related to semiconductor processing systems, particularly to semiconductor processing systems, which use Advanced Process Control (APC).

Background of the Invention

[0003] 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.

[0004] 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.

[0005] 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.

Summary of the Invention

[0006] Accordingly, it is an object of the present invention to provide an Advanced Process Control (APC) system for controlling a processing tool in a semiconductor processing environment, where the APC system comprises an APC server providing a plurality of APC related applications; an Interface Server (IS) coupled to the APC server; a database coupled to the IS and APC server; and a GUI component coupled to the APC server, wherein

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