2009 Best Product Awards

The editors of Semiconductor International have chosen 15 products, materials or services that are proven in the manufacturing environment and should serve the industry well for years to come.

By Laura Peters, Editor-in-Chief -- Semiconductor International, July 1, 2009

Qcept Technologies Inc.

The ChemetriQ 3000 system is being used to inspect memory wafers incorporating sub-40 nm design rules as well as advanced R&D wafers that incorporate novel materials, processes and device structures. Applications include in-line yield learning to accelerate ramp-up of next-generation processes, excursion monitoring, and pre-scanning prior to sending wafers to the analytical lab to enable faster root-cause analysis of non-visual defects. These evaluations are being performed at post-etch clean, post-CMP clean, pre-diffusion clean, and incoming wafer inspection. The non-visual defect (NVD) inspection platform provides rapid, full-wafer, in-line detection of NVDs including organic and inorganic residues, metallic contaminants, process-induced charging, and watermarks.

Tec-Sem Group

The Pr@ctor 300 mm single-wafer management system stores wafers horizontally in a proprietary storage system (Tec-Cell) in a clean ISO 1 microenvironment, with optional nitrogen or extra clean dry air (XCDA) purge capability. The wafer storage is combined with a single-wafer transfer/sorter system and an optional carrier-buffer for 300 mm front-opening unified pods (FOUPs). Each wafer and its history is continuously tracked. The system can administer or change categories of the wafers based on the process cycles, thus providing a complete management solution for test or product wafers. Key features and advantages over traditional processes using cassette stockers and sorters include automatic background preparation of lots, faster access

to each wafer, reduced use of cleanroom storage space and FOUPs, increased WIP capacity, reduced cross-contamination, optional nitrogen purge, reduced test wafer consumption and improved process tool utilization. The system integrates in any MES system.

Nikon Precision

The NSR-S610C hyper numerical aperture (NA=1.30) ArF immersion scanner targets mass production of 45 nm and smaller memory and 32 nm logic devices. The scanner uses proprietary Local Fill Technology, which is proven to eliminate scanner-induced immersion defects with no bubbles, water spots or backside wafer contamination. This technology also eliminates evaporation of the immersion fluid, providing a critical advantagein preventing immersion-related overlay problems. The company's Tandem Stage system uses two stages with different functions to increase throughput, improve accuracy, and enhance long-term stability.

W.L. Gore & Associates

Gore filters for ultrapure water applications provide both high particle retention and high flow rate for reduced cost of ownership. Performance benefits include fewer filters to purchase and manage, lower pressure drop and reduced energy consumption, maintained/increased delivery pressure at point of use, reduced downtime, and faster return to baseline from change-outs. The filters provide 3× higher flow rates for equivalent retention compared with conventional water filtration cartidges. A range of filters are available to improve the performance of most facilities' water applications including pre-filters, trap filters and final filters.

Cabot Microelectronics

The Epic D100 CMP pad is based on proprietary technology and a state-of-the-art manufacturing process designed to improve pad performance and significantly lower cost of ownership. The Epic D100 has demonstrated longer pad life than a conventional pad due to its material characteristics. The design features a single polymer material and production via a continuous single-sheet manufacturing process. The aim

is to eliminate batch-to-batch and pad-to-pad inconsistencies found in conventional pads. The pad can be customized to match customer grooving requirements in facilities located in the United States and Asia.

Applied Materials

SEMVision G4 is an advanced defect review SEM for 45 nm and beyond. Its SEM column technology and enhanced multi-perspective imaging system enables it to deliver state-of-the-art 2 nm physical resolution. Analytical tools enable users to rapidly analyze and classify defects as small as 30 nm in the most sensitive device layers. The column technology can rotate and tilt up to 45° relative to the wafer to provide complete 3-D data for defect visualization and classification.

Carl Zeiss SMT

The Ultra plus scanning electron microscope (SEM) uses charge compensation for nonconductive samples to provide high-resolution, stable and noise-free images from samples such as ceramics, polymers, dielectrics and many other nonconductive materials, even at high acceleration voltage and high probe current. A proprietary gas-injection system provides for a local flush of an inert gas to enable charge neutralization. Thereby, electrostatic charging of samples is neutralized and detection of secondary electrons (SE) as well as backscattered electrons (BSE) becomes feasible. Together with the AsB (angle selective backscattered) detector for low-angle backscattered electrons revealing orientation contrast as well as the chamber-mounted Everhart Thornley detector for topographical contrast, this SEM offers a complete detection system for all applications on conductive as well as nonconductive samples.

ATMI

The Safe Delivery Source (SDS) cylinder provides safe transport and storage of toxic dopant gases. The SDS cylinders incorporate a specially designed filter that turns gases into a solid under sub-atmospheric pressure conditions. Over 1 billion wafers have been manufactured with SDS with no reported incident. SDS cylinders virtually eliminate the risk of toxic gas leakage in gas storage or at ion implantation tools, while reducing ventilation

and exhaust requirements. SDS canisters are demonstrated to have better fire survivability than high-pressure canisters, which increases safety margin by increasing time for evacuation and arrival time for first responders.

ASM Technology Singapore

The new phase in encapsulation requires a machine that handles both liquid and solid encapsulant for the packaging of advanced devices such as high-brightness LEDs and high-I/O ICs. IDEALcompress performs this task by combining compression and dispensing technology. The tool is able to encapsulate large-format substrates, maximize asset usage, and achieve eco-friendly manufacturing due to the elimination of material waste.

Linde Group

The Generation-*F* 80 on-site fluorine generator is specifically designed to meet the exacting requirements of CVD chamber cleaning within the semiconductor industry and is SEMI S2 certified and CE marked. On-demand, high-purity 100% fluorine production of up to 80 std L/hr (3.2 kg/day) is integrated with purification, compression and storage in a compact, easy-to-install extracted enclosure. Features include a safer gas delivery system than cylinder supply; low gas pressure, temperature and velocity; no cylinder changes required; double containment throughout; PFC emissions reduction; a more stable, higher-purity process; and flexible installation.

ATMI

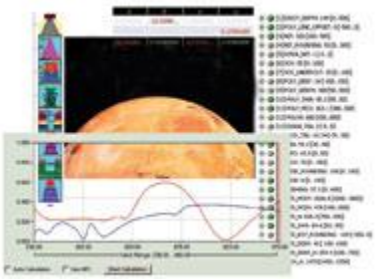
AutoClean provides an in situ ion implant cleaning process for more extendible source life. The system is comprised of a cleaning reagent, a process recipe, a solid-source delivery mechanism and customer-specific application development capability. The process removes deposits from the ion source and extraction regions of the implanter, reducing human

exposure to hazardous byproducts. The system reduces cross-contamination, which minimizes the need for mandatory species rotation. The AutoClean system runs as a normal recipe for cleaning the source region or as a conditioning recipe for pre- or post-implant operations.

AMEC

The 300 mm Primo D-RIE system leverages a twin-station mini-batch cluster architecture with a single-wafer environment and patented very high-frequency (VHF) de-coupled RIE plasma source designed to provide fine critical dimension control, high selectivity tomask, wide process window, and robust and repeatable performance for critical and other dielectric etch applications at nodes of 65–45 nm and beyond. The applications include very high-aspect-ratio etch, hard mask open, spacer etch, dual-damascene via and trench etches, among many others.

Nova Measuring Instruments Ltd.



NovaMARS (Metrology Analysis & Recipe Setup) advanced software provides an automated solution for advanced structure modeling and application development Of the four steps in model development, the first and last, materials characterization and matching to reference metrology, are the longest. Materials characterization is reduced from weeks to hours by extracting optical properties of all materials involved directly from product wafers in real time. Systematically targeted reference matching uses proprietary algorithms rather than traditional trial-and-error methods with multiple repeat steps.

Environmental Metrology

The Electro-Chemical Residue Sensor (ECRS) performs in situ and real-time measurement of cleanliness inside high-aspect-ratio features while the wafer is being cleaned, rinsed or dried by measuring the impedance across a critical feature. A comprehensive simulation model extracts the residual concentration of impurity from the measurement results. This approach to determining the endpoint of rinsing and drying processes, especially in single-wafer cleaning tools, can lead

to significant savings in water and energy usage. The ECRS allows staged rinsing to be developed to reduce resource usage compared with conventional rinsing.

CI Semi

WetSpec200 is a next-generation, fully integrated, in-line wet chemistry analyzer for real-time monitoring of chemical concentrations in wet processes.

It accurately measures the absorption spectrum in the near-infrared to monitor the chemical concentrations of liquids in wet processes. The system supports up to eight channels in parallel, measuring different chemistry components, and its SW models enable soft-switch between different chemistries, analysis of different chemistries for each channel, and flexible chemo-metric methodology for a fluid's property value determinations.