



## Applied Materials Introduces Ultra-Shallow Junction Module to Enable GigaHertz-Generation Devices

August 25, 1998

**SANTA CLARA, Calif.--(BUSINESS WIRE)--Aug. 25, 1998--**

Complementary RTP and Implant Technologies Provide Critical Roadmap Capability for Faster Chips

Applied Materials, Inc. announces its Ultra-Shallow Junction (USJ) Module, a unique combination of leading-edge ion implant and rapid thermal processing (RTP) technologies that will enable chipmakers to form the transistor junctions required for faster device designs.

By leveraging the synergy between the company's industry-leading xR LEAP(tm) (Low Energy Advanced Performance) ion implant system and RTP XEplus(tm) Centura(R) system, Applied Materials' USJ Module offers a completely characterized, production-ready process for the rapid development and manufacture of ultra-shallow junction transistors.

Mart Graef, group manager at Philips Research, said, "Ultra-shallow junctions require exceptional optimization of the implant and RTP steps to avoid performance and yield loss. Applied Materials has already developed a production-ready solution to forming these structures using its xR LEAP and RTP Centura systems. Taking advantage of this expertise allows us to quickly implement this unique integrated process into production, saving us time and development cost."

The precise, repeatable and cost-effective formation of ultra-shallow transistor junctions is an essential roadmap requirement to achieve next-generation, gigahertz-speed devices using 0.18-micron and below design rules.

Until now, it has been extremely difficult to ensure that, once dopants are implanted, they remain precisely positioned in the device after RTP annealing. Subtle process variations can offset the depth of the implanted dopants by tens of nanometers, adversely affecting device performance and manufacturing yield.

"Using our knowledge of key process interactions to optimize the implant and RTP steps as a sequential process, we can provide our customers with an elegant solution that gives them the best performance and yield in these challenging structures," said Nick Miller, president of Applied Materials' Thermal Process and Implant product business group.

"By significantly accelerating the integration and qualification of these two processes in the fab, this fully developed low-energy implant-RTP process capability can potentially mean greater profitability for chipmakers."

The USJ Module is the first time the company has formally offered its xR LEAP implant system and the RTP XEplus Centura system to customers as a sequentially optimized, fully characterized process. Customers who already have one of these systems installed can easily take advantage of this process solution by completing the module. Several prominent chipmakers in the U.S., Taiwan and Europe are now using Applied Materials' xR LEAP and RTP Centura systems for ultra-shallow junction formation with excellent results.

The xR LEAP implant system was introduced in 1996 for ultra-low-energy ion implantation (less than 1KeV). More than 25 xR LEAP systems are already in use at leading chipmakers, primarily for development work on advanced device designs and the manufacture of advanced microprocessors. The xR LEAP is the only known commercially successful ultra-low energy implanter on the market today, with a unique beamline design that enables high throughput and beam currents at extremely low energies.

(The energy of the implanted ions determines the depth and lateral spread of the implant. In ultra-shallow junctions, it is critical to control the implant depth to within a few atomic layers, which is impossible to do with conventional implant systems.)

After introducing the RTP Centura system in 1995, Applied Materials quickly became the global market leader in RTP. More than 150 RTP Centura systems are installed in facilities of virtually all major semiconductor manufacturers worldwide.

The first enhancement to the system was the RTP XE Centura, announced in 1997, which featured several productivity and performance innovations, including a throughput increase to more than 100 wafers per hour. The new RTP XEplus features an accelerated 150(degree)C per second temperature ramp rate and improved temperature uniformity that provides the process performance required for the formation of ultra-shallow junction transistors.

Philips Research laboratories serve as a center of competence for Philips Semiconductors, the largest European semiconductor manufacturer.

Applied Materials, Inc. is a Fortune 500 global growth company and the world's largest supplier of wafer fabrication systems and services to the global semiconductor industry. Applied Materials is traded on the Nasdaq National Market System under the symbol "AMAT." Applied Materials' web site is <http://www.AppliedMaterials.com>.