Applied Materials Takes RTP Technology to Next Level with New Radiance Centura System

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Radiance(TM) Centura(R) Addresses Challenging Requirements
for 0.13 Micron Chip Manufacturing with Advanced Technology
and Productivity

Applied Materials, Inc. (Nasdaq:AMAT) introduces the Radiance Centura, a new RTP (rapid thermal processing) system that leapfrogs existing RTP technologies to achieve a new level of performance for advanced, 0.13 micron and below chip manufacturing.

"The next several generations of transistors will require an entire spectrum of new RTP capabilities including tighter temperature uniformity and control, faster ramp and cool-down rates, and closed-loop control at lower temperatures," said Dr. Chris Gronet, vice president of the Thermal Processing Organization at Applied Materials.

"Radiance Centura, which is based on our production-proven RTP XE technology, easily meets these new requirements, enabling advanced applications such as ultra-shallow junctions and gate oxides, as well as advanced silicides, with extendibility beyond 0.1 micron geometries."

As the industry moves to extremely short anneal times in advanced devices, the process of ramping up and cooling down account for a significant fraction of the total process time and thus control overall process uniformity. The formation of ultra-shallow junctions, for example, requires precise, rapid (spike) implant anneals that limit high temperature exposure of the wafer to a few seconds.

To enable these new device designs, the Radiance Centura features significant advancements in temperature control, even at high temperature ramp rates, for exceptional within-wafer uniformity and wafer-to-wafer repeatability.

The Radiance system's fast wafer rotation (240 rpm) and a high speed (100 Hz), multi-point, closed-loop temperature control system provide tight temperature uniformity during ramps. Rapid ramp (250(degree)C/s) and cool-down (90(degree)C/s) rates limit thermal exposure of the wafer to less than 3 seconds above 950(degree)C for a 1050(degree)C spike anneal. The Radiance Centura also enables closed loop control at process temperatures below 280(degree)C for next-generation cobalt or nickel silicides.

"All of our improvements are aimed at higher productivity and lower operating costs in our customers' production fab environments," said Dr. Kelly Truman, director of Global Product Management and Strategic Technology for Applied Materials' Thermal Processing Organization.

"Besides the significant leaps in process performance and flexibility, the Radiance Centura system makes day-to-day fab operation much easier. The system can be quickly qualified and calibrated, while process recipe setup, matching, and transfer are also much improved. Operators can tune the process and cut setup cost dramatically with the new system."

Enhanced temperature uniformity across the wafer can improve yield by permitting better control of device parameters as well as gate oxide thickness and uniformity at sub-angstrom levels. The Radiance's temperature control system features integrated multi-point temperature measurement and emissivity compensation at sampling rates up to ten times greater than competitive systems. These features improve overall temperature uniformity over the entire range of wafer backside emissivities; this is especially important to customers manufacturing multiple types of devices.

Radiance features a variety of advancements that improve hardware matching and reliability and reduce operating cost. Wafer rotation is performed by a revolutionary magnetic levitation (mag-lev) mechanism developed by SatCon Technology Corp. and available exclusively on the Radiance system. The mag-lev technology provides better uniformity during ramp up and increased reliability with less maintenance.

Other features included on the Radiance are: SmartSensor(TM), a technology that distinguishes between various types of wafers and sets heating profiles automatically; and TempMatch(TM), a unique calibration unit for highly accurate system-to-system matching.

The Radiance Centura system uses a single process chamber for all applications, eliminating the need to use separate atmospheric and reduced-pressure chambers for annealing and/or oxidation applications. The system continues Applied Materials' extension of RTP technology into enabling the growth of critical oxide film used in transistor structures that were previously performed by batch furnaces. In Situ Steam Generation (ISSG) oxidation technology, for example, is gaining favor as a preferred method of growing ultra-thin (