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Hydrogen Peroxide Gas Plasma Enables Extremely Dense Hydroxyl Surface

Density and roughness of three-dimensional structures critical to high breakdown voltage and low leakage in next generation semiconductors

San Diego, California – May 25, 2022 – RASIRC announced results from a recent study that shows a stable plasma can be made with hydrogen peroxide gas, enabling an extremely dense hydroxyl surface during semiconductor fabrication. The resulting improved wetting angle on HF last silicon was superior to oxygen or water alone. Smaller wetting angle corresponds to increased hydrophilicity and increased hydroxyl density. Having more hydroxyls at the surface improves the interface layer, leading to more organized and cleaner atomic layer films.

“Hydrogen peroxide plasma for use in semiconductor manufacturing is now possible with the invention and commercialization of BRUTE Peroxide and the Peroxidizer,” said RASIRC Founder and CEO Jeffrey Spiegelman. “Remote hydrogen peroxide plasma will enable low temperature dielectric films with very high K.”

RASIRC conducted the study in collaboration with Taiyo Nippon Sanso Corporation (TNSC). The $6 billion-dollar multinational gas company has a large research and development effort focused on developing innovative solutions for next generation semiconductors, 3D metal printing, and renewable resources.

The study compares surface functionalization characteristics of hydrogen peroxide plasma to those of water and oxygen plasma-based methods. As films continue to shrink and three dimensional and gate all-around structures move into production, increasing density and reducing roughness of the interface layer becomes critical to creating very thin layers with high breakdown voltages and low leakage.

Additional areas of interest is in oxide wafer bonding, which requires a uniformly flat wafer surface with dense hydroxyl (-OH) groups. Ultimately, wafer bonding strength is a function of hydroxyl group density on the wafer surface before bonding.

Details on the research will be presented at the 241st ECS Meeting held May 29-June 2, 2022 in Vancouver.

About the RASIRC Peroxidizer®
The RASIRC Peroxidizer provides a safe, reliable way to deliver high-concentration hydrogen peroxide gas into ALD, annealing, gapfill, dry surface preparation, and cleaning processes.

About the BRUTE® Peroxide
BRUTE Peroxide is a controlled and safer chemical method to deliver high concentration hydrogen peroxide (H2O2) gas into Atomic Layer Deposition (ALD) and Etch (ALE) processes.

About RASIRC
RASIRC transforms liquids into dynamic gases that power process innovation in semiconductor and adjacent markets. By commercializing molecules for lower temperature processes, RASIRC patented technology enables the manufacture of atomic-scale oxides, nitrides, and metals. Innovative products such as Brute Peroxide, Brute Hydrazine, the Peroxidizer, and the Rainmaker Humidification Systems are being used to develop solutions for 5G, AI, IOT, and advanced automation.

What makes RASIRC a unique industry leader is our technical expertise and commitment to solving complex industry challenges for our customers. Our team of industry experts has a proven track record of beating larger competitors to market by efficiently delivering state of the art technology that reduces cost, improves quality, and dramatically improves safety. With our customers at the forefront of all we do, we continue to research, develop, and design innovative products that purify and deliver ultra-pure gas from liquids for the semiconductor and related markets. Contact RASIRC to help solve your complex problems.

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