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Si-Doped HZO and ZrO_2 For Hysteresis Free High-*k* Dielectric

Brute® Peroxide enables Si doping of HZO and ZRO thin films eliminating electric field hysteresis while preserving high-k

San Diego, Calif – January 8, 2025 – RASIRC announced new sponsored research from UCSD published in Journal of Vacuum Science and Technology A . The article titled: "*Si-Doped HZO and ZrO_2 For Hysteresis Free High-k Dielectric*" showed hafnium zirconium oxide (HZO) and zirconium oxide (ZrO_2) films grown with hydrogen peroxide have significantly less carbon impurities. The low impurity content improved film crystallinity, preserving high-*k* value compared to films grown with water. When the films were doped with silicon atoms an energy barrier to crystal phase switching was created, eliminating current/voltage and polarization/voltage hysteresis under electric fields within ±1.5 V bias.

"Hydrogen peroxide for semiconductor manufacturing is now possible with the invention and commercialization of BRUTE® Peroxide and the Peroxidizer® Vaporizer," said RASIRC Founder and CEO Jeffrey Spiegelman. "Hydrogen peroxide enables low temperature dielectric films with very high *k*."

About the RASIRC Peroxidizer®

The RASIRC Peroxidizer provides a safe, reliable way to deliver high-concentration hydrogen peroxide gas into ALD, annealing, gap fill, dry surface preparation, and cleaning processes. Peroxide is supplied by the end user and delivered into manufacturing processes at high concentrations using proprietary RASIRC technology.

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. Loading anhydrous hydrogen peroxide onto a solid support improves safety allowing air shipping of hydrogen peroxide ampoules.

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 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 being first 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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