

FOR IMMEDIATE RELEASE

Brute® Hydrazine Enables Low Temperature Nitride Films and Cobalt-Copper Inverse Hybrid Metal Bonding

Brute® Hydrazine permits novel semiconductor film growth at significantly reduced temperatures relative to ammonia.

San Diego, California – December 11th to 14th, 2024 - Leading experts in the field of semiconductor interfaces gathered at the Catamaran Hotel for the 55th IEEE Semiconductor Interface Specialists Conference (SISC). Among the cutting-edge research presented was “*Reversible Polarity of GaN / Si Surfaces Using Low Energy Ions During ALD*”.

This research, conducted by SeongUk Yun, Ping-Che Lee, and Andrew C. Kummel of UCSD, in collaboration with Jeffrey Spiegelman of RASIRC, focused on the utilization of high purity Brute® Hydrazine in ALD processes for low temperature deposition of gallium nitride with control of crystal polarity. The approach showed promising results, highlighting the superiority of hydrazine over ammonia to grow low temperature nitrides. Thermal ALD with Brute® Hydrazine and tris(dimethyl amido)gallium (TDMAGa) had equivalent GPC from 275-375 °C producing GaN films with gallium polar crystal structure. When ion bombardment was added to the process GaN films with reversed polarity; nitrogen polar, were produced. At temperatures >450 °C, CVD of GaN was observed.

Jeffrey Spiegelman, CEO and Founder of RASIRC, expressed his enthusiasm for the findings, stating, "The results prove again that hydrazine is a better choice than ammonia for the growth of low temperature nitrides."

Two posters demonstrating uses of Brute® Hydrazine to produce high quality films with minimal contamination in low temperature processes for back end of line (BEOL) applications were also presented at the 55th IEEE SISC,.

1. ***Co metal ALD on Cu with Cyclic clean for Inverse Hybrid Metal Bonding***, Cheng-Hsuan Kuo¹, Dipayan Pal², Madison Manley⁴, Rohan Sahay⁴, Jeff Spiegelman⁵, Mansour Moinpour³, Ravindra Kanjolia³, Jacob Woodruff³, Muhannad Bakir⁴ and Andrew C. Kummel²

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²*Department of Chemistry and Biochemistry, University of California, San Diego*

³EMD Electronics ⁴Georgia Institute of Technology ⁵Rasirc

2. **Atomic Layer Annealing BN with Low Carbon Concentration**, Ping Che Lee¹, Diego A. Contreras Mora¹, SeongUk Yun¹, Dipayan Pal¹, Amy Ross¹, Mark Clark³, Larry Chen³, Jeffery Spiegelman², Ravindra Kanjolia³, Mansour Moinpour³, and Andrew C. Kummel¹

¹UCSD, ²RASIRC, ³EMD Electronics

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 6G, 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 costs, 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.

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