

FOR IMMEDIATE RELEASE

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

*Brute® Hydrazine grows nitride films at lower temperatures than ammonia.*

San Diego, California – December 11th to 14th, 2024 - Leading experts in semiconductor interfaces gathered at the Catamaran Hotel for the 55th IEEE Semiconductor Interface Specialists Conference (SISC). Among the impressive 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 promising results highlighted Brute® Hydrazine’s superiority to ammonia at growing 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 a 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. Ammonia based GaN processes do not produce films below 400 °C without plasma, and plasma processes suffer from line of sight only deposition.

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 were also presented demonstrating Brute® Hydrazine use producing high quality semiconductor films with minimal contamination in low temperature processes for back end of line (BEOL) applications,

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*

*1Materials Science and Engineering Program, University of California, San Diego*

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*3EMD Electronics 4Georgia Institute of Technology 5Rasirc*

1. ***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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