

Press Release

February 3, 2010

## Advanced Diamond Technologies Publishes Etch Recipe for Diamond MEMS and Sensors

Romeoville, IL—February 3, 2010—Advanced Diamond Technologies (ADT) is making broadly available an etch recipe which enables engineers and product developers to reliably and affordably design micro devices and sensors out of diamond. Based on research published in the November/December 2009 issue of the peer-reviewed *Journal of Vacuum Science & Technology B (JVST B)*, the etch recipe is available for download from ADT's website at <http://www.thindiamond.com>. Using standard processes available in most foundries, this dry etch recipe enables designers to develop cutting-edge diamond micro devices and sensors while eliminating the complexity traditionally associated with diamond.

"The process to make diamond available, accessible, and affordable is complete. We have published this recipe so diamond can be incorporated into process flows using the same equipment and materials used to process silicon. We've eliminated the risk—and mystery—of how to make diamond devices and we hope to stimulate the creativity and ingenuity of designers to make diamond devices without having them worry about processing steps," said ADT's president, Neil Kane.

The article, "Nanofabrication of Sharp Diamond Tips by E-beam Lithography and Inductively Coupled Plasma Reactive Ion Etching," describes the etch recipe developed while creating sharp diamond tips for atomic force microscopy (AFM) probes. The dry etch recipe was optimized to achieve a maximum etch rate of 650 nm/min using ADT's UNCD<sup>®</sup> Wafers. Parameters to achieve slower etch rates are also outlined which are applicable for developing delicate nano-structures. Process steps for creating and patterning the hard mask, a 350 nm thick plasma-enhanced chemical vapor deposited SiO<sub>x</sub> layer, are also detailed.

"We have customers using our UNCD Wafers to make diamond products as diverse as AFM probes, switches for phased-array radar, biosensors to detect *E. coli* in water, LED lighting, and boron-doped diamond electrodes for water purification. A simple, optimized etch recipe makes the adoption of diamond very straightforward," says ADT's chief technical officer Dr. John Carlisle. "A whole generation of 2D and 3D diamond structures are now conceivable such as high performance RF MEMS devices and accelerometers," said ADT's MEMS lead scientist and lead author of the *JVST B* article, Dr. Nicolaie Moldovan.

The development of an optimized dry etch capability is part of ADT's ongoing research to advance its 2009 R&D100 Award winning NaDiaProbes<sup>®</sup>, the world's first all-diamond AFM probes, which are created using UNCD Wafers as a starting material. NaDiaProbes are not diamond-coated probes or pieces of diamond mounted on cantilevers; rather the entire cantilever and tip assembly is made of UNCD, a thin-film form of nanocrystalline diamond.

ADT gratefully acknowledges its continuing collaboration with Argonne National Laboratory (Argonne) which is a co-author of the *JVST B* article. NaDiaProbes were developed with a grant from the National Science Foundation's SBIR/STTR program.

The logo for Advanced Diamond Technologies, Inc. features a dark green rectangular background. On the left side, there is a white, stylized graphic of a diamond or a light flare. To the right of this graphic, the text "ADVANCED DIAMOND TECHNOLOGIES, INC." is written in a white, sans-serif, all-caps font.

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**About Advanced Diamond Technologies**

Formed to commercialize the ultrananocrystalline diamond technology developed at Argonne, ADT is the exclusive licensee to its portfolio of diamond patents. ADT is a World Economic Forum 2007 Technology Pioneer, a recipient of a 2008 EuroAsia IC Award in the Materials Enabling category from *EuroAsia Semiconductor* magazine, a 2008 R&D 100 Award winner for mechanical seals faces for fluid pumps, and a 2009 R&D 100 Award winner for NaDiaProbes. For more information about ADT, visit <http://www.thindiamond.com>.

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