

PRESS RELEASE

January 10, 2018

For Immediate Release

Contact: Ted Prescop

408-980-1800 Ext.3

tprescop@multibeamcorp.com

Multibeam Patent Enhances Highly-Localized Precision Material Removal in Advanced Semiconductor Manufacturing

SANTA CLARA, CA - Jan. 10, 2018 - Multibeam Corporation today disclosed a new patent that describes the innovative use of e-beam technology for highly localized precision etching in manufacturing advanced memory and logic ICs. The vast improvement enabled by the new patent highlights the company's leadership in innovating a high-throughput e-beam platform to enhance the industry's fabrication capability.

Multibeam's dynamic e-beam platform concurrently addresses four major applications: Complementary E-Beam Lithography (CEBL) to reduce litho cost; Direct Electron Writing (DEW) to enhance device security; Direct Deposition/Etch (DDE) for highly localized precision etch and deposition using directed electron activation; and E-Beam Inspection (EBI) to speed defect detection and yield ramp.

Multibeam Patent # 9,673,114

The new patent describes innovative techniques utilizing electrons to enhance selective removal of material from the substrate at precise locations. The techniques are especially useful for advanced-IC fabrication.

The electrons deliver incremental activation energy to initiate chemical reactions on the wafer surface in the plasma, while leveraging existing etch chemistry. The electrons are directed to exact locations in accordance with the layout database, eliminating optical patterning (including multi-patterning) and masks. The electron-enhancement techniques reduce cost and complexity while complementing conventional plasma etching.

The etch process is further enhanced by innovative kinetic lens technology described in the patent. Each e-beam column is augmented with a gas "lens" that increases local partial pressure of select gas components to accelerate desired chemical reactions. The gas lens also eliminates gas-purge cycles to increase throughput.

A photon lens focuses on the etch target to modulate gas adsorption rate and speed etching. The photon lenses can also act as detectors to ensure precision process monitoring and control.

Each e-beam in the multi-column array is individually controlled. Multiple e-beam process chambers can be integrated into a cluster tool for higher throughput.

Complementary E-Beam Technology

Multibeam's expanding IP portfolio in advanced chip-making and device-security applications seeks to complement and enhance established technology solutions, not to supplant them. Electrons have different properties than the photons used in conventional optical lithography. The e-beam can be controlled directly from a database with no need for masks. Multibeam's proprietary mini-column makes the process chamber compact and small, enabling multi-chamber clustering to boost throughput. The company's complementary e-beam technology promises to extend IC fabrication capability, benefiting both semiconductor device manufacturers and their customers.

About Multibeam

Multibeam Corporation is a leading electron-beam technology innovator in wafer fab equipment. The company's proprietary miniature e-beam column array is currently being used to build lithography systems for the U.S government. In addition to these systems that enable low-volume, high-mix production of microchips, the company aims to apply its e-beam platform to serve other key applications such as embedding chip-specific security information to reinforce device security and enhancing etch/deposition accuracy in advanced-node fabrication. Based in Santa Clara, California, Multibeam is led by Dr. David K. Lam, the founder and first CEO of Lam Research. Widely recognized as a major contributor to the growth of the semiconductor industry, Dr. Lam was inducted into the Silicon Valley Engineering Hall of Fame in 2013.

For more information, visit www.multibeamcorp.com.