

Nanoprototyping And Nanofabrication Using Focused Ion Beam (FIB) And Dualbeam Technologies

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Today, as the dimensions demanded by modern applications scale down, the ability to prototype and fabricate small devices is becoming more and more difficult. In addition, controlling of these processes is also becoming more demanding. What is required is a fast, reproducible method of machining down to a nanometer level, to be able to verify the dimensions and if necessary, modify them again immediately.

With their ability to view, mill away and deposit complex shapes of various materials on the nanometer scale, FIB and DualBeams are being utilized in novel ways to engineer nano-structures and devices. In a DualBeam the FIB is combined with a high resolution FEGSEM, both looking at exactly the same point in space giving the ability to directly mill complex 3D nano-structures and immediately observe them non-destructively. The electron beam may equally be used for lithography and depositions on a nano-scale. Also, since all FIB / DualBeam operations involve a 1-step process, very fast prototyping and fabrication are achieved. This technique has already been used to trim and make SQUIDs, Josephson junctions, AFM and atom probe tips and a range of other samples that require site specific nano-machining.

Using an on-board digital pattern generator and scripting language to control the instrument, nanoscale fabrication of complex structures can be reproducibly created with the FIB with little or no user intervention. Beam parameters such as dwell time, beam overlap and beam spot size may be controlled via digital patterning or scripting.

In this presentation FIB and DualBeam will be introduced in their roles for micro-and nano-machining.

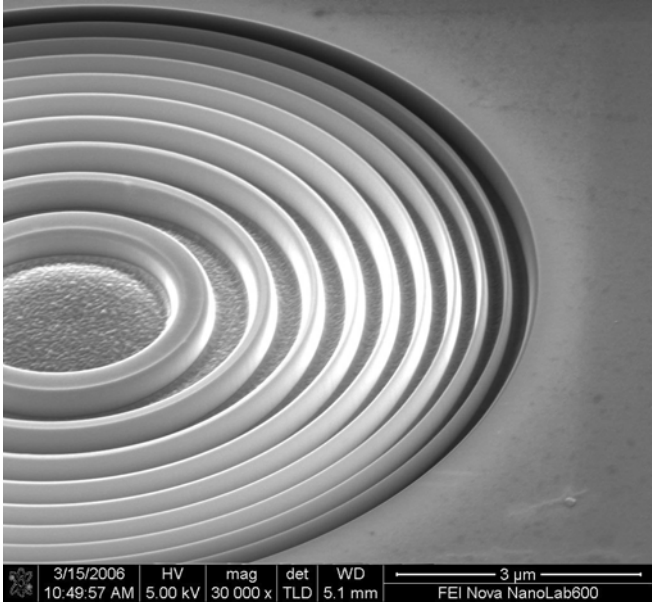


Figure : FIB-fabricated Fresnel Lens