

# FIB and DualBeam Technology: Nanoprototyping and Nanofabrication Applications

Brandon Van Leer and Lucille A. Giannuzzi, FEI Company, Hillsboro, Oregon, USA

## Abstract

The use of focused ion beam (FIB) technology in the area of nanoprototyping and nanofabrication is becoming increasingly important as dimensions of emphasis continue to shrink from the micrometer to the nanometer level. FIB technology is being utilized in novel ways to engineer nano-structures and devices employing ion- and/or electron-beam deposition of metals, organic materials or insulators, and milling of materials with the ion beam. 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. The figure below reveals that channel widths of less than 100 nm are easily achievable with FIB milling. This interactive presentation will summarize the nanofabrication techniques and show how arrays of nano-structures can be generated with a high degree of repeatability.

## Author Biographies

Brandon Van Leer joined FEI Company in late 2004 as a Senior Applications Engineer after his tenure at HP as a Materials Engineer in the Imaging and Printing Group. Brandon's

professional background has focused largely on materials characterization and development of electronic materials and polymers. His current research interests are in nanoscale fabrication of 3D structures using FIB technology. Brandon received his BS in Physics (1988) and his MS in Electrical Engineering (2002) from Oregon State University. He is a member of IEEE.

Lucille A. Giannuzzi recently changed positions from Professor, Mechanical Materials and Aerospace Engineering at the University of Central Florida, to Field Product Marketing Engineer for FEI Company. Her research endeavors have broadly focused on the structure/property relationships of materials using FIB/TEM methods, ion-solid interactions, and FIB and DualBeam applications and development. She has co-taught short courses on FIB and FIB/TEM specimen preparation at UCF and Lehigh University and has been a local affiliate and traveling speaker for both the Microscopy Society of America and the Microbeam Analysis Society. Dr. Giannuzzi is on the editorial board of the Microscopy and Microanalysis, on MAS Council, on the MSA education committee, and is also a member of ACerS, ASM International, AVS, MRS, and TMS.

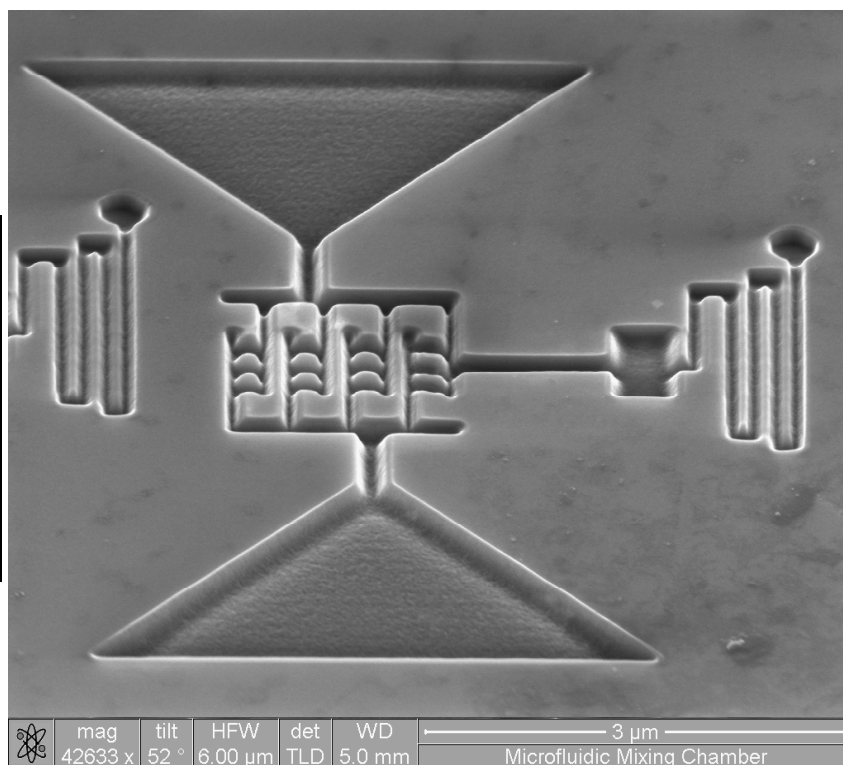
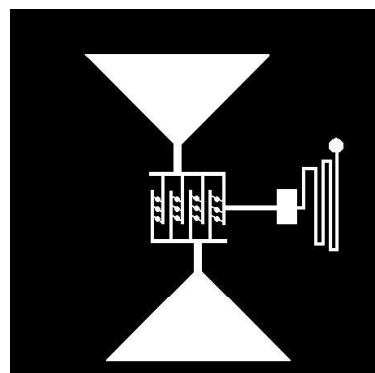


Figure 1. Microfluidic MixingChamber – digitally patterned with FIB