

## **Fabrication and Characterization of Free-Standing Silicon Nano-Meshes**

M.E. Curtis, P.R. Larson, J.C. Keay, G.D. Lian, M. Keil, and M.B. Johnson,

*Physics and Astronomy, University of Oklahoma,*

X. Wang and M. Xiao,

*Physics, University of Arkansas,*

B. Jiang,

*Physics, Arizona State University*

Free-standing nanometer-sized silicon meshes have been fabricated on silicon-on-insulator substrates using a combination of photolithography, wet-anisotropic etching, porous alumina templates, and dry etching techniques. The resulting structure consists of an array of holes with 50 nm diameters and 100 nm spacings. Such nano-meshes will be useful for nano-filtration and sensor array applications. These silicon structures can be further reduced in size by various techniques. For example, self-limiting oxidation on similar structures leaves behind Si cores with sub-5 nm dimensions encased in silicon oxide. The photoluminescence from such structures indicate quantum confinement effects. The results for photoluminescence and absorption spectroscopy measurements on these free-standing meshes will be discussed. This work was supported by NSF grant nos. ECS-9734228, DMR-0080054, and NSF-0132534.