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Fabrication and Characterization of Free-Standing Silicon Nano-Meshes M. E. CURTIS, P. R. LARSON, J. C. KEAY, University of Oklahoma, Department of Physics and Astronomy, M. KEIL, Weizmann Institute of Science, Israel, X. WANG, M. XIAO, University of Arkansas, Department of Physics, M. B. JOHNSON, University of Oklahoma, Department of Physics and Astronomy, UNIVERSITY OF OKLAHOMA, DEPARTMENT OF PHYSICS AND ASTRONOMY TEAM, WEIZMANN INSTITUTE OF SCIENCE, ISRAEL TEAM, UNIVERSITY OF ARKANSAS, DEPARTMENT OF PHYSICS TEAM — 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.

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