Abstract Submitted
for the TSF13 Meeting of
The American Physical Society

An Empirical Model for Subwavelength Diffraction in Silicon Nano-Patterned Membrane ANTON GRIBOVSKIY, MALIK RAKHMANOV, Department of Physics & Astronomy, University of Texas at Brownsville — Nano-patterned membranes or two-dimensional photonic crystal slabs promise many applications in silicon nanophotonics. They can be used as highly efficient broadband reflectors or narrowband filters in silicon integrated circuits. These applications are based on interaction between the radiation field and the guided modes in the slab. The associated subwavelength diffraction in the reflected light was experimentally observed for 1064 and 1550 nm wavelengths. In this work we introduce an empirical model to explain this subwavelength diffraction and its polarization properties. The model is built in terms of periodic waves excited in the slab by the incident light. The study of the empirical model is backed by the FDTD simulations of light scattered by the reduced size nano-patterned membrane. By varying the periodicity of the in-plane waves, their amplitudes and phases we achieve agreement with experiment.

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Date submitted: 16 Sep 2013 Electronic form version 1.4