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Modeling and fabrication of photonic bandgap waveguiding structures[1] M.Y. TEKESTE, Physics Department, Miami University, Oxford, OH, P.R. RICE, Physics Department, Miami University, Oxford, OH, J.M. YARRISON-RICE, Physics Department, Miami University, Oxford, OH — Novel photonic devices based on the idea of photonic bandgap (PBG) crystals are poised to make contributions in modern optoelectronic and telecommunication applications. These nanophotonic devices have the ability to guide light with very low loss even around tight corners. Several PBG waveguide structures are modeled using using the finite difference time domain technique in EMlab software. The resulting electric field distributions allow us to study single line defect waveguiding and a wavelength demultiplexer structure for single mode propagation, the depth of light leakage into the lattice, and transmission coefficients. These models inform the experimental fabrication process where a 2D triangular lattice is etched into the silicon nitride on silicon dioxide planar wafer which has been patterned via e-beam lithography. SEM micrographs record the various fabrication steps. Optical characterization of the structures will include bulk transmission measurements, as well as near field scanning microscopy.

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