# Integrated Photonic Device Fabrication Using PMN-PT


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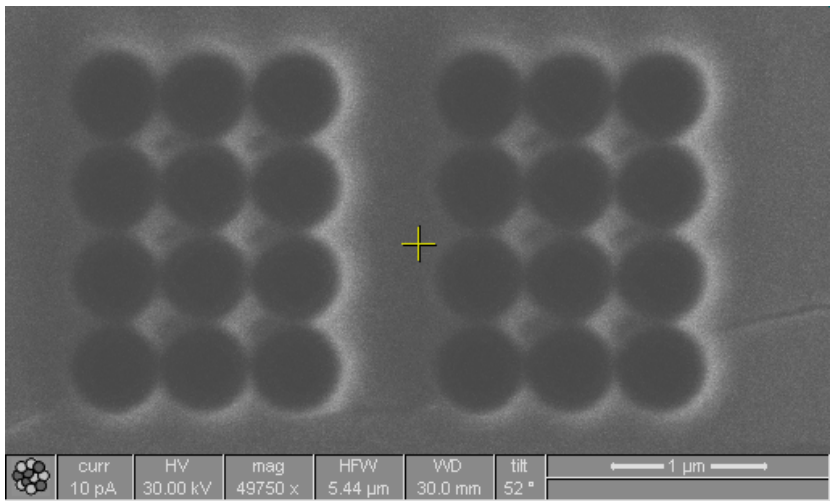
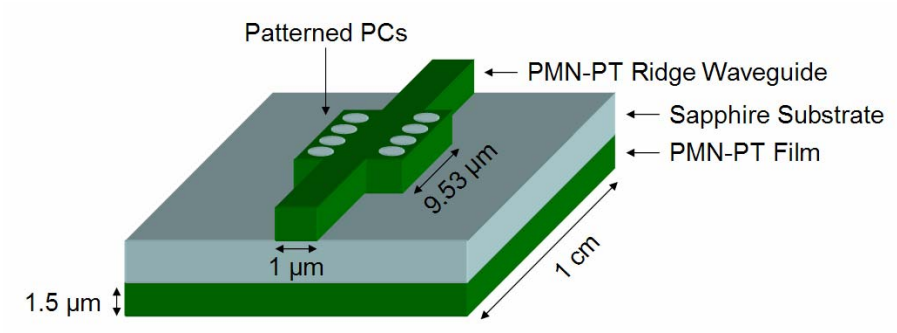
**Motivation:** The high electro-optic effect of $Pb(Mg_{1/3}Nb_{2/3})O_3$-$PbTiO_3$ (PMN-PT) combined with light-molding properties of photonic crystals can allow novel integrated photonic devices. In particular, the index of a PMN-PT matrix can be changed with an applied field to allow shifts in the bandgaps of 2D photonic crystals. A Focused Ion Beam allows the realization of these periodic 2-D nanoscaled structures from thin films, while traditional lithography provides necessary framework for optical analysis.

**Applications:** A wide range of optical device components can be fabricated using this approach, including: tunable wavelength filters, polarizers, lossless bends, laser cavities, superlenses, wide-angle splitters and non-linear filters.




Photonic crystal air holes (circles) and defect (column between circles) patterned using a Focused Ion Beam. The nanometer resolution of this equipment allows the realization of arbitrary patterns.




A ridge waveguide will couple light to a structure in the middle of the sample, where photonic crystals will be patterned. This configuration will be used to demonstrate optical waveguides, switches, filters and other integrated photonic devices.