Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Nanostructured Silicon Optical Waveguides[1] PRABHAKAR BANDARU, DAVID YANG, Materials Science, UC, San Diego, JUNG PARK, SHAYAN MOOKHERJEA, Electrical Engineering, UC, San Diego — Nanophotonic "void" or "slotted" waveguides, with features smaller than the wavelength of light, could be helpful in tailoring the phase difference between the transmitted TE (transverse electric) and TM (transverse magnetic) waves, as well as mode-shaping of the field by near-field interactions of highly-confined modes. Such artificially-induced birefringence can be utilized for chip-scale optical delay lines and compact waveguide-based polarization switches incorporating phase retardation. Using electron-beam lithography and dry etching, we have fabricated and demonstrated multi-slot waveguides in silicon-on-insulator chips, with slot width 100 nm and slot-to-slot spacing of 150 nm. We have measured the group index in both the TE and TM polarizations, and the experimental values agree closely with computational simulations using a fully-vectorial finite-difference mode-solver. We observe an engineered birefringence (refractive index difference between TE and TM waves) of ~ 1.4 over an 80 nm waveguiding bandwidth (1530-1610 nm).

[1]We acknowledge financial support from the NSF and the Office of Naval Research

Prabhakar Bandaru
Materials Science, UC, San Diego

Date submitted: 13 Dec 2007 Electronic form version 1.4