Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Temperature tuning of two-dimensional photonic crystals in the presence of phonons and a plasma of electrons and holes JESUS MANZANARES-MARTINEZ, FELIPE RAMOS-MENDIETA, Universidad de Sonora, PETER HALEVI, Instituto Nacional de Astrofisica, Opticay Electronica — We have theoretically studied the electromagnetic transmittance in finite samples of InSb-based two-dimensional photonic crystals. Due to the temperature dependence of the intrinsic carrier concentration in the semiconductor, our square arrays of parallel InSb cylinders in air give rise to tunable transmission spectra. As the temperature increases from 200 to 290 K, we find that the midgap frequencies move up in frequency while the widths of the gaps diminish, in agreement with the bulk band structure. We find that absorption affects considerably the transmittance intensity. In order to achieve significant tuning of the transmission, appropriate structural parameters and spectral regions are proposed. We have also studied transmission of light through two-dimensional photonic crystals of finite width, with the radii of the cylinders in the middle row altered in comparison to the host cylinders.

Jesus Manzanares-Martinez
Universidad de Sonora

Date submitted: 06 Jan 2006 Electronic form version 1.4