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Surface plasmon resonance based infrared photo-detectors[1] YIGIT AYTAC, UNIL PERERA, Department of Physics and Astronomy, Georgia State University, Atlanta, Georgia 30303, USA — At present materials can be engineered to control propagation of light in certain directions at certain wavelengths. Such materials are called photonic crystals which contain a periodic arrangement of metals and dielectric materials on a wavelength scale. Surface Plasmon Resonances (SPR) in metallic and dielectric nano-arrays can be used to enhance the response of photo-detectors. There are variety of potential ways to increase the performance of infrared photo-detectors by using electromagnetic enhancement and dependence of the resonance wavelength on the arrays size, shape and the local dielectric environment integration of these apertures. A detailed analysis of the optical properties of the waveguides in two and three dimensions with periodically perforated array structures is presented. Transmission and reflection spectra, resonant modes and field patterns of photonic crystals were calculated and imaged with using FDTD (Finite-difference Time-domain) method by numerical analysis of the non-linear dispersion relation. Additionally, by varying the orientation of holes on the wave-guide, polarization sensitivity was achieved in the model.

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