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Tuning of the Optical Response of a Si/SiO_2 Superlattice at the Wavelength of 1.54μ**m** E. GALINDO, P. HALEVI, INAOE, Apdo.Post.51, Puebla, Pue.72000, México, ADAN S. SANCHEZ, INAOE and INTEL, Guadalajara, Mexico — We have studied a one-dimensional photonic crystal of alternating layers of silicon and silicon oxide (and, also, air), fixing the wavelength at 1.54μm, of great importance for communications in the near infrared. We assume strong doping of the Si layers, the density of free electrons reaching values up to $3X10^{20}/cm^3$. Using a realistic plasma model that takes into account electrons, holes, and the corresponding attenuation, our calculations lead to the conclusion that the reflectance and transmittance can depend very strongly on the carrier density. With a careful choice of parameters, a change in the reflectance from 0 to 90% can be attained in the vicinity of a photonic band edge, with only a moderate change in the impurity concentration.

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