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Simple Analytic Model for Nanowire Array Polarizers VINCENT PELLETIER, KOJI ASAKAWA, MINGSHAW WU, RICHARD REGISTER, PAUL CHAIKIN, Princeton University — Cylinder-forming diblock copolymers can be used to pattern nanowire arrays on a transparent substrate to be used as a polarizer, as described by Koji Asakawa in a complementary talk at this meeting. With a 33nm period, these wire arrays can polarize UV radiation, which is of great interest in lithography, astronomy and other areas. One can gain an analytical understanding of such an array made of non-perfectly conducting material of finite thickness using a model with an appropriately averaged complex dielectric function in an infinite wavelength approximation. This analysis predicts that the grid can go from an E-polarizer to an H-polarizer as the wavelength decreases below a cross-over wavelength, and experimental data confirm this cross-over. The overall response of the polarizing grid depends primarily on the plasma frequency of the metal used and the volume fraction of the nanowires, as well as the grid thickness. A numerical approach is also used to confirm the analytical model and assess departure from infinite wavelength effects. For our array dimensions, the polarization is only slightly different from this approximation for wavelengths down to 150nm.

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