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Controlling the polarization of light transmitted through metallic bilayers of subwavelength apertures ZSOLT MARCET, J. PASTER, H.B. CHAN, University of Florida, D.W. CARR, Symphony Acoustics, J.E. BOWER, R. CIRELLI, F.P. KLEMENS, W.M. MANSFIELD, J.F. MINER, C.S. PAI, J.A. TAYLOR, Bell Labs, I. KRAVCHENKO, Oak Ridge National Laboratory — Periodic apertures in a metal film exhibit extraordinarily high optical transmission at wavelengths where surface excitations are at resonance with the incident light. The evanescent fields created by these subwavelength structures can channel the optical energy to specific locations, resulting in strong and localized field enhancements. We fabricated two metal films patterned with subwavelength slit arrays in close proximity and tailored the evanescent field coupling between them to achieve new functionalities. At the resonant wavelength, TM polarized light is transmitted efficiently with its transmitted magnitude and phase being strongly coupled to the lateral shift between the two layers. Transmission of TE polarization is smaller by several orders of magnitude. We present both numerical simulations and experimental data to demonstrate that by exploiting these properties a novel polarization rotator can be manufactured using a planer process offering the potential to dramatically reduce system cost and size.

Zsolt Marcet
University of Florida

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