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Spatial and Spectral Investigation of Extraordinary Optical Transmission[1] T. RIBAUDO, University of Massachusetts at Lowell, B.S. PASSMORE, E.A. SHANER, Sandia National Laboratories, D. WASSERMAN, University of Massachusetts at Lowell — Extraordinary Optical Transmission (EOT), or the enhancement of light transmission through periodic arrays of sub-wavelength holes in metal films, has been investigated for its clear contradiction with conventional aperture theory, as well as for possible applications in chemical sensing and display technologies. In the visible and near-infrared spectral ranges, EOT is argued to be predominantly a result of the excitation of surface plasmon polaritons (SPPs) on metal/dielectric interfaces. Here, we report our investigations of the far-field transmission characteristics of EOT gratings designed for the mid-infrared frequency range. Using a tunable Quantum Cascade Laser, we explore the spatial and spectral dependence of the transmitted far field on the angle of incidence and the exciting frequency of the laser. We show that for frequencies coincident with the EOT maximum, little SPP propagation is observed, while laser frequencies on the high energy falling edge of the EOT peak couple to such propagating modes.

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