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Title:Transmitted properties of terahertz wave through metallic hole arrays

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Abstract:Terahertz (THz) wave transmission through a thin metal film with periodic arrays of subwavelength rectangular holes is investigated systematically. The roles of the waveguide resonances and surface plasmon polaritons (SPPs) in extraordinary transmission are also clarified. The transverse waveguide resonances (hole-shape dependence) dominates the position and width of maximum transmission. In addition, the periodicity of the hole arrays dominates the position of minimum transmission due to the excitation of SPP, which acts as a band-stop filter in the THz transmission spectra. Our results clearly demonstrate that the extraordinary transmission in THz frequency is originated from the transverse waveguide resonances that behave with a SPP-like character. Simulation based on finite-difference time-domain (FDTD) agrees well with the experimental results.

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