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Thermal emission from two-dimensional metallo-dielectric photonic crystals MOHIT DIWEKAR, Z.V. VARDENY, University of Utah, Department of Physics, Salt Lake City, Utah 84112 — We studied thermal light emission from a sub-wavelength hole arrays with square lattice of $4\ \mu\text{m}$ periodicity fabricated in aluminum (Al) and silver (Ag) films on silicon (Si) substrates by conventional photolithography. The emission spectra were obtained using a FTIR setup with a port for an external cryostat configured for thermal emission measurements. These patterned films show extraordinary transmission bands in the mid-IR spectral range, which can be well explained as due to light coupling to surface plasmons on the two film interfaces. The thermal emission spectrum from these photonic crystals followed the transmission spectrum characteristics; however it differs significantly from the obtained absorption spectrum, in contrast to the Kirchhoff's law of radiation. We conclude that the fabricated photonic structures behave as radiation filters where the emission radiation is suppressed in the frequency range outside the transmission bands in the spectrum.

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