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Polariton-assisted coherent thermal emission by heterogeneous structures[1] C.J. FU, Z.M. ZHANG, Woodruff School of Mechanical Engineering, Georgia Tech., D.B. TANNER, Department of Physics, University of Florida — The control of thermal radiation has important applications in thermophotovoltaic devices, solar cells, and space thermal management. Excitation of surface polaritons allows the thermal emission spectra to be modified using nanostructured materials. The coupling of the excited surface polaritons to thermal radiation *via* diffraction by gratings can result in coherent thermal emission. Here, we describe a novel concept of a gratingless coherent thermal source that uses paired single-negative layers: one with a negative permittivity (ε) and the other with a negative permeability (μ). We show that coherent thermal emission is feasible for both s- and p-polarizations, owing to surface polariton excitation at the interface of the negative-ε and negative-μ media. Moreover, the emission frequency and emission angle can be controlled by adjusting the film thicknesses. Future development in nanooptical materials with negative-μ at near-infrared frequencies is critically needed to realize the proposed coherent thermal source.

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