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(54) **METALLIC LAYER-BY-LAYER PHOTONIC CRYSTALS FOR LINEARLY-POLARIZED THERMAL EMISSION AND THERMOPHOTOVOLTAIC DEVICE INCLUDING SAME**

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(58) **Field of Classification Search**
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See application file for complete search history.

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(57) **ABSTRACT**

Metallic thermal emitters consisting of two layers of differently structured nickel gratings on a homogeneous nickel layer are fabricated by soft lithography and studied for polarized thermal radiation. A thermal emitter in combination with a sub-wavelength grating shows a high extinction ratio, with a maximum value close to 5, in a wide mid-infrared range from 3.2 to 7.8 μm , as well as high emissivity up to 0.65 at a wavelength of 3.7 μm . All measurements show good agreement with theoretical predictions. Numerical simulations reveal that a high electric field exists within the localized air space surrounded by the gratings and the intensified electric field is only observed for the polarizations perpendicular to the top sub-wavelength grating. This result suggests how the emissivity of a metal can be selectively enhanced at a certain range of wavelengths for a given polarization.

12 Claims, 5 Drawing Sheets

