

Metamaterial metal-based bolometers

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We demonstrate metamaterial metal-based bolometers, which take advantage of resonant absorption in that a spectral and/or polarization filter can be built into the bolometer. Our proof-of-principle gold-nanostructure-based devices operate around 1.5 μm wavelength and exhibit room-temperature time constants of about 134 μs . The ultimate detectivity is limited by Johnson noise, enabling room-temperature detection of 1 nW light levels within 1 Hz bandwidth. Graded bolometer arrays might allow for integrated spectrometers with several octaves bandwidth without the need for gratings or prisms and for integrated polarization analysis without external polarization optics.

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