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Title:Matrix structure of metamaterial absorbers for multispectral terahertz imaging
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Abstract:A multispectral 24 × 24 bolometric matrix structure of terahertz (THz) absorbers operating at 0.3-0.4 THz was proposed and experimentally investigated. Each pixel of the structure was implemented as a fragment of an ultra-thin metamaterial absorber. The matrix structure consisted of four types of pixels with nearly perfect absorptivity. Three pixels were at 0.30, 0.33, 0.36 THz respectively with identically oriented polarization sensitivity, and the fourth pixel was at 0.33 THz oriented with polarization sensitivity orthogonal to foregoing ones. The backside of the structure included a high-performance infrared emissive layer. Resonant absorption of THz radiation induced the structure heating and increasing IR emission from the emissive layer, which was henceforth detected by the IR camera. The terahertz imaging system, capable to operate in real time, with spectral and polarization discrimination was demonstrated. The experimental results showed good spectral and polarization resolution together with acceptable spatial resolution.
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