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Metasurface-based MEMS THz-to-IR focal plane array

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American Physical Society

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Session F01: Applications: Electromagnetic Radiation, Detectors and Antennae

11:15 AM–2:15 PM, Tuesday, March 6, 2018

LACC Room: 150A

Sponsoring Unit: FIAP

Chair: Dmitry Voronine, University of South Florida

Abstract ID: BAPS.2018.MAR.F01.13

Abstract: F01.00013 : Metasurface-based MEMS THz-to-IR focal plane array^{1*}

1:39 PM–1:51 PM

← Abstract →

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Terahertz (THz) technology has gained momentum in recent years owing to special properties of THz waves of being non-ionizing and at the same time being able to penetrate through nonmetallic and non-polar materials. Nearly perfect THz absorption, optimized to particular THz quantum cascade laser (QCL) illumination sources, was achieved using metal-dielectric metasurfaces. The metasurfaces are comprised of ultra-thin films of silicon oxide and aluminum, deposited on silicon substrates and were fabricated using standard MEMS processes. The metasurface absorbers were structurally integrated onto an array of thermally insulated free-standing MEMS membranes that work as heat accumulators. The temperature of array is probed directly by a commercial thermal camera, translating the THz scene to infrared. The main characteristics such as spectral response, thermal time constant and sensitivity are controlled by the geometry and tuned by design according to the application demands. The results indicate a great potential of using these THz sensors in real-time imaging applications.

^{1*}Supported by DoD-SP

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