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Microfabrication of highly absorbent THz metafilms tuned for specific frequencies[1] DRAGOSLAV GRBOVIC, FABIO ALVES, BRIAN KEARNEY, GAMANI KARUNASIRI, Naval Postgraduate School — THz imaging has gained increased attention in recent years. The main motivation is the property of THz radiation to penetrate through most non-metalic materials and fabrics, making it attractive for medical and security applications. In addition, the radiation is non-ionizing and therefore does not present a risk for human health. However, THz imaging requires external illumination, often by quantum cascade lasers (QCLs). Metafilm absorbers with nearly 100% absorption, at frequencies matched to appropriate QCLs, have been designed and fabricated using a periodic array of aluminum (Al) squares and an Al ground plane, separated by a thin SiO_2 dielectric film. All metafilms are below 2 μm and are suitable for integration with microbolometers or bimaterial sensors for THz imaging. The THz spectral characteristics of structures were probed using FTIR spectrometer. Films with different dielectric layer thicknesses exhibited resonant absorption at close to 100% at respective frequencies. The measured THz reflection, from thin film of both broad-band and resonant metamaterial structures, exhibit excellent agreement with their respective finite element models.

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