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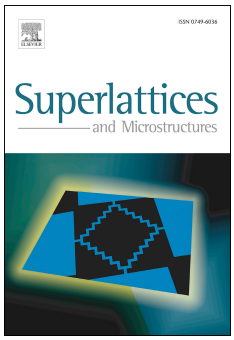

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Design of triple-band polarization controlled terahertz metamaterial absorber

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Abstract: A kind of triple-band polarization tunable terahertz absorber based on a metallic mirror and a metallic patch structure with two indentations spaced by an insulating medium layer is presented. Results prove that three near-perfect absorption peaks with average absorption coefficients of 98.25% are achieved when the polarization angle is equal to zero, and their absorptivities gradually decrease (and even disappear) by increasing the angle of polarization. When the polarization angle is increased to 90 degrees, three new resonance modes with average absorption rates of 96.59% can be obtained. The field distributions are given to reveal the mechanisms of the triple-band absorption and the polarization tunable characteristics. Moreover, by introducing photosensitive silicon materials (its conductivity can be changed by the pump beam) in the indentations of the patch structure, the number of resonance peaks of the device can be actively tuned from triple-band to dual-band. The presented absorbers have potential applications, such as controlling thermal emissivity, and detection of polarization direction of the incident waves.

Keywords: Metamaterials; terahertz; triple-band absorption; polarization controllable

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