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Title:Enhanced transmission with a graphene-dielectric microstructure at low-terahertz frequencies

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Abstract:Here, we report on the transmissivity of electromagnetic waves through a stack of monolayer graphene sheets separated by dielectric slabs at low-terahertz frequencies. It is observed that the multilayer structure possesses band-gap properties and supports a series of bandpass and band-stop regions, similar to the cases of stacked metallic meshes separated by dielectric slabs at microwave/THz frequencies and a metal-dielectric stack at optical frequencies. The transmission resonances in the bandpass region are identified as coupled Fabry-Perot resonances associated with the individual cavities of dielectric slabs loaded with graphene sheets. It is also noticed that these resonances lie within a certain characteristic frequency band, independent of the number of layers in the graphene-dielectric stack. The study is carried out using a simple analytical transfer-matrix approach or, equivalently, a circuit-theory model, resulting in the exact solution for the multiple dielectric/graphene sheet surface-conductivity model. Also, an independent verification of the observed phenomena is obtained with commercial numerical simulations.

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