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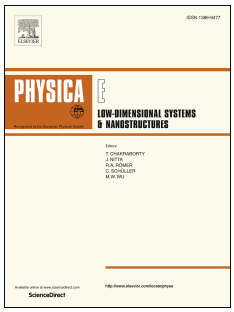

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Plasmonic tuning in mid-infrared regime with a composite array of graphene ribbons and silver nanowires

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This work reports on a study regarding the systematic tuning of plasmonic resonance wavelength in the mid-infrared regime, by using a composite array composed of graphene ribbons and silver nanowires. A composite array that consists of graphene ribbons and silver nanowires are proposed on top of a glass substrate. The light transmittance is numerically simulated in the mid-infrared wavelength range from 6 to 20μm with several parameters being varied, including the Fermi energy level and the layer number of the graphene ribbons, the radius of the silver nanowires, as well as the grating constant of the array. The results demonstrate that the plasmonic resonance wavelength associated with the composite array and the corresponding full width at half maximum can systematically be tuned in the mid-infrared range, by carefully adjusting the parameters of either the graphene ribbons or the silver nanowires, or both. Based on the tuning characteristics revealed by this study, we suggest that the structure of the composite array comprised of graphene ribbons and silver nanowires be implemented in further designs of plasmonic tuning devices at mid-infrared wavelengths.

Keywords: Plasmonic tuning; Mid-infrared; Graphene ribbon; Silver nanowire