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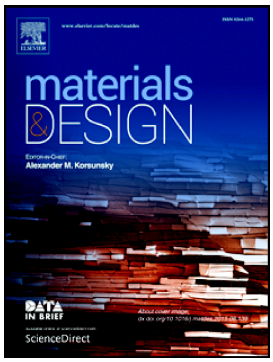

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Numerical study on tunable perfect absorption in square graphene-dielectric arrays at near-infrared wavelengths

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Abstract

As a two dimensional material with extraordinary optoelectronic properties, graphene has been persistently focused and studied. Inspired by the effects of prominent near-field enhancement and tight field confinement of graphene surface plasmons, tunable perfect absorber constituted by square graphene-dielectric arrays is proposed in this work and investigated with numerical simulation. Complete monolayer graphene is utilized in the arrays, without demand of manufacture process to cut graphene layer into periodic patterns. Within a wide range of specific geometric parameters, the arrays achieve two absorption peaks with near unity absorbance at near-infrared wavelengths. The absorption performance of the arrays is also independent of polarization. It's discovered that surface plasmonic modes are simultaneously excited on graphene and gold-dielectric interface, and there is a strong coupling between such two modes. Moreover, both of the two peaks can be dynamically tuned by adjusting chemical potential of graphene, without salient absorption reduction. With these excellent features, the arrays may provide prospects in development of new sensors and switches.

Keywords: Graphene; Surface plasmons; Perfect absorption; Tunable absortion

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