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Enhanced absorption of a monolayer graphene using encapsulated cascaded gratings

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Abstract: We present the design and realization of a graphene-based absorber with nearly 60% absorption efficiency using the encapsulated cascaded gratings (ECGs). The absorption locations can be estimated by using the dispersion relation of the ECGs, and it is confirmed that the absorption of the graphene-based ECGs is resulted from the excitation of the guided mode resonance (GMR). The absorption location is almost immune to the variation of the thickness of the top grating, and the absorption location is red-shifted with the increase of the fill factor. The shift of the absorption peak can be adjusted to the design value by tuning the incident angle as the grating period is altered. Multiple absorption bands can be achieved by increasing the thickness of the bottom grating. The absorption properties can be tailored based on the dispersion diagram of the ECGs structure.

Key Words: enhanced absorption; monolayer graphene; guided-mode resonance; encapsulated cascaded gratings

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