

## Graphene on a subwavelength metallic grating: anomalous optical properties

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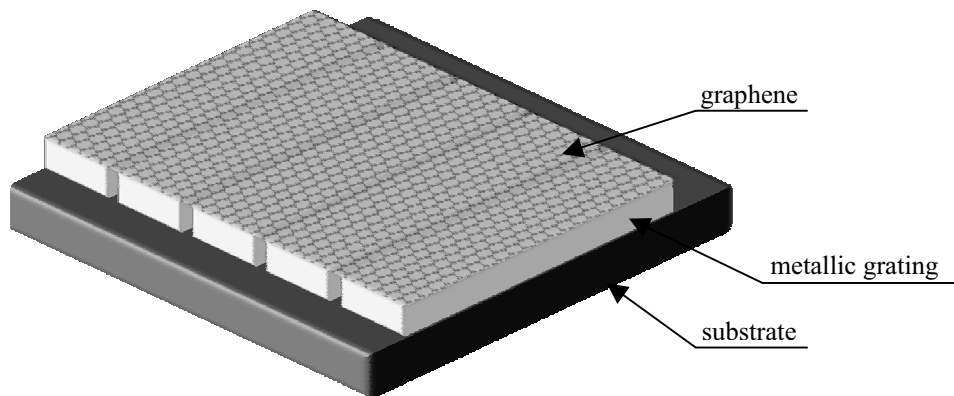
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We study the electromagnetic response of a composite structure consisting of monolayer graphene [1] on the metallic grating with narrow subwavelength slits. The spectral response of the grating without and with graphene on it was theoretically obtained in the scattering matrix formalism [2]. For this purpose we have developed S-matrix method for graphene. By examining the grating transmission spectrum without and with graphene we found extraordinary sensitivity of grating to the presence of graphene manifested as the anomalous transmission of light on the wavelength corresponding to the transmission dip for grating. We attribute this effect to the enhancement of the field in the slits in the immediate vicinity of the surface of the grating. The effect was studied for various geometrical parameters of the grating and different carrier densities in graphene.



Schematic of graphene on a subwavelength metallic grating.

- [1] K.S. Novoselov, A.K. Geim, S.V. Morozov, D. Jiang, M.I. Katsnelson, I.V. Grigorieva, S.V. Dubonos, A.A. Firsov, *Nature* **438**, 197 (2005).
- [2] S.G. Tikhodeev, A.L. Yablonskii, E.A. Muljarov, N.A. Gippius, T. Ishihara, *Phys. Rev. B* **66**, 045102 (2002).