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Tunable broadband perfect absorber based on Graphene

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Abstract
In this paper a graphene-based metasurface is designed and analyzed to operate as an electromagnetic wave absorber in the terahertz frequency range. The proposed geometrical structure consists of a graphene ring with four slits in each unit cell, arranged in a two-dimensional array on a dielectric substrate. Simulation results obtained using the finite element method (FEM) demonstrate that, by tuning the geometric and physical parameters of the structure—such as the slit width inner and outer radii of the ring and the Fermi energy of graphene—the absorption of electromagnetic waves can be significantly enhanced over a specific frequency range. This high absorption performance is attributed to the excitation of surface plasmon resonances in graphene as well as the induced magnetic resonance modes within the ring structure. The proposed design offers high tunability and fabrication simplicity, making it a promising candidate for applications in terahertz sensing tunable absorbers and stealth technologies.

Keywords: Metasurface, Graphen, Perfect Absorber, Terahertz.

For full article, refer to the Persian section