

40. Title: Transformation Optics Using Graphene

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Source: SCIENCE

Volume:332

Issue:6035

Pages: 1291-1294

Publication year: 2011

Document type:Journal article (JA)

Abstract: Metamaterials and transformation optics play substantial roles in various branches of optical science and engineering by providing schemes to tailor electromagnetic fields into desired spatial patterns. We report a theoretical study showing that by designing and manipulating spatially inhomogeneous, nonuniform conductivity patterns across a flake of graphene, one can have this material as a one-atom-thick platform for infrared metamaterials and transformation optical devices. Varying the graphene chemical potential by using static electric field yields a way to tune the graphene conductivity in the terahertz and infrared frequencies. Such degree of freedom provides the prospect of having different "patches" with different conductivities on a single flake of graphene. Numerous photonic functions and metamaterial concepts can be expected to follow from such a platform.