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Title:Broadband graphene terahertz modulators enabled by intraband transitions
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Abstract:Terahertz technology promises myriad applications including imaging, spectroscopy and communications. However, one major bottleneck at present for advancing this field is the lack of efficient devices to manipulate the terahertz electromagnetic waves. Here we demonstrate that exceptionally efficient broadband modulation of terahertz waves at room temperature can be realized using graphene with extremely low intrinsic signal attenuation. We experimentally achieved more than 2.5 times superior modulation than prior broadband intensity modulators, which is also the first demonstrated graphene-based device enabled solely by intraband transitions. The unique advantages of graphene in comparison to conventional semiconductors are the ease of integration and the extraordinary transport properties of holes, which are as good as those of electrons owing to the symmetric conical band structure of graphene. Given recent progress in graphene-based terahertz emitters and detectors, graphene may offer some interesting solutions for terahertz technologies.
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Uncontrolled terms:broadband graphene terahertz modulators - intraband transitions - terahertz electromagnetic waves - graphene-based device - transport properties - symmetric conical band structure - temperature 293 K to 298 K - C
Inspec classification codes:A7125X Electronic structure of fullerenes and fullerene-related materials; intercalation compounds
Numerical data indexing:temperature 2.93E+02 2.98E+02 K
Chemical indexing:C/el
Treatment:Experimental (EXP)
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