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Accession number:20122915263180
Title:Infrared spectroscopy of tunable Dirac terahertz magneto-plasmons in graphene
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Source title:Nano Letters
Abbreviated source title:Nano Lett.
Volume:12
Issue:7
Issue date:July 11, 2012
Publication year:2012
Pages:3766-3771
Language:English
ISSN:15306984
E-ISSN:15306992
CODEN:NALEFD
Document type:Journal article (JA)
Publisher:American Chemical Society, 2540 Olentangy River Road, P.O. Box 3337, Columbus, OH 43210-3337, United States
Abstract:We present infrared spectroscopy study of plasmon excitations in graphene in high magnetic fields. The plasmon resonance in patterned graphene disks splits into edge and bulk plasmon modes in magnetic fields. Remarkably, the edge plasmons develop increasingly longer lifetimes in high fields due to the suppression of backscattering. Moreover, due to the linear band structure of graphene, the splitting of the edge and bulk plasmon modes develops a strong doping dependence, which differs from the behavior of conventional semiconductor two-dimensional electron gas (2DEG) systems. We also observe the appearance of a higher order mode indicating an anharmonic confinement potential even in these well-defined circular disks. Our work not only opens an avenue for the investigation of the properties of Dirac magnetoplasmons but also supports the great potential of graphene for tunable terahertz magneto-optical devices. © 2012 American Chemical Society.
Number of references:34
Main heading:Graphene
Controlled terms:Electron gas - Infrared spectroscopy - Magnetic fields - Plasmons - Semiconductor doping
Uncontrolled terms:Anharmonic - Circular disk - Confinement potential - Doping dependence - edge-magnetoplasmon - High field - High magnetic fields - Higher-order modes - magnetoplasmon - Magnetoplasmons - Plasmon excitations - Plasmon modes - Plasmon resonances - Tera Hertz - Two-dimensional electron gas (2DEG)
Classification code:932.3 Plasma Physics - 932 High Energy Physics; Nuclear Physics; Plasma Physics - 804 Chemical Products Generally - 933 Solid State Physics - 761 Nanotechnology - 714.2 Semiconductor Devices and Integrated Circuits - 701.2 Magnetism: Basic Concepts and

Phenomena - 741.1 Light/Optics
DOI:10.1021/nl3016335
Database:Compendex