Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Active focal control of a metasurface lens based on a graphene-metal hybrid structure BIN HU, ZI WANG, JUAN LIU, Beijing Institute of Technology — Metasurfaces are ultrathin films with metallic nano-antennas for generating abrupt wavefront changes of electromagnetic waves. However, the phase modulation is hard to change once a metasurface structure is fabricated. Here we show that, assisted by a monolayer graphene, tunable metasurface devices are able to be realized. Based on Berry geometrical phase, we propose a tunable graphene-metal metalens, which is able to dynamically control the focal length at infrared frequencies. The tunability is achieved by changing the chemical potential of the graphene uniformly. The tuning mechanism is easy to realize in experiments because the graphene chemical potential can be modified by an external gate voltage. Our results have demonstrated that the focal length can be changed from 105μm to 85μm continuously when the incident wavelength is 6.6μm, which illustrates that graphene may be applied for realizing tunable metasurface devices.

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Date submitted: 11 Nov 2016 Electronic form version 1.4