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Tune the polarization of terahertz waves via subwavelength metallic gratings

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Abstract

Here we present our recent work on tuning the polarization of terahertz waves via subwavelength metallic gratings. Firstly, we have experimentally demonstrated a linear polarization rotator that is a three-layer metallic grating structure for manipulating the polarization of broadband terahertz waves. By mechanical rotations of the composite grating layers, this freely tunable device can rotate the polarization of a linearly polarized THz wave to any desired direction with high conversion efficiency [1]. Then we theoretically investigate the propagation of terahertz waves through a graphene-loaded metal grating under external magnetic field. It is found that resonant modes in the system can be converted between transverse-electric and transverse-magnetic polarizations due to Hall conductivity of grapheme, as a consequence, asymmetric transmission of terahertz waves through this graphene-loaded metal grating is achieved, and it can be tuned by adjusting either the external magnetic field or the Fermi level of grapheme [2]. These tunable terahertz devices have potential applications in various areas, such as material analysis, wireless communication, and terahertz imaging.

References

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