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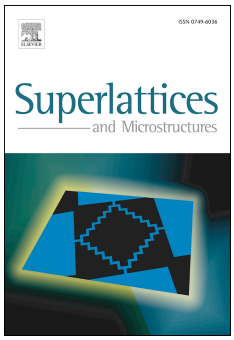

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Realization of Electromagnetically induced phase grating and Kerr nonlinearity in a graphene ensemble under Raman excitation

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Abstract

Some optical properties including the linear and nonlinear susceptibility and electromagnetically induced phase grating (EIG) in graphene under Raman excitation is studied. A single-layer graphene nanostructure driven by coherent and incoherent fields is investigated theoretically. It is revealed that by adjusting the amplitude of control and incoherent fields, the linear and nonlinear absorption as well as Kerr nonlinearity of the medium can be optimized. It is realized that the enhanced Kerr nonlinearity can occur with zero linear absorption and nonlinear amplification. Furthermore, it should be noted that EIG in graphene is studied for the first time. The results indicate that the diffraction efficiency of the phase grating is dramatically enhanced by controlling the amplitude of coherent and incoherent fields, and an efficient electromagnetically induced phase grating can be obtained. A novel result shows a considerable improvement of the intensity of higher-order diffractions and switching between different orders of grating via incoherent pumping field. Therefore, this model can be used in real experiments for the development of new types of nanoelectronic devices used for the realization of all-optical switching processes.

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