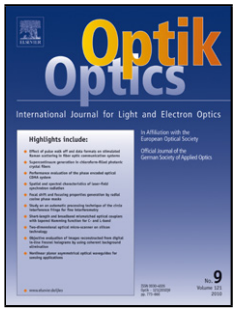

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PII: S0030-4026(17)30187-0
DOI: http://dx.doi.org/doi:10.1016/j.ijleo.2017.02.044
Reference: IJLEO 58860

To appear in:

Received date: 25-11-2016
Accepted date: 12-2-2017

Please cite this article as: Tingting Bian, Xingru Gao, Shen Yu, Lixia Jiang, Jun Lu, P.T.Leung, Scattering of light from graphene-coated nanoparticles of negative refractive index, Optik - International Journal for Light and Electron Optics http://dx.doi.org/10.1016/j.ijleo.2017.02.044

Scattering of light from graphene-coated nanoparticles of negative refractive index

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Abstract

The recent study of the Lorenz-Mie scattering from a graphene-coated sphere is extended to the case when the sphere is of negative refractive index, focusing on the two intriguing phenomena observed previously for a "bare" negative index sphere of sub-wavelength sizes, namely, the non-Rayleigh behavior and the low-frequency resonances. It is observed that while the graphene coating can regulate the non-Rayleigh scattering back towards Rayleigh, manifested with its own low frequency plasmonic resonances in the IR region; the low-frequency peak observed previously can be significantly suppressed with the result rather insensitive to the doping level of the graphene layer. These graphene-induced effects are clarified via a study of the Bohren-Hunt theory in the limit of small size parameters for the negative refracting sphere.

Key Words: Graphene-coated nanoparticles, Lorenz-Mie scattering,
Negative refraction