Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Focusing electromagnetic waves in subwavelength structures by lossy anisotropic media HUI KIN KWOK, SZE FUNG LEE, KING CHUN LAI, KIN WAH YU, The Chinese University of Hong Kong — Different from subwavelength focusing by negative refractive index slab and microsphere array, we have proposed a new mechanism of subwavelength focusing by lossy radial anisotropy which helps to beat the diffraction limit in near field microscopy. We consider the propagation of a plane polarized electromagnetic wave incident on a nanosphere with anisotropic complex permittivity. For a sphere with complex radial permittivity implying a loss effect on radial component of the electric field, only the tangential component of the field survives, and thus the Poynting vectors can be made to concentrate at the centre of the sphere by increasing the complex permittivity to enhance the radial loss. Extending the study of electromagnetic scattering by coated spheres with lossless radial anisotropy by Gao et al.(2008), we consider a lossy medium and calculate the distribution of electromagnetic field by solving Maxwell's equations with expressing the fields in terms of Debye potentials. Considering the sphere of subwavelength scale and thus the incident fields are nearly quasistatic, the calculation of Poynting vectors inside reveals a focusing effect as expected. This nanosphere also offers a possible way to convert light into a nanospot which leads to applications in computing.

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Date submitted: 14 Nov 2013 Electronic form version 1.4