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Nanoplasmonic Upconverting Nanoparticles as Orientation Sensors for Single Particle Microscopy. SHUANG FANG LIM, Department of Physics, North Carolina State University — We show that the anisotropic disk shape of nanoplasmonic upconverting nanoparticles (NP-UCNPs) create changes in fluorescence intensity in the event of rotational motion. We determine the orientation by a three-fold change in fluorescence intensity, and further show a strong dependence of the luminescence intensity on the particle orientation and polarization of the excitation light. The luminescence intensity shows a three fold difference between flat and on edge orientation. The intensity also varies sinusoidally with the polarization of the incident light, with the ratio, I_{max}/I_{min} of up to 2.02. Both the orientation dependence and I_{max}/I_{min} is dependent on the presence of the gold shell on the UCNP. This orientation dependence of the fluorescence will enable the detection of the rotational motion of biomolecules coupled to the nanoparticle. Finally, we demonstrate tracking of the real-time rotational motion of a single NP-UCNP in a microfluidic channel..

Shuang Fang Lim
Department of Physics, North Carolina State University

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