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Single particle optical investigation of gold shell enhanced upconverted fluorescence emission KORY GREEN, SHUANG FANG LIM, HANS HALLEN, North Carolina State University — Upconverting nanoparticles (UCNPs) excited in the near IR offer novel advantages as fluorescent contrast agents, allowing for background free bio-imaging. However, their fluorescence brightness is hampered by low quantum efficiency due to the low absorption cross section of Ytterbium and Erbium ions in the near IR. We enhance the efficiency of these particles by investigating the plasmonic coupling of 30nm diameter core NaYF4: Yb, Er upconverting particles (UCNPs) with a gold shell coating. An enhancement of green emission by a factor of five and a three times overall increase in emission intensity has been achieved for single particle spectra. UV-Vis absorption has confirmed the surface plasmon resonance (SPR) of the gold shell to the near IR and transmission electron microscope (TEM) images demonstrates successful growth of a gold shell around the upconversion particle. Time-resolved spectroscopy shows that gold shell coupling changes the lifetime of the energy levels of the Erbium ion that are relevant to the emission process.

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