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Single particle optical investigation of gold-enhanced upconverted fluorescence emission KORY GREEN, SHUANG FANG LIM, North Carolina State University — Near IR excited upconverting nanoparticles (UCNPs) are ideal fluorescent contrast agents, leading to background free bioimaging. However, their fluorescent brightness is hampered by low quantum efficiency due to material limitations. We investigate the plasmonic coupling of 20 nm diameter core NaYF4: Yb, Er upconverting nanoparticles (UCNPs) coupled to both gold nanoparticles and coated in a gold nanoshell. The structures of the UCNPs composites have been verified by transmission electron microscopy (TEM), UV-Vis absorption and fluorescent emission. Spectroscopic studies such as single particle spectra and time resolved decay has been performed to investigate and fine tune the luminescent enhancement. In particular, we have performed time-resolved spectroscopy between 400 nm and 1700 nm. The monitoring of all relevant energy level transitions, including intermediate levels, contribute to a complete understanding of the mechanisms at work in plasmonicly enhanced, high-efficiency, small UNCPs.

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