

Characterization of localized field enhancements in laser fabricated gold needle nanostructures

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Abstract

Field intensity enhancements (FEs) produced by gold needle nanostructures, namely, standing upright sharp and sphere-terminated needles, fabricated on a gold substrate by femtosecond laser irradiation, are investigated and characterized using linear reflection spectroscopy, two-photon photoluminescence (TPL) scanning optical microscopy, and high-resolution confocal Raman microscopy. Surface enhanced Raman scattering (SERS) is observed using linearly polarized 532 nm excitation of Rhodamine 6G homogeneously adsorbed on the structures. The obtained high-resolution TPL and Raman images both indicate a relatively high FE level of ~ 75 for the fabricated structures. We believe that the observed FE levels along with the special topography make these upright elongated structures particularly promising for SERS experiments with living cells. © 2011 Optical Society of America.

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