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Profiling the Near field of Nanoshells Using Surface Enhanced Raman Spectroscopy SURBHI LAL, NAOMI J. HALAS, Rice University, Houston TX — There is tremendous interest in the enhancement of electromagnetic fields near metal surfaces. The spatial extent of the near field as a function of distance from the metal surface is of particular interest for applications such as surface enhanced Raman spectroscopy. By using specially designed molecular scaffolds with Raman-active constituents, we measure the profile of this fringing field at a nanoshell surface. Nanoshells are colloidal particles composed of a silica core covered by a gold shell, which exhibit a tunable plasmon resonance; close to this resonance there is a strong enhancement of the electromagnetic near field. The molecular scaffolds consist of polyadenine DNA strands as tethers with a terminal fluorescein molecule. By varying the length of the DNA strand, the fluorescein molecule is placed at controlled distances from the nanoshell surface. Both the DNA scaffold and the terminal fluorescein molecule provide us with independent SERS Stokes modes whose relative intensities permit us to map the average spatial decay length of the near field of the nanoparticle at its plasmon resonance.

Surbhi Lal
Rice University, Houston TX

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