

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Nanoparticle Material and Geometry Requirements for Surface-Enhanced Raman Scattering KEVIN WEBB, JIA-HAN LI, Purdue University — Some experiments have shown Raman scattering cross-sections which are many orders of magnitude larger than expected based on a homogeneous sample, and this has been associated to the presence of rough surfaces, in particular, recessed regions in conductors. This surface-enhanced Raman scattering (SERS) has been attributed to the large electromagnetic fields near metallic nanoparticles, and numerical simulations have confirmed this in dimer-like systems. By considering numerical and analytical solutions for simplified yet representative structures, we show the underlying mechanism for the field enhancement. This in turn leads to basic material and geometry parameters in order to achieve large field enhancement. These results provide a basis for the design of experiments.

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Date submitted: 27 Mar 2013

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