Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Probing the SERS Gap Dependence Through Controlled Nanoparticle Positioning KRISTEN ALEXANDER, University of North Carolina at Chapel Hill, SHUNPING ZHANG, Chinese Academy of Sciences, KWAN SKINNER, University of North Carolina at Chapel Hill, HONGXING XU, Chinese Academy of Sciences, RENE LOPEZ, University of North Carolina at Chapel Hill
— Since its first observation in 1970, surface enhanced Raman scattering (SERS) has been regarded as a promising new tool in the field of sensing technology. Unfortunately, reproducibility issues have made it difficult for scientists to devise experiments that accurately characterize the SERS enhancement factor. The key to this problem lies in the ability to elicit control over the small nanostructure spacings required to attain large enhancement factors. Previous theoretical studies have determined that the SERS enhancement is extremely sensitive to the spacing between features, decreasing at a rate of approximately one order of magnitude per nanometer of separation and disappearing almost entirely for spacings greater than 5 nm. In this research, we present a facile method to regulate this spacing on the sub-5 nm level that utilizes the stretching properties of an elastomeric substrate. By building our nanostructures on a flexible substrate and varying the amount of strain applied, nanostructures can be moved relative to one another with the precision necessary to study this effect.

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Date submitted: 20 Nov 2009 Electronic form version 1.4