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Nanosphere Templating Through Controlled Evaporation: A High Throughput Method For Building SERS Substrates KRISTEN ALEXANDER, UNC Department of Physics, MEREDITH HAMPTON, UNC Department of Chemistry, RENE LOPEZ, UNC Department of Physics, JOSEPH DESIMONE, UNC Department of Chemistry — When a pair of noble metal nanoparticles are brought close together, the plasmonic properties of the pair (known as a "dimer") give rise to intense electric field enhancements in the interstitial gap. These fields present a simple yet exquisitely sensitive system for performing single molecule surface-enhanced Raman spectroscopy (SM-SERS). Problems associated with current fabrication methods of SERS-active substrates include reproducibility issues, high cost of production and low throughput. In this study, we present a novel method for the high throughput fabrication of high quality SERS substrates. Using a polymer templating technique followed by the placement of thiolated nanoparticles through meniscus force deposition, we are able to fabricate large arrays of identical, uniformly spaced dimers in a quick, reproducible manner. Subsequent theoretical and experimental studies have confirmed the strong dependence of the SERS enhancement on both substrate geometry (e.g. dimer size, shape and gap size) and the polarization of the excitation source.

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