Microspheres with hierarchical surface complexity for molecular detection based on Surface Enhanced Raman Scattering

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Surface Enhanced Raman Scattering (SERS) has been emerged as one of the most promising strategies in chemical and biomolecular detection due to high sensitivity and label-free identification of molecules. However, conventional SERS systems based on planar metal pattern have the limitations in binding kinetics and cost of metal pattern preparation. In this study, we report the microparticles decorated with metal nanostructures, which shows enhanced performance in SERS analysis. To obtain the microparticles with complex metallic nanopatterns, photocurable ethoxylated trimethylolpropane triacrlate (ETPTA) droplets containing colloidal silica particles were prepared. After photopolymerization of emulsion droplets, silver nanoparticles were deposited on the exposed silica surfaces selectively. Using the silver nanoparticle-decorated microspheres, we could observe the enhanced SERS signal of benzenethiol molecules adsorbed onto the patterned silver array.