

Void nanogap between plasmonic nanoparticle and metal film for small molecule detection

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Nanogap between plasmonic nanoparticles and closely separated metal film has attracted interest owing to strong electromagnetic field enhancement and its ease of fabrication. Typically, nanoparticles are separated from the film by using an intervening spacer layer. However, the spacer layer blocks the diffusion of molecules to the junction between nanoparticle and film, limiting its application to molecular sensing. Here, we present void nanogap between plasmonic nanoparticle and metal film without an intervening spacer layer by using anisotropic gold-dielectric nanorods. We synthesize such anisotropic nanorods by selectively growing dielectric spheres only at the tips of gold nanorods. The synthesized nanoparticles are characterized by electron microscope and UV-vis spectrometer. We then place the nanoparticles on gold film for the detection of small molecules *via* surface-enhanced Raman spectroscopy.