One-Step Production of SERS-Active Microgels for In-Situ Molecular Detection

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Nanostructure or nanoparticle composed of novel metal used as Surface-enhanced Raman scattering (SERS) substrate. However, proteins in the biological fluid are adsorbed on the metal surface, making it difficult to detect small target molecules. In this study, we designed high-density gold nanoparticles loaded hydrogel to directly detect biomarkers in biological samples without pretreatment. Cross-linked hydrogel exclude adhesive proteins that are larger than the mesh size and high-density gold nanoparticles make nanogaps in microgel and serve as SERS active site. Using a microfluidic system, precursor for gel and a precursor for metal nanoparticles in water phase is emulsified into the oil phase. The photo-reduction of metal nanoparticles at high concentration and polymerization of hydrogel are achieved simultaneously through ultraviolet exposure. Therefore, the SERS active microgels enable the detection of small target molecules dissolved in biological fluids without pre-treatment.