

Fabrication of SiO₂-Ag core-satellite composite particles via mussel-inspired polydopamine coating and its application for Surface-Enhanced Raman Spectroscopy (SERS)

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Dopamine, inspired by adhesive proteins excreted by marine mussels, can act as a versatile surface modification agent and a platform for secondary reactions because of its strong adhesive property. By using metal-binding ability of polydopamine (PDA) intermediate layer, a simple and novel method for depositing silver nanoparticles on dielectric silica nanoparticles is proposed. Silica-silver composite particles of a core-satellite structure were fabricated by dispersing silica particles in an aqueous dopamine solution followed by a chemical reduction by using glucose as a reducing agent. Uniform PDA layer with nano-meter thickness was deposited spontaneously on the surface of silica particles by oxidative self-polymerization of dopamine under alkaline conditions. Chemical deposition of silver nanoparticles was carried out under different concentrations of a silver precursor, the reducing agent, and the amount of added silica-PDA particles. Prepared silver-deposited silica nanoparticles were used as a SERS substrate.