Designing Surface Enhanced Raman Scattering (SERS) Substrates Using Citrate-capped and Cysteamine-capped Gold Nanoparticles to Modify Glass Substrate and Polystyrene Well Plates

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Surface-enhanced Raman scattering (SERS) is a powerful technique for enhancing Raman signals of molecules adsorbed on metallic plasmonic nanostructures such as gold nano particles. This study examines the synthesis and application of two types of gold nanoparticles: Citrate-capped Au nanoparticles (CT-Au NPs) and cysteamine-capped Au nanoparticles (CY-Au NPs). These NPs were synthesized using chemical reduction methods which employ trisodium citrate and cysteamine as capping agents. Two different substrates, a glass slide and a polystyrene well plate were functionalized with CT-Au NPs CY-Au NPs respectively. Polystyrene well plates were exposed to UV/O_3 treatment to modify the surface, followed by treatment with EDC (1-Ethyl-3-diaminopropyl carbodiimide) and NHS (N-hydroxysuccinimide) to facilitate the deposition of cysteamine-capped Au NPs. Additionally, glass substrates were treated with piranha solution and (3-aminopropyl) triethoxysilane (APTES) to introduce amine groups, enabling the deposition of citrate-capped Au NPs. Characterization was performed using a Raman spectroscopy for their potential for sensitive and reliable SERS-based detection.

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