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Nanoporous Ag-Au bimetallic triangles synthesized by galvanic replacement for plasmonic applications

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Galvanic replacement is a versatile method of converting simple noble metallic nanoparticles into structurally more complex porous multi-metallic nanostructures. In this work, roughened nano porous Ag-Au bimetallic triangles are synthesized by galvanic replacement between smooth Ag triangles and $AuCl4^-$ ions. Transmission electron microscope and the elementary mapping measurements show that numerous protrusions and pores are formed on the {111} facets and Ag, Au atoms homogeneously distribute in the triangle plate. Due to the additional hot spots generated by the surface plasmons coupling of the newly formed protrusions and pores, the roughened nano porous Ag-Au triangles aggregates demonstrate a higher surface-enhanced Raman scattering enhancement factor (seven times larger) and better reproducibility than that of smooth Ag triangles aggregates. The well-maintained triangular shape, surface-roughened evolutions of both micro- and nanostructures, and tunable NIR surface plasmon resonance effect enable potential applications of the Au-Ag alloy nanoplates in surface-enhanced Raman spectroscopic detection of biomolecules through 785 nm laser excitation. Moreover, these synthesized roughened nano porous Ag-Au bimetallic triangles could be promising candidate for the applications in analytical chemistry, biological diagnostics and photothermal therapy due to their excellent plasmonic performances and good biocompatibility.

Biography

Qian Hongmei has pursued her PhD from School of Materials Science and Engineering of Beijing Institute of Technology, China. She is currently working as an Asociate Professor in School of Architecture and Civil Engineering, West Anhui University Hefei, Anhui, China. Her current research interest is inorganic materials based hybrid nanostructures to possess novel optical, electronic properties for applications in energy conversion and storage, catalysis, optoelectronics and biology.

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