

31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

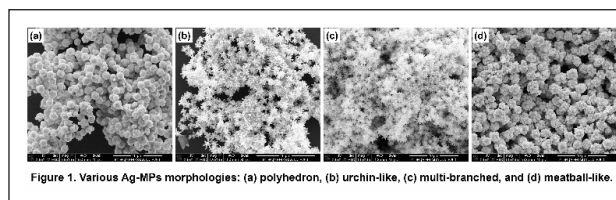
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Synthesis of new-type Ag meso-particles for ultrasensitive SERS activity

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Surface-Enhanced Raman Scattering (SERS) spectroscopy is one of a few techniques that are capable of ultimately detecting matter at single molecule scale. The SERS activity of Noble-Metal Nano-Particles (NM-NPs) depends mainly on their shapes, as this determines the number and position of hot spots and, therefore, it is critical to have a purposeful control over the shapes in order to maximize their performance. Herein, using the control variate technique in the solution reaction process, various high-symmetrical Ag Meso-Particles (Ag-MPs) with well-tuned morphology were prepared for ultrasensitive SERS activity, which include polyhedron, urchin-like, multi-branched and meatball-like. Multi-branched Ag-MPs were shown to have the strongest SERS sensitivity in rhodamine B (RhB) detection in all samples as particle-array substrates with a detection limit of 10-13 M and an enhancement factor greater than 108, which can be undoubtedly applied to the molecular trace-detection. In order to verify the practical effectiveness, these Ag-MPs were used as the SERS materials for the in situ detection of a widely used growth regulator (forchlorfenuron) on an apple surface, showing clear Raman peaks at 0.01 ppm. Moreover, we investigated the influence of different variates on the morphology of Ag-MPs and propose a complete growth mechanism for these various Ag-MPs. This can provide a promising synthetic method to produce artistic Ag-architectures for SERS activity with ultrahigh sensitivity, good uniformity and low cost.



Biography

Hengwei Qiu has completed his Master's degree from Shandong Normal University in 2016. He is now studying for a PhD degree in Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education and International Center for Dielectric Research, Shaanxi Engineering Research Center of Advanced Energy Materials and Devices, Xi'an Jiaotong University. His research interests are design and synthesis of noble-metal nanostructures and their applications, especially for biosensors.

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