Chemical Engineering and Catalysis

August 28-29, 2018 | Paris, France

Rationally designed plasmonic nanostructures for biosensing



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co-authors: Xiaowei Cao, Jian Dong and Weiping Qian Southeast University, China Gold nanostars, as one of plasmonic nanostructures, have been recently reported to yield extraordinary field enhancements for SERS, especially at the tip of their branches. It has been reported that gold nanostars show stronger SERS enhancement than nanorods and nanospheres under similar experimental conditions. Thus, the combination of these two aspects may provide a solution to the fabrication of a lowcost, large-scale, and reproducible SERS active substrate. We study the assembly of gold nanostars as reproducible SERS substrates via electrostatically assisted APTES-functionalized surface-assembly method and detect the SERS activities. The gold nanostars were immobilized on ITO surface by using electrostatically assisted APTES-functionalized surface-assembly as SERS active substrates. A comparison of these substrates' optical characteristics and SERS efficiency as a function of branch length was made, and the potential use of these substrates in quantitative detection applications was also investigated. There are two main advantages of our substrates: firstly, the fabricating progress of this substrate is simple, low-cost, reproducible, and equipment-independent, thus it is possible for large-scale production, even for commercial manufacture; secondly, the obtained substrates have extremely good uniformity, which is preponderant for biosensing. Moreover, by employing the TAT peptide conjugated Au nanostars (AuNSs) as an intracellular probe, we developed a method for the identification of LR-MSC differentiation by surface-enhanced Raman scattering (SERS) spectroscopy. By PCA analysis of the SERS spectra, we have demonstrated that cellular components and cytoarchitecture have been changed during differentiation.

Biography

Qianqian Su has received her BE and ME degrees from Southeast University (China) in 2008 and 2011, respectively. She is currently pursuing her PhD in Southeast University, China. Her current scientific interests are focused on developing novel nanomaterials for bio-sensors and catalytic application. She has published several papers in reputed journals as first author.

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