

Accepted Manuscript

Title: Applications of shell-isolated nanoparticles in surface-enhanced raman spectroscopy and fluorescence

Author: Ping-Ping Fang, Xihong Lu, Hong Liu, Yexiang Tong

PII: S0165-9936(15)00009-6

DOI: <http://dx.doi.org/doi: 10.1016/j.trac.2014.11.015>

Reference: TRAC 14372

To appear in: *Trends in Analytical Chemistry*



Please cite this article as: Ping-Ping Fang, Xihong Lu, Hong Liu, Yexiang Tong, Applications of shell-isolated nanoparticles in surface-enhanced raman spectroscopy and fluorescence, *Trends in Analytical Chemistry* (2015), <http://dx.doi.org/doi: 10.1016/j.trac.2014.11.015>.

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Applications of shell-isolated nanoparticles in surface-enhanced Raman spectroscopy and fluorescence

Ping-Ping Fang ^{a, *}, Xihong Lu ^a, Hong Liu ^b, Yexiang Tong ^a

^a KLGHEI of Environment and Energy Chemistry, MOE of the Key Laboratory of Bioinorganic and Synthetic Chemistry, School of Chemistry and Chemical Engineering, Sun Yat-Sen University, Guangzhou 510275, China

^b Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences, Chongqing 401122, China

HIGHLIGHTS

- We review shell-isolated nanoparticle-enhanced Raman spectroscopy (SHINERS)
- We demonstrate the properties and the applications of surface-enhanced fluorescence
- Surface-enhanced Raman spectroscopy-fluorescence in biodetection and bioimaging

ABSTRACT

Shell-isolated nanoparticle (NP)-enhanced Raman spectroscopy (SHINERS) has expanded the versatility of surface-enhanced Raman scattering (SERS) and can be applied to virtually any substrate type and morphology. Surface-plasmon resonance (SPR) can enhance fluorescence through an electromagnetic field in a similar way to SERS, which is called surface-enhanced fluorescence (SEF) or metal-enhanced fluorescence (MEF). The SERS-SEF dual-mode method can greatly improve the accuracy and the sensitivity of detection in applications.

In this review, we introduce extension of SHINERS to shell-isolated NP-enhanced fluorescence (SHINEF) and application of the SERS-fluorescence dual-mode technique, taking advantage of SERS and fluorescence. We first introduce SHINERS and its applications, and then move on to the applications of SHINERS in SEF. Finally, we introduce application of the SERS-fluorescence dual mode to biodetection and bioimaging.

Keywords:

Biocompatibility

Biodetection

In-vivo imaging

Localized surface-plasmon resonance

Shell-isolated nanoparticle

Shell-isolated nanoparticle-enhanced fluorescence

Shell-isolated nanoparticle-enhanced Raman spectroscopy

SHINERS

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