Supporting Information

Electrodeposition of Ag nanosheet-assembled microsphere @ Ag dendrites core-shell hierarchical architectures and their application in SERS

Xiaodan Li¹, Meicheng Li¹, ²,* Peng Cui¹, Xing Zhao¹, Tiansheng, Gu¹ Hang Yu¹, Yongjian Jiang¹ and Dandan Song¹, ²

¹ State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources, School of Renewable Energy, North China Electric Power University, Beijing 102206, China
² Suzhou Institute, North China Electric Power University, Suzhou 215123, China

Fig. S1. (a) and (b) SEM image and EDX energy spectrum of the Ag core-shell hierarchical microstructures.

Fig. S2. SEM images of (a) silver dendritic structures; (b) Ag nanosheet-assembled microspheres; (c-e) Ag core-shell hierarchical microstructures deposited at 1.26 V, 1.11, 1.05V, respectively
Part S1 Estimation of enhancement factor

The SERS enhancement factor of the Ag core-shell hierarchical microstructure is estimated by calculating the ratios of the peak intensities of the SERS spectrum of R6G molecule on as-prepared sample (red curve in Fig. 5b) to the corresponding normal Raman spectrum of R6G molecule on FTO-coated glass (black curve in Fig. 5b):

$$ EF = \frac{I_{\text{SERS}}}{I_{\text{Ref}}} \times \frac{N_{\text{Ref}}}{N_{\text{SERS}}} $$

(1)

Where

$I_{\text{SERS}}$ is the peak intensity of the SERS spectrum,

$I_{\text{Ref}}$ is the peak intensity of normal Raman spectrum

$N_{\text{SERS}}$ is the number of R6G molecules illuminated by the laser on the as-prepared sample substrate

$N_{\text{Ref}}$ is the number of R6G molecules illuminated by the laser on the pure FTO-coated glass substrate

For the R6G film on the pure FTO-coated glass (1.5mm×1.8mm), the diameter of laser spot is 2µm, so the value of $N_{\text{Ref}}$ was gotten as $10^{-3} \times 2 \times 10^{-3} \times 6.02 \times 10^{23} \times \pi (2 \mu m / 2)^2 / (1.5 \times 1.8) mm^2 = 4.46 \times 10^9$. In a similar way, the value of $N_{\text{SERS}}$ was 44.6. For the band at 612cm$^{-1}$, $I_{\text{SERS}} / I_{\text{Ref}}$ was 1.6. Therefore average enhancement factor for the band at 612cm$^{-1}$ is estimated to be $1.6 \times 10^8$. For other bands, the enhancement factor may be more than $10^8$ because of higher value of $I_{\text{SERS}} / I_{\text{Ref}}$.

Fig. S3 Raman spectra of R6G (10-12 M) adsorbed on the samples treated by plasma cleaning