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Highly reproducible SERS-active Au nanostructures prepared by simple electrodeposition: Origin of SERS activity for Electroanalytical application

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Surface-enhanced Raman scattering (SERS) substrate has received a great deal of attention because of their useful applications. Fabrication of effective SERS-active dendritic Au rod (DAR) structures on Au surfaces via a simple one-step electrodeposition in short time has been demonstrated. Comparison of SERS activities between DAR and other nanostructured Au surfaces with different morphologies reveals that the presence of highly faceted sharp edge sites might be critical for inducing a high SERS activity on DAR surfaces. The SERS enhancement factor of 1.5×10^5 for DAR is estimated and the detection limit of rhodamine 6G at DAR surfaces was 10^{-8} M. The DAR substrate also shows extremely excellent reproducibility and long-term stability is very good. It was demonstrated use of effective DAR surfaces for electrochemical SERS. We conclude that DAR electrodes present a significant advantage because SERS enhancement is not lost upon excursion to extremely negative potentials