

Facile Nanostructured Substrate Preparation Using Gold Nanocuboids for SERS

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Abstract.

In the present work, we report a practical fabrication method of gold-aluminium substrates for surface enhanced Raman spectroscopy. A commercial aluminium-foil was used to fabricate SERS substrates by depositing gold nanocuboids and faceted particles onto their surfaces using the drop-drying method. The gold nanoparticles were characterized by ultraviolet-visible spectroscopy, while the size and morphology were determined by field emission scanning electron microscopy. The performance of the substrates was investigated using Rhodamine 6G in a water solution where a volume of 3 μl was placed on the surfaces of the SERS substrates, and the Raman spectra were immediately acquired using diode laser excitation at 785 nm. The estimated analytical enhancement factor of the gold-aluminium substrates was 1.8×10^6 , using a solution of Rhodamine 6G with a concentration of 1×10^9 (0.4796 ppb). We show that our SERS substrates can be easily fabricated, and that they are reproducible and have suitable surface uniformity, thus allowing one to analyse Rhodamine 6G not only as a dry sample, but also in a solution.

Keywords: Al-foil, gold nanoparticles, SERS substrates, Rhodamine 6G, liquid detection.