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PII: S1386-1425(15)00521-1
DOI: http://dx.doi.org/10.1016/j.saa.2015.04.049
Reference: SAA 13600

To appear in: *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*

Received Date: 11 February 2015
Revised Date: 14 April 2015
Accepted Date: 16 April 2015

Please cite this article as: L. Fu, D. Zhu, A. Yu, Galvanic replacement synthesis of silver dendrites-reduced graphene oxide composites and their surface-enhanced Raman scattering characteristics, *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* (2015), doi: http://dx.doi.org/10.1016/j.saa.2015.04.049

Galvanic replacement synthesis of silver dendrites-reduced graphene oxide composites and their surface-enhanced Raman scattering characteristics

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Abstract

A simple method was developed to synthesize Ag dendrites/reduced graphene oxide (AgD/RGO) composites based on the galvanic displacement method. $AgNO_3$ was used as the precursor for Ag dendrites and aluminum foils served as the sacrifice metal. The as-synthesized AgD/RGO composite was characterized by SEM, FTIR, UV-vis spectroscopy and Raman spectroscopy. The results showed that the graphene oxide was successfully incorporated into the Ag dendritic structure and was reduced during the galvanic displacement between Ag^+ ions and the aluminum foil. XRD analysis revealed that the Ag formed in the composite was in the cubic phase. The surface-enhanced Raman scattering (SERS) property of the as synthesized AgD/RGO composite was evaluated using Rhodamine B as a probe. The composite deposited substrate exhibited a much higher SERS activity compared with substrates modified with Ag dendrites or GO, indicating that the AgD/RGO could potentially be used as a highly sensitive SERS substrate for molecule detecting applications.

Introduction

Synthesis of shape-controlled noble metal nanostructures has attracted considerable attentions in the past decay because the morphologies could significant affect the properties and applications [1, 2]. Among various nanostructures, dendritic and fractal structures have gained particular