

Title of the Abstract: One-step synthesis of a monolayer of monodisperse gold nanocubes for SERS substrates

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Abstract:

Self-assembly of polymer drives the synthesis of metallic nanoparticles (NPs) have gained remarkable attention in the fields of catalysis and sensing applications, which require a fine control of size and shape of nanoparticles [1-2]. In the present communication, we describe a synthesis method of monodisperse gold nanoparticles. The monodispersity relies on PMMA self-assembly into nanoholes embedded with gold nanoparticles. A thermodynamic study allowed us to control the structural properties of NPs and to finally obtain gold nanocubes through vapor induced phase separation [3]. The spin-coating of gold precursor dispersed in PMMA solution on a conductive substrate (N-doped silicon) results into the formation of PMMA micelles. Consequently, the evaporation of solvents from these micelles leads to the formation of single shape of GNPs, which is cubic [4-5]. More precisely, adjusting the concentration of gold precursor, the choice of PMMA molecular weight and concentration and the substrate chemical surface allowed us to control the NPs shape. Our actual research aims to go further in the study of the synthesis mechanism in order to obtain other morphologies such as triangular and hexagonal. Thus, a physio-chemical study based on the variation of the synthesis experimental parameters is under investigation to tune the optical and structural properties of GNPs.

Biography:

Rana Omar had a Bachelor degree in Biochemistry from the Lebanese University in 2011. She received a master degree in Environmental Sciences and Natural Resources from the Lebanese University in 2014 with a practical training at University of Calabria (Italy). She is currently in her 3rd year of the Ph.D. degree in Physical Chemistry between University of Lorraine (France) and the Lebanese University. Her research focuses on the fabrication of ultrasensitive SERS substrates based on uniform gold nanoparticles.

Research Interests:

Nanofabrication: Synthesis of metallic nanoparticles
SERS applications on bio-chemical molecules

Experienced in characterization techniques:

Spectroscopy: Raman, SERS, µ-extinction and Ellipsometry

Microscopy: SEM, AFM and confocal Microscopy

References:

[1] Shi, Y., Peng, L., Ding, Y., Zhao, Y., & Yu, G. (2015). Nanostructured conductive polymers for advanced energy storage. Chemical Society Reviews, 44(19), 6684-6696.

[2] Elsabahy, M., Heo, G. S., Lim, S. M., Sun, G., & Wooley, K. L. (2015). Polymeric nanostructures for imaging and therapy. Chemical reviews, 115(19), 10967-11011.

[3] Omar, R., Naciri, A. E., Jradi, S., Battie, Y., Toufaily, J., Mortada, H., & Akil, S. (2017). One-step synthesis of a monolayer of monodisperse gold nanocubes for SERS substrates. Journal of Materials Chemistry C, DOI: 10.1039/C7TC03069J.

[4] Khanafer, M., Issa, A., Akil, S., Hamieh, T., Adam, P. M. and Jradi, S. 2016, RSC Advances, 6, 102843.

[5] Akil S., Jradi S., Plain J, Adam P.-M., Bijeon, J.-L., Sanchez C., Bachelot R. and Royer P. , Chemical communications (2011), 47, 2444.

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