Hanna Bandarenka, J Nanomed Nanotechnol 2014, 5:5
http://dx.doi.org/10.4172/2157-7439.S1.018

OMICS Group Conferences
Accelerating Scientific Discovery

4th International Conference on
Nanotek & Expo

December 01-03, 2014 DoubleTree by Hilton Hotel San Francisco Airport, USA

Porous silicon as a template for fabrication of SERS-active substrates

Hanna Bandarenka
Belarusian State University of Informatics and Radioelectronics, Belarus

Surface Enhanced Raman scattering (SERS) allows detection or state identification of molecules at sub-micromolar concentrations which are especially required for accurate analysis of physiological liquids. An enormous increase of Raman signal intensity from molecules adhered on metallic nanostructures is mostly connected with plasmonic properties of metals. By today solid SERS-active substrates have attracted a great attention due to enhancement factor (EF) reproducibility and simple use. On the other hand solid substrates have to be composed of highly ordered arrays of metallic nanostructures which are fabricated by complicated and expensive nanoengineering methods. In this report, results of a research of porous silicon (PS) as a template for the fabrication of SERS-active substrates are presented. PS was formed by an electrochemical anodization of bulk silicon in HF-based solutions. Dimensions of pores and silicon crystallites in PS were varied from a couple of nanometers to micron by the anodization regimes and the type of bulk silicon. Metallic nanostructures were deposited on PSby "wet"methods. PS templates provided fabrication of different morphological forms of metallic structures (nanoparticles, dendrites, nanovoids, etc.). It was found that plasmonic properties of the metallic nanostructures strongly depend on the PS morphology and the metal deposition regimes. SERS-activity of the obtained substrates was studied using aqueous or alcoholic solutions of rhodamine6G and metallic porphyrins as analytes. It was estimated that EF of SERS-active substrate based on PS template can reach 10^9. Deviation of EF reproducibility from substrate to substrate was shown to be less than 20 %.

Biography

Hanna Bandarenkais is currently defending her PhD thesis in Engineering Sciences from Belarusian State University of Informatics and Radioelectronics this October. She is Research Scientist in R&D Laboratory of Nanomaterials and Nanostructures at her Alma Mater. Up to date her research activities have been devoted to fabrication, properties and application of porous silicon. Results of her work have found practical application in manufacturing semiconductor devices, ICs and MEMS. Currently she focuses on study of porous silicon for biomedicine. Special interest is directed to development of SERS-active substrates based on metallized porous silicon for performing an extremely accurate analysis of physiological liquids.

h.bandarenka@gmail.com