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Platform for smart SERS sensors based on surface-modified metal plasmonic thin films

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Plasmon-active noble metals nanostructures based on Ag, Au thin films become widely applied in the field of plasmonics and related sensing technologies. Moreover, surface modification by the attachment of organic groups to plasmonic surfaces is a subject of current interest in material science and sensor design. We proposed a method for development of new SERS based sensor systems for the heavy metal ions and organic contaminants detection. Proposed systems consist of plasmon-active periodical metal surfaces decorated with immobilized organic chelator or thermo-regulated polymer. Firstly, we developed a method for covalent modification of Au plasmonic thin films via interaction with arenediazonium tosylates. Further, grafting of 4-carboxyphenyl and 4-aminophenyl groups enabled to create a strong covalent linker between the surface and active functional groups. Thermo-regulated polymer (PNIPAAm) and chelator molecule DTPA were grafted to the plasmonic films via interaction with active amino and carboxyl on the surface. The molecular recognition of contaminants resulted in the shift of SERS peaks position or arising of the new peaks in the latter case. As model solutions we used solutions of heavy metal ions (Pb²⁺, Cu²⁺, Cd²⁺) for capturing by chelator and solutions of azo-dyes (crystal violet, metanil yellow, disperse red I) for thermo-regulating capturing by PNIPAAm.

Biography

Guselnikova Olga has completed her Bachelor and Master degrees in Tomsk Polytechnic University, Russia and now she is PhD Student in University of Chemistry and Technology, Prague. She has published 4 papers in reputed journals.

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