SUBSTRATES SERS STUDY OBTAINED BY TOLLENS AND ELECTROLESS TECHNIQUES. APPLICATION IN DETECTION OF ARSENIC OXIDES

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In 2009, the IBEROARSEN project developed a study about existent methodologies to detect and quantify arsenic in soil and water. The study stated that arsenic can be present in several oxidation states (As\(^{-3}\), As\(^0\), As\(^{+3}\), As\(^{+5}\)) in inorganic and organic forms, in an broad range of concentrations in the air, water, soil, vegetables and animals, being the most important As\(^{+3}\) and As\(^{+5}\) [1]. Several studies report on SERS applications for the detection of arsenical contaminants in water, for example, in [2] by applying the Langmuir Blodgett technique, detection limits of 18 ppb were reached for solutions of arsenite and arsenate, in [3] , silver nanofilms were generated by modification of the mirror reaction for detection of arsenite and arsenate in groundwater, reaching detection limits of 50 ppb. In this work we have studied the Raman response of metallic substrates developed by Electroless and Tollens techniques. The SERS response of the silver substrates was evaluated with the vibration 1641 cm\(^{-1}\) of the rhodamine B (2x10\(^{-6}\)M) finding that the substrates developed by the electroless technique provide an increase of 4-times the Raman signal with respect to the substrate developed by the Tollens reaction. Substrates prepared by Electroless were selected for the detection of arsenic pentoxide (As\(^{+5}\)) in solution at different concentrations below 1000 ppm. The SERS response of the arsenic samples was analyzed between 770-800 cm\(^{-1}\).

References:

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