

Utilization of chitosan-based sensor thin films for the detection of lead ion by surface plasmon resonance optical sensor.

Abstract

Chitosan-based sensor thin films were fabricated to detect trace amounts of lead ion using surface plasmon resonance (SPR) optical sensor. The gold surface used for SPR measurements was modified with chitosan and chitosan-tert-butylcalix[4]arene-tetrakis(N,N-dimethylthioacetamide) (chitosan-BCAT). Both chitosan and chitosan-BCAT layers were deposited on the gold surface by spin coating technique. The experiment has been carried out to monitor the SPR signals for lead ion with sensitive enhancement by chitosan and chitosan-BCAT layers. For both layers, the change in resonance angle ($\delta\theta$) is directly proportional to the concentration of lead ion solution. The higher amounts of ($\delta\theta$) were obtained for chitosan-BCAT film due to a specific binding of BCAT with lead ion. The chitosan-BCAT film enhanced the sensitivity of detection down to 0.03 ppm. Data analysis also has been done by Matlab software using Fresnel formula for multilayer system.

Keyword: Chitosan-based; Sensor thin films; Lead ion; Surface plasmon resonance.