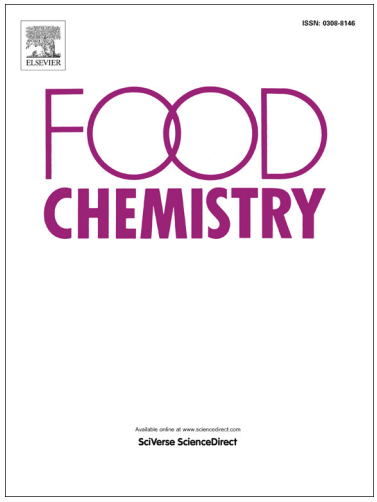

Analytical Methods

Detection of heavy metal ions in contaminated water by surface plasmon resonance based optical fiber sensor using conducting polymer and chitosan

Roli Verma, Banshi D. Gupta

PII: S0308-8146(14)00931-5
DOI: http://dx.doi.org/10.1016/j.foodchem.2014.06.045
Reference: FOCH 15987

To appear in: *Food Chemistry*

Received Date: 12 August 2013
Revised Date: 20 February 2014
Accepted Date: 8 June 2014

Please cite this article as: Verma, R., Gupta, B.D., Detection of heavy metal ions in contaminated water by surface plasmon resonance based optical fiber sensor using conducting polymer and chitosan, *Food Chemistry* (2014), doi: http://dx.doi.org/10.1016/j.foodchem.2014.06.045

Detection of heavy metal ions in contaminated water by surface plasmon resonance based optical fiber sensor using conducting polymer and chitosan

Roli Verma and Banshi D. Gupta*
Department of Physics, Indian Institute of Technology Delhi, New Delhi-110016 India
*Corresponding Author Email: bdgupta@physics.iitd.ernet.in

Abstract:

Optical fiber surface plasmon resonance (SPR) based sensor for the detection of heavy metal ions in the drinking water is designed. Silver (Ag) metal and indium tin oxide (ITO) are used for the fabrication of the SPR probe which is further modified with the coating of pyrrole and chitosan composite. The sensor works on the wavelength interrogation technique and is capable of detecting trace amounts of Cd^{2+}, Pb^{2+}, and Hg^{2+} heavy metal ions in contaminated water. Four types of sensing probes are fabricated and characterized for heavy metal ions out of these pyrrole/chitosan/ITO/Ag coated probe is found to be highly sensitive among all other probes. Further, the cadmium ions bind strongly to the sensing surface than other ions and due to this the sensor is highly sensitive for Cd^{2+} ions. The sensor's performance is best for the low concentrations of heavy metal ions and its sensitivity decreases with the increasing concentration of heavy metal ions.

Key Words: Pyrrole, chitosan, optical fiber, sensor, surface plasmon resonance, heavy metal ions.