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Sensing heavy metals for environmental monitoring

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In this research, an optical sensor based on surface plasmon resonance (SPR) for detection of trace amounts of mercury and lead ions was prepared. Heavy metals such as mercury and lead ions have long been recognized as harmful environmental pollutants that can result in serious health risks, so early detection of such environmental pollution can protect human health and people from harmful chemical exposure. The sensing area for this optical sensor was fabricated from gold surface modified with polypyrrole-chitosan (PPy-CHI) conducting polymer composite. The polymer layer was deposited on the gold surface by electrodeposition. This optical sensor was used for monitoring toxic metal ions with and without sensitivity enhancement by chitosan in water samples. The higher amounts of resonance angle unit (ΔRU) were obtained for PPy-CHI film due to a specific binding of chitosan with Pb^{2+} and Hg^{2+} ions. The Pb^{2+} ion bind to the polymer films most strongly, and the sensor was more sensitive to Pb^{2+} compared to Hg^{2+} . The concentrations of ions in the parts per million range produced the changes in the SPR angle minimum in the region of 0.03 to 0.07. Data analysis was done by Matlab software using Fresnel formula for multilayer system.

Biography

Mahnaz M Abdi is a Senior lecturer and research associate at the Centre of Foundation Studies for Agricultural Science and the Department of chemistry, Faculty of Science, Universiti Putra Malaysia. She received her PhD in Material chemistry from the Universiti Putra Malaysia in 2010. She started her career as a researcher at the Institute of Tropical Forestry and Forest Products UPM, and at the Lulea University of Technology (LTU), Lulea, Sweden before being appointed to her current position. Her research interests are in the area of Material and analytical chemistry, Electrochemistry, Sensor and biosensors. She has published more than 30 papers in scientific journals, book chapters, reviewed conference proceedings and she held 2 patents. She is a reviewer for several international sensor and materials journals.

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