

Application of polypyrrole multi-walled carbon nanotube composite layer for detection of mercury, lead and iron ions using surface plasmon resonance technique

Abstract

Polypyrrole multi-walled carbon nanotube composite layers were used to modify the gold layer to measure heavy metal ions using the surface plasmon resonance technique. The new sensor was fabricated to detect trace amounts of mercury (Hg), lead (Pb), and iron (Fe) ions. In the present research, the sensitivity of a polypyrrole multi-walled carbon nanotube composite layer and a polypyrrole layer were compared. The application of polypyrrole multi-walled carbon nanotubes enhanced the sensitivity and accuracy of the sensor for detecting ions in an aqueous solution due to the binding of mercury, lead, and iron ions to the sensing layer. The Hg ion bonded to the sensing layer more strongly than did the Pb and Fe ions. The limitation of the sensor was calculated to be about 0.1 ppm, which produced an angle shift in the region of 0.3° to 0.6°.

Keyword: Polypyrrole multi-walled carbon nanotube; Heavy metal ions; Surface plasmon resonance technique