

Polypyrrole thin film sensor base surface plasmon resonance for detection of Cu(II) and Fe(III) in aqueous solution

ABSTRACT

In this study, the performance of surface plasmon resonance method incorporated with polypyrrole sensing layer was examined for detection of Cu (II) and Fe (III) ions in aqueous solutions. The polypyrrole was prepared by electro-oxidation method on a gold layer for the detecting low concentration ions (0.1, 1 5 10 20 ppm). The experiments carried out at room temperature, and each sample was flowed through the flow cell. A photodiode registered the SPR signals as the function of rotation angle and thickness of layers. For observing the association and dissociation processes, the experiments repeated more than ten times, and the sensorgrams were obtained. Furthermore, Langmuir model was utilized to describe the binding interactions of ions with the polypyrrole layer. The lower concentration detection limit was about 0.1 ppm and the terminal resonance angles were occurred after the 300 s. The sensor was also found to be more sensitive to the presence of Cu than Fe ions.

Keyword: Copper; Electro-oxidation; Iron; Polypyrrole film; SPR refractometer; SPR sensor