

Fiber-based surface plasmon resonance sensor for lead ion detection in aqueous solution

ABSTRACT

Maghemite/reduced graphene oxide nanocomposite has been successfully deposited onto the surface of a gold-coated Dshaped optical fiber. The synergetic combination of gold, graphene, and iron oxide nanoparticles has shown enhancement of the resonance field and sensitivity of the fiber-based plasmonic sensor. In particular, the sensor exhibited its capability to detect lead ions (Pb^{2+}) in aqueous solution via monitoring the spectral response of the sensor probe to different concentrations of Pb^{2+} . A sensor sensitivity of 1.2 nm per $\mu g/L$ was attained at the lowest detected Pb^{2+} concentration, which is 0.001 ppm (limit of detection). This robust, compact, and highly sensitive fiber-based plasmonic sensor will be of a great interest for an in situ and real-time water safety environmental monitoring.

Keyword: Nanocomposite; Graphene; Surface plasmon resonance sensor; Environmental monitoring