Hydrous ferric oxide-magnetite-reduced graphene oxide nanocomposite for detection of arsenic using surface plasmon resonance

ABSTRACT

Surface plasmon resonance sensor coated with hydrous ferric oxide-magnetite-reduced (Fe2H2O4-Fe3O4-rGO) graphene oxide nanocomposite film was demonstrated to detect two toxic heavy metals; Arsenic (III) [As(III)] and Arsenic (V) [As(V)] in aqueous solution. The proposed nanocomposite film exhibited successful absorption of As with enhanced sensitivity and selectivity. Resultantly, when tested with different concentrations of As(III) and As(V), (0.1-1.0 ppb) the sensor ranged linearly with sensitivity of 2.196 °ppb-1 and 0.960 °ppb-1, respectively, and achieved a detection limit as low as 0.1 ppb. These results validate the potential of Fe2H2O4-Fe3O4-rGO nanocomposite material for optical sensing applications in as detection.

Keyword: Magnetic nanocomposite; Heavy metal ions; Surface plasmon resonance