

Efficient synthesis and characterization of Polyaniline@Aluminium–succinate metal-organic frameworks nanocomposite and its application for Zn(II) ion sensing

ABSTRACT

A new class of conductive metal-organic framework (MOF), polyaniline- aluminum succinate (PANI@Al-SA) nanocomposite was prepared by oxidative polymerization of aniline monomer using potassium persulfate as an oxidant. Several analytical techniques such as FTIR, FE-SEM, EDX, XRD, XPS and TGA-DTA were utilized to characterize the obtained MOFs nanocomposite. DC electrical conductivity of polymer-MOFs was determined by four probe method. A bare glassy carbon electrode (GCE) was modified by nafion/PANI@Al-SA, and examined for Zn (II) ion detection. Modified electrode showed improved efficiency by 91.9%. The modified electrode (PANI@Al-SA/nafion/GCE) exhibited good catalytic property and highly selectivity towards Zn(II) ion. A linear dynamic range of 2.8–228.6 μM was obtained with detection limit of LOD 0.59 μM and excellent sensitivity of 7.14 $\mu\text{A } \mu\text{M}^{-1} \text{ cm}^{-2}$. The designed procedure for Zn (II) ion detection in real sample exhibited good stability in terms of repeatability, reproducibility and not affected by likely interferents. Therefore, the developed procedure is promising for quantification of Zn(II) ion in real samples.

Keyword: PANI@Al-SA modified electrode; MOFs; Composite; Linear sweep voltammetry