

Preparation, characterization and optical properties of ionophore doped chitosan biopolymer thin film and its potential application for sensing metal ion

ABSTRACT

In this study, the preparation of ionophore doped chitosan biopolymer solution using chitosan, glutaraldehyde and p-tert-butylcalix[4]arene-tetrakis(N,N-dimethylacetamide) in acetic acid under mild condition has been described. After the reaction, the ionophore doped chitosan biopolymer thin film was prepared using spin coating technique. The obtained chitosan derivative was confirmed and characterized by Fourier transform infrared spectroscopy (FTIR) and ultraviolet–visible near infra-red (UV–Vis–NIR) spectroscopy. Surface morphology, evaluated by atomic force microscopy (AFM), indicates the biopolymer thin film is relatively smooth and homogeneous. Absorption of the thin film is high with optical band gap of 3.177 eV. The incorporation of this derivative thin film with an optical spectroscopy can produce positive responses towards metal ion. This ionophore doped chitosan thin film can be considered as a novel optical material for practical application especially in the field of metal ion sensing.

Keyword: Ionophore; Chitosan; p-tert-Butylcalix[4]arene-tetrakis(N,N-dimethylacetamide); Thin film; Optical properties; Sensing metal ion