

Preparation and characterization of hexadecyltrimethylammonium bromide modified nanocrystalline cellulose / graphene oxide composite thin film and its potential in sensing copper ion using surface plasmon resonance technique

ABSTRACT

In this study, the preparation of hexadecyltrimethylammonium bromide modified nanocrystalline cellulose/graphene oxide composite (CTA-NCC/GO) solution under mild condition has been described. The CTA-NCC/GO thin film then was prepared by spin coating technique. Moreover, the CTA-NCC/GO thin film was characterized by Fourier transform infrared spectroscopy (FTIR) and atomic force microscopy (AFM) for the structural properties while the optical properties were characterized by ultraviolet-visible (UV-vis). FTIR confirmed the functional group that is contained in CTA-NCC/GO thin film and the surface morphology obtained from AFM results showed that the thin film is homogenous. The UV-vis analysis also showed that CTA-NCC/GO thin film has high absorption with optical band gap of 4.00 eV. Furthermore, the CTA-NCC/GO thin film has been studied to be incorporated with surface plasmon resonance spectroscopy (SPR) to detect copper ion. The SPR results showed that copper ion can be detected as low as 0.01 ppm using this thin film.

Keyword: Surface plasmon resonance; Optical properties; Nanocrystalline cellulose; Graphene oxide; Sensing; Copper ion