

## **Cationically modified nanocrystalline cellulose/carboxyl-functionalized graphene quantum dots nanocomposite thin film: characterization and potential sensing application**

### **ABSTRACT**

In this study, highly functional cationically modified nanocrystalline cellulose (NCC)/carboxyl-functionalized graphene quantum dots (CGQD) has been described. The surface of NCC was first modified with hexadecyltrimethylammonium bromide (CTA) before combining with CGQD. The CGQD, CTA-NCC and CTA-NCC/CGQD nanocomposites thin films were prepared using spin coating technique. The obtained nanocomposite thin films were then characterized by using the Fourier transform infrared spectroscopy (FTIR) which confirmed the existence of hydroxyl groups, carboxyl groups and alkyl groups in CTA-NCC/CGQD. The optical properties of the thin films were characterized using UV–Vis spectroscopy. The absorption of CTA-NCC/CGQD was high with an optical band gap of 4.127 eV. On the other hand, the CTA-NCC/CGQD nanocomposite thin film showed positive responses towards glucose solution of different concentration using an optical method based on surface plasmon resonance phenomenon. This work suggests that the novel nanocomposite thin film has potential for a sensing application in glucose detection

**Keyword:** Nanocrystalline cellulose; Graphene quantum dots; Thin film; Optical; Sensing; Glucose; Surface plasmon resonance