

## **Nanocrystalline cellulose decorated quantum dots based tyrosinase biosensor for phenol determination**

### **ABSTRACT**

Novel biosensor architecture based on nanocrystalline cellulose (NCC)/CdS quantum dots (QDs) nanocomposite was developed for phenol determination. This nanocomposite was prepared with slight modification of nanocrystalline cellulose (NCC) with cationic surfactant of cetyltrimmonium bromide (CTAB) and further decorated with 3-mercaptopropionic acid (3-MPA) capped CdS QDs. The nanocomposite material was then employed as scaffold for immobilization of tyrosinase enzyme (Tyr). The electrocatalytic response of Tyr/CTAB-NCC/QDs nanocomposite towards phenol was evaluated using differential pulse voltammetry (DPV). The current response obtained is proportional to the concentration of phenol which attributed to the reduction of o-quinone produced at the surface of the modified electrode. Under the optimal conditions, the biosensor exhibits good linearity towards phenol in the concentration range of 5–40  $\mu\text{M}$  ( $R^2 = 0.9904$ ) with sensitivity and limit of detection (LOD) of 0.078  $\mu\text{A}/\mu\text{M}$  and 0.082  $\mu\text{M}$ , respectively.

**Keyword:** Nanocrystalline cellulose; Biosensor; Tyrosinase; Electrochemical; Quantum dots