

## **Polyaniline-modified nanocellulose prepared from Semantan bamboo by chemical polymerization: preparation and characterization**

### **ABSTRACT**

Crystalline nanocellulose was prepared from Semantan bamboo (*Gigantochloa scortechinii*) via acid hydrolysis and was used to synthesize a nanocomposite of polyaniline/crystalline nanocellulose (PANi/CNC) via in situ oxidative polymerization of aniline in the presence of crystalline nanocellulose. The electrochemical properties of the nanocomposite were studied using a modified PANi/CNC electrode via cyclic voltammetry, and higher current response was observed for the PANi/CNC-modified electrode compared to that for the modified electrode with PANi. The results obtained from EIS displayed lower value of  $R_{ct}$  for the PANi/CNC-modified electrode, indicating that the incorporation of CNC into the PANi structure could enhance the electron transfer rate. The characteristic peaks of PANi and CNC were observed in the FTIR spectra of the nanocomposite, indicating the incorporation of CNC inside the nanocomposite structure. Moreover, in the XRD diffractogram, lower crystallinity was observed at the  $2\theta$  values of 22.6 and 16.1 for PANi/CNC compared to that for pure CNC. The FESEM images showed high porosity of the nanostructure with no phase separation, revealing the homogenous polymerization of the monomer on the surface of the crystalline cellulose. Aggregation of PANi particles was observed with the increasing aniline concentration.