

## **Electrospun biocomposite: nanocellulose and chitosan entrapped within a poly(hydroxyalkanoate) matrix for Congo red removal**

### **ABSTRACT**

Nano adsorbent possess notable adsorption capabilities but is difficult to recover in wastewater treatment processes. To overcome this limitation, the entrapment of nanocellulose (NCC) and chitosan (Cts) within poly(hydroxyalkanoate) (PHA) via electrospinning is proposed. The Pickering emulsion stabilized with Tween 80 formed a homogeneous NCC-Cts-PHA mixture prior to electrospinning. The resulting electrospun biocomposites were characterized with SEM, FT-IR, XrD and TGA. The electrospun biocomposites were with high porosity, rendering exposure of NCC and Cts to dye adsorption. The incorporation of nanocellulose and chitosan significantly increased the crystallinity of the electrospun biocomposites from 57.6% to 70.5%. The adsorption of Congo red dye by electrospun biocomposites fitted well with the Langmuir isotherm model and pseudo-second order kinetics, indicating a chemisorption nature. PHA2NCC (30.9%) has 3-fold higher dye removal percentage than that of PHA2Cts (10.5%). The results showed that Pickering emulsion is electrospinnable and recorded highest dye removal percentage in PHA3NCC1Cts (75.8%).

**Keyword:** Nanocellulose; Chitosan; Electrospinning; Pickering emulsion; PHA; Wastewater

