

## **Chitosan/polyethylene oxide (Peo) filled carbonized wood fiber conductive composite film**

### **Abstract**

Biopolymer-based conductive polymer composites (CPCs) would open up various possibilities in biomedical applications owing to ease of processing, renewable resource and environmentally friendly. However, low mechanical properties are a major issue for their applications. In this study, the conductivity of chitosan/ PEO blend films filled with carbonized wood fiber (CWF) prepared by solution casting. The effect of CWF was also investigated on tensile properties and their morphological surfaces. The tensile results from different ratios of chitosan/PEO blend films without CWF show that the tensile strength and modulus increased with the increase of chitosan content and chitosan/PEO blend film with 70/30 ratio exhibited the best combination of tensile strength and flexibility. However, a reduction of tensile strength was observed when CWF amount was increased while the modulus of the tensile shows an increment. The film also exhibited higher electrical conductivity as compared to low chitosan ratio. The addition of CWF greatly enhanced the conductivity three-fold from  $10^{-10}$  to  $10^{-6}$  S/cm. The electrical conductivity continued to increase with the increase of CWF up to 30 wt%. The surface morphology by Scanning Electron Microscopy (SEM) exhibits the absence of phase separation for the blends indicating good miscibility between the PEO and chitosan. Incorporation of CWF into the blend films at 5 wt% showed agglomeration. However, the increase of CWF created larger agglomerations that formed conductive pathways resulting in improved conductivity. FTIR analysis suggested that intermolecular interactions occurred between chitosan and PEO while CWF interacts more with the protons of PEO.

### **Keywords**

Carbonized wood fiber; Chitosan; Conductive polymer composites; Electrical conductivity; Polyethylene oxide