

## **Preparation of activated carbon filled epoxy nanocomposites.**

### **ABSTRACT**

Activated carbon derived from oil palm empty fruit bunch (AC-EFB), bamboo stem (AC-BS), and coconut shells (AC-CNS) were obtained by pyrolysis of agricultural wastes using two chemical reagents ( $H_3PO_4$  or KOH). The AC-EFB, AC-BS and AC-CNS were used as filler in preparation of epoxy nanocomposites. Epoxy nanocomposites prepared at 1, 5 and 10 % activated carbons filler loading using KOH and  $H_3PO_4$  chemical agents. Transmission electron microscopy confirms better dispersion of the nano-activated carbons in the epoxy matrix at 5 % activated carbon. The presence of 5 % AC-CNS in the epoxy matrix using  $H_3PO_4$  chemical reagent resulted in an improvement of the thermal stability of epoxy matrix. KOH treated AC filled epoxy nanocomposites were slightly better in thermal stability as compared to  $H_3PO_4$  treated AC filled epoxy nanocomposites, may be due to better interaction of filler with epoxy matrix. Thermal analysis results showed that thermal stability of the activated carbon filled epoxy nanocomposites improved as compared to the neat epoxy matrix. The degree of crystallinity of epoxy matrix was improved by adding the activated carbon due to interfacial interaction between AC and epoxy matrix rather than loading of AC alone. Developed nanocomposites from biomass (agricultural wastes) materials will help to reduce the overall cost of the materials for its demanding applications as insulating material.

**Keyword:** Epoxy; Nano-structure; Electron microscope; Thermal analysis; Activated carbon.