

## **The properties of recycled copper filled epoxy/unsaturated polyester composites**

### **Abstract**

A blend system between two different thermoset polymer, epoxy and unsaturated polyester at ratio 80/20 weight percentage (wt. %) with 10, 20, 30 and 40 volume percentage (vol. %) of recycled copper powder as conductive filler was investigated. The conductive polymer blend composites were undergone some characterization and testing which include flexural properties, hardness, thermal stability, electrical properties and scanning electron microscopy (SEM). The flexural strength of the unfilled system decreased as increasing of the recycled copper powder content. With the increase of recycled copper, from 0 vol.% to 40 vol.%, a total 350% of increment in flexural modulus was observed. The thermal stability of the blend polymer increased with the filler loading, from 140°C to 300°C, which was the 5% weight loss onset degradation temperature. The electrical conductivity properties of the blend composite shown the percolation threshold at 30 - 40 vol.% of recycled copper powder filler content, where the conductive blend composites change from insulator to conductor.

**Keywords** — Epoxy, polymer blend, recycled copper, unsaturated polyester