

## Synergistic effect of oil palm based pozzolanic materials/oil palm waste on polyester hybrid composite

### ABSTRACT

This research work aims to investigate the synergistic effect of pozzolanic materials such as oil palm ash (OPA) and oil palm empty fruit bunch (OPEFB) on the developed hybrid polymer composites. The OPEFB and OPA fillers of different particle sizes (250, 150, and 75  $\mu\text{m}$ ) were mixed at OPEFB:OPA ratios of (0:100; 20:80; 40:60; 60:40; 80:20 and 100:0) and incorporated into an unsaturated polyester resin. Furthermore, both mechanical and morphological properties of the composites were analyzed and it was found that tensile, flexural, and impact properties were significantly improved at OPEFB:OPA of 75  $\mu\text{m}$  particle size hybridization of the polymer. The increase of OPEFB to OPA filler ratio up to 80:20 significantly improved the tensile properties of the composites while 40:60 ratio of 75  $\mu\text{m}$  gave the optimum filler ratio to obtain the highest flexural and impact properties of the composites among all studied samples. Scanning electron micrograph images showed strong particle dispersion of the embedded fillers with resin which explained the excellent mechanical strength enhancement of the composite.

**Keyword:** Oil palm empty fruit bunch; Pozzolanic materials; Oil palm ash; Unsaturated polyester resin; Hybrid composites; Hybrid material