

## **Properties of coconut shell powder-filled polylactic acid eco-composites: Effect of maleic acid**

### **Abstract**

Ecocomposites were produced by incorporating coconut shell powder (CSP) into polylactic acid (PLA) resin. The effect of filler content and chemical modification on the mechanical properties, thermal properties, and morphology of PLA/CSP ecocomposites were investigated. The addition of filler has decreased the tensile strength and elongation at break of PLA/CSP ecocomposites. However, tensile strength and modulus of elasticity of PLA/CSP ecocomposites were enhanced by maleic acid treatment. Meanwhile, glass transition temperature ( $T_g$ ) and crystallinity ( $X_c$ ) of PLA/CSP ecocomposites increased at 30 php of filler content and increased the presence of maleic acid (MA). However, the melting temperature ( $T_m$ ) and crystallization temperature ( $T_c$ ) were not significantly changed with the filler content and MA modification. The thermal stability of PLA/CSP ecocomposites increased with the CSP content. The MA modification improved the thermal stability of PLA/CSP ecocomposites through better filler-matrix interaction. The improvement was confirmed by scanning electron microscope study.

### **Keywords**

Coconut shell powders; Crystallinities; Polylactic acid (PLA)