

## **Mechanical properties, water absorption, and swelling behaviour of rice husk powder filled polypropylene/recycled acrylonitrile butadiene rubber (pp/nbr/rhp) biocomposites using silane as a coupling agent**

### **Abstract**

The performance of rice husk powder (RHP) filled polypropylene (PP)/recycled acrylonitrile butadiene rubber (NBRr) biocomposites with and without coupling agent,  $\gamma$ -aminopropyltrimethoxysilane (APS), were investigated. The composites with different RHP filler loading (0 to 30 phr) were prepared in a Haake internal mixer. Mechanical properties, swelling behavior, and water absorption of PP/NBRr/RHP were studied. Increasing RHP loading in PP/NBRr/RHP biocomposites increased processing torque, tensile modulus, water absorption, and swelling in oil but decreased the tensile strength and elongation at break of the biocomposites. The  $\gamma$ -APS treated RHP composites exhibited higher processing torque, tensile strength, and tensile modulus but lower elongation at break when compared to untreated RHP composites. This is due to strong bonding between  $\gamma$ -APS treated RHP filler and PP/NBRr matrices. These findings were well supported by micrographs from the morphology studies. The  $\gamma$ -APS treatment on RHP improved the adhesion between RHP fiber and PP/NBRr polymer matrices, which led to less water and oil absorption into PP/NBRr/RHP/biocomposites.

### **Keywords**

Biocomposites; Coupling agent; Mechanical properties; Polypropylene; Rice husk powder; Swelling; Water absorption