

## **Effect of various coupling agents on properties of alumina-filled PP composites**

### **Abstract**

The effect of coupling agents on the properties of alumina-filled polypropylene (PP) has been studied. Several types of coupling agents such as silane Z-6020 ((Aminoethylaminopropyl) trimethoxysilane), 3-GPS (3-(Glycidyloxypropyl) trimethoxysilane), and titanium dioxide powder (TiO<sub>2</sub>) were employed either during compounding or before compounding i.e., at pre-treatment stage. The silane coupling agent was first diluted into ethanol in appropriate ratio and subsequently dried before compounding. In the case of titanate, the powder was directly mixed with alumina-PP compound during mixing using Brabender internal mixer. Series of mechanical tests such as tensile and flexural testing were carried out using Instron model 3366 machine in accordance to ASTM D368 and D790-92 respectively. It has been found that the tensile strength of alumina-filled PP composite has increased considerably when both types of coupling agents are added. PP filled alumina composite with titanium as coupling agent showed a greater value of tensile strength as compared to silane-treated and untreated alumina-filled PP composites. Similarly, the flexural strength recorded was higher as compared to the untreated system with silane-treated alumina-filled composites showing the most positive results of all the systems. Consequently, study on the impact properties showed that titanium has notably improved the impact resistance of alumina-filled PP composite as compared to silane-treated composite. Study on the scanning electron micrograph revealed that improved texture on the treated composite has allowed greater plastic deformation to occur with improved adhesion and interaction between filler and matrix.

**Keywords** — Adhesion, alumina, polypropylene (PP), silane, titanium dioxide