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LIKIT KULAVONG: REACTIVE COUPLING OF POLYPROPYLENE TO
CALCIUM CARBONATE FILLER. THESIS ADVISOR : ARUNEE TABTAING,
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Reactive coupling in polypropylene (PP) /calcium carbonate (CaCO_3) composites was carried out using a co-rotating twin screw extruder with filler loading in the range 0 to 0.25 volume fraction. This work was divided into two parts. In part I, the effects of various interfacial modifying agents on the properties of the composites were studied and in part II the effects of a multifunctional monomer, trimethylolpropane trimethacrylate (TMPTMA), was investigated.

Part I: It was found that reactive coupling can improve tensile yield stress with increasing CaCO_3 contents due to the reinforcing effect of the particulate CaCO_3 filler through the polymer-filler interphase. Non-reactive treatment led to improved impact strength due to the enhancement of plastic deformation of the matrix by debonding and the retardation of crack propagation. The presence of β -crystallinity was an influencing factor upon the impact strength of PP. Melt flow rates increased for coatings containing peroxide. DSC analyses revealed changes in crystallization behaviour of the PP upon addition of filler, especially with the reactive coupling system. The morphology of the composites for various compositions was examined using scanning electron microscopy (SEM) and related to their mechanical properties. The SEM clearly showed the effect of the reactive components at the PP/ CaCO_3 interphase.

Part II: The addition of the TMPTMA slightly reduced the molecular weight reduction due to the excess level of peroxide. The impact strength was enhanced due to the formation of a rubbery phase covering the filler surface. As in part I it was found that the tensile yield stress can be improved by reactively coupling CaCO_3 in filled PP.