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PORNSUDA HORANONT: A STUDY OF PHASE STRUCTURE  
FORMATION AND MECHANICAL PROPERTIES OF TERNARY COMPOSITES  
OF POLYPROPYLENE, ELASTOMER AND FILLER. THESIS ADVISORS:  
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Ternary composites of polypropylene (PP), elastomer and calcium carbonate ( $\text{CaCO}_3$ ) filler were investigated. Particular consideration was given to the influence of composite formulation, elastomer and filler characteristics, and processing methodology on the composite microstructure and mechanical properties. The composite structure was evaluated using various techniques including SEM, DMA, DSC and XRD. The mechanical tests included tensile and impact measurements. Various theoretical models were used in analysing the mechanical property data.

A study of composite microstructure has shown that two kinds of phase structure were formed, either a separate dispersion of the phases, or encapsulation of the filler by elastomer. Factors controlling these structures are believed to be due mainly to the surface characteristics of the components. The composite formulation and mixing sequences of each component in an extruder showed a minor influence. In this study, the use of polar ethylene vinyl acetate (EVA) elastomer resulted in composites with encapsulation structure. Composites containing non-polar ethylene-octene copolymer (EOR), on the other hand, showed separate dispersion of the components. The former composites, with good adhesion at the elastomer and filler interface, have higher tensile yield stress, while the latter variant is characterised by higher modulus and impact strength. Improvements in impact strength of the composites were also achieved by using stearic acid coated filler, instead of uncoated filler. Results of the present study have thus shown that phase structure and properties of ternary composites can be controlled, to some extent, by the use of suitable materials and appropriate mixing methodology.