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SAISAMORN LUMLONG: MODIFICATION OF SWELLING CLAYS FOR USE AS REINFORCING ADDITIVES IN POLY(VINYL CHLORIDE). THESIS ADVISORS: ARUNEE TABTIANG, Ph.D., RICHARD A. VENABLES, Ph.D., KRISDA SUCHIVA, Ph.D., 141p. ISBN 974-662-697-3

Poly(methyl methacrylate) (PMMA)-clay hybrids have been synthesised for use as reinforcing additives in Poly(vinyl chloride) (PVC). The hybrids were prepared through four methods: aqueous polymerisation, bulk polymerisation, solution polymerisation, and direct melt intercalation of PMMA. Characterisation of the hybrid clay structure, through measurements of the (001) plane d-spacings, using X-ray diffractometry, showed that the reaction products through solution polymerisation in the presence of organophylic clay were the desired delaminated nanocomposites. Subsequent melt processing of the reaction products resulted in reordering of the clay galleries via the partial exclusion of the polymer. The final gallery spacings were governed by the orientation and length of the pre-intercalated alkylammonium ions. The hybrids had markedly higher relaxation temperatures and storage moduli than the commercially produced PMMA.

PVC was melt mixed with the solution polymerisation hybrids; the hybrids were miscible with PVC and increased the modulus of the PVC formulations, particularly at elevated temperatures, in comparison with the conventional composite. The dispersed clay particles acted as stress concentrators in the PVC, and hence reduced the ductility of the composites.