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TEERANANT NAKINPONG: A STUDY OF THE PROPERTIES AND MORPHOLOGY OF LOW DENSITY POLYETHYLENE/LIQUID CRYSTALLINE POLYMER *IN-SITU* COMPOSITE FILMS.
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Melt blends of low density polyethylene, LDPE, with a thermotropic liquid crystalline polymer, TLCP, (copolyester of 60 mol% *p*-hydroxybenzoic acid and 40 mol% ethylene terepthalate, trade name Rodrun LC3000) were prepared in a co-rotating twin screw extruder. These polymers were mixed at different extrusion speeds. The concentration of TLCP was varied at 0, 10, 15, and 20 % by weight. Pellets of polymer blends were extruded through a microtruder to produce cast film. TLCP/PE blends were investigated in terms of rheological, mechanical properties and morphology. Thermal properties of the composite films and molecular ordering of TLCP phase were also examined.

Melt viscosity was measured using cone-and-plate rheometer at low shear rate and capillary rheometer at high shear rate. The viscosities of all components showed non-Newtonian behavior. The TLCP/PE viscosity ratios were in the range of 0.04-0.11 as measured by using capillary rheometer.

Mechanical properties of composite films such as the Young's modulus and tensile strength increased with increasing TLCP content. The size, shape and dispersion of TLCP fibers in the composite films were observed using OM and SEM. These were found to depend on the processing conditions and TLCP content. The dispersion of TLCP seems to be at optimum when using the twin screw extrusion speed of 100 rpm.

Thermal properties studied by differential scanning calorimetry revealed that TLCP phase might act as nucleation center for PE to crystallize. The order parameter of TLCP domain was investigated by polarized-FTIR. The results showed that increasing film draw ratio enhanced the order parameter of TLCP, but the extrusion speed had no influence on the orientation of TLCP molecules.