

368b Rheology of Reactive and High-Viscosity Polymers with Supercritical Carbon Dioxide

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The effects of using supercritical carbon dioxide (SCCO₂) to melt process reactive and high-viscosity polymers are studied. In particular, acrylonitrile/methyl acrylate copolymers (PAN/MA) are studied in an effort to develop a benign processing technology that eliminates the use of toxic organic solvents, and ultra-high molecular weight polyethylene (UHMWPE) is studied in an effort to broaden its processability beyond ram extrusion and compression molding. Capillary and slit-die rheometry are used to quantify the effect SCCO₂ has on the melt viscosity of middle (65%) to high (85%) AN content PAN/MA copolymers as well as various blends of UHMWPE. Carbon dioxide uptake and plasticization are quantified using mass flow measurements and thermal analysis techniques, including thermal gravimetric analysis (TGA) and differential scanning calorimetry (DSC).