

Abstract Submitted
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Shear and Extensional Flow-Induced Particle Orientation in Polypropylene/Clay Nanocomposites WESLEY BURGHARDT, ERICA MCCREARY, Northwestern University — Synchrotron-based in situ x-ray scattering is used to monitor the orientation of dispersed particles in molten polypropylene/clay nanocomposite melts during flow. Nanocomposite samples were prepared via twin screw extrusion processing, and the degree of clay exfoliation assessed in terms of the magnitude of the low frequency enhancement in viscoelasticity. In shear flow, an annular cone and plate flow cell is used which allows measurement of the degree and direction of particle orientation in the flow-gradient (1-2) plane. Samples were also studied in extensional flow, using an SER extensional flow fixture installed in a custom-built convection oven that provides x-ray access. In both shear and extensional flow, only a moderate degree of particle orientation is observed. Extensional flow studies are complicated by (i) the tendency of samples to fail at moderate Hencky strain, and (ii) a heterogeneous initial distribution of particle orientation in the SER specimens, prepared by compression molding of extruded pellets of the nanocomposite.

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