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Orientation of dilute multi-walled carbon nanotube suspensions in shear and planar extensional flow BINBIN LUO, WESLEY BURGHARDT, Northwestern University — Small-angle x-ray scattering is used to study flow-induced orientation in suspensions of multi-walled carbon nanotubes in viscous, uncured epoxies. Shear flow studies are performed in an annular cone and plate shear cell in which fluid structure is probed in the flow-gradient (1-2) plane, allowing measures of both the degree and direction of nanotube orientation. General orientation behavior is consistent with expectations of Brownian dispersions of elongated particles. At high Peclet number, the degree of orientation saturates, and the orientation angle approaches the flow direction. Interestingly, otherwise identical suspensions in two different epoxies of different viscosity yield dramatically different degrees of orientation, even when compared at comparable Peclet number. The same suspensions are studied in planar extensional flow, using a cross-slot flow cell, in order to probe the relative effectiveness of shear and extensional flow at promoting nanotube orientation.

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