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Effect of Curtet Number Variation on Dispersion of SWNTs in Epoxy Composites Prepared by a Continuous Impingement Mixing Process GOPINATH SUBRAMANIAN, MALCOLM ANDREWS, Texas A&M University — Dispersion of nanoparticles is a key issue in preparing nanocomposites. Preparation of polymer nanocomposites is normally done by batch processing, with nanoparticles synthesized in-situ by a chemical reaction, which leads to a good dispersion. However, the in-situ synthesis technique is not readily applicable to the dispersion of single wall carbon nanotubes (SWNTs). A novel approach is presented here to improve the dispersion of SWNTs in polymers to enhance the structural, electrical and thermal properties that uses a continuous, high output impingement mixing process. In particular, we report on the dispersion and properties of composites of SWNTs in a Shell EPON-862/W system. The primary mechanism of dispersion is a high-speed jet immersed in a secondary stream confined by a constant area duct. The degree of dispersion is governed by the Curtet number (C_t) calculated using the diameter ratio and the velocity ratio. It was found that dispersion was affected by a critical value for C_t of 0.75. Poor performance above the critical Curtet number is attributed to a reduction in residence time of fluid within the mixer. A series of composites with various SWNT loading were prepared at various C_t. The effect of C_t on the degree of dispersion was evaluated by scanning electron microscopy and electrical conductivity measurements. Percolation curves were also obtained.

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