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Morphology of PEDOT:PSS/SWCNT Composites: Insight into Carbon Nanotube Based Organic Thermoelectric Matrices THUSITHA ETAMPAWALA, Department of Chemistry, The University of Tennessee, Knoxville, TN, MEHRAN TEHRANI, Mechanical Engineering Department, The University of New Mexico, Albuquerque, NM, MARK DADMUN, Department of Chemistry, The University of Tennessee, Knoxville, TN and Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN — Carbon nanotube (CNT) loaded poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) nanocomposites are promising materials as the active layer in organic thermoelectric devices. Improvements in the thermoelectric performance of these nanocomposites have been hampered by the lack of an understanding of the correlation between thermo-electrical performance and morphology. In this study, the morphology of highly conducting single walled CNT/PEDOT:PSS nanocomposites were probed by small and ultra-small angle neutron scattering (SANS and USANS respectively) as a function of CNT loading (10wt%, 30wt% and 50wt%,), sonication duration to control the CNT dispersion, and presence and absence of ethylene glycol (EG) in the deposition solution of PEDOT:PSS. The morphology of these composites is currently being correlated to their thermo-electric performance. The SANS and USANS profiles were analyzed with the hierarchical Beaucage model. Further, the USANS data were fit to a two ellipsoidal form factor, which is consistent with the analysis of the USANS data by the Beaucage model and SEM results. These results reveal that the sonication duration and presence of EG effectively de-bundle the CNTs and disperse them in the PEDOT:PSS matrix.

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