Morphology Characterization of Polymer Nanocomposites using Electron Tomography and Analytical TEM LAWRENCE DRUMMY, UES Inc., RICHARD VAIA, Air Force Research Laboratory — Polymer nanocomposites often display complex hierarchical structures that require high resolution morphological and chemical analysis. Here we describe methods for and quantitative results from electron tomography of polymer/layered silicate nanocomposites. High angle annular dark-field scanning transmission electron microscopy (HAADF-STEM) and subsequent tomographic reconstruction produced fully segmented 3D data sets from the nanocomposites. A 3D power spectrum of the fast Fourier transform (FFT) was calculated, radially integrated, and compared with the one dimensional SAXS from the same sample. As a tool for determination of nanoparticle global dispersion, the analysis revealed good agreement between the techniques from the sub-nm regime up to a length scale of 1 micron. Currently, energy filtered TEM and energy dispersive spectroscopy in STEM mode are being investigated for providing high spatial resolution chemical information at interfaces and inhomogeneities in polymer nanocomposites.

Lawrence Drummy
UES Inc.

Date submitted: 30 Dec 2008   Electronic form version 1.4