Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Toward Reconciliation of STEM and SAXS Data from Ionomers by Investigating Gold Nanoparticles NICHOLAS BENETATOS, Univ. of Pennsylvania, Dept. of Materials Science and Eng., BRIAN SMITH, Medical Sciences Div., Fox Chase Cancer Center, PAUL HEINEY, Univ. of Pennsylvania, Dept. of Physics and Astronomy, KAREN WINEY, Univ. of Pennsylvania, Dept. of Materials Science and Eng. — We have recently pioneered the use of scanning transmission electron microscopy (STEM) for direct, model independent imaging of the nano-scale morphology of ionomers. To date, the sizes of ionic aggregates determined in STEM experiments are inconsistent with SAXS data interpreted by the Yarusso-Cooper model. To address this discrepancy we have investigated a pair of model nanoparticles (11 and 55 atom Au clusters) with both STEM and SAXS. Using this model system we have improved our method of measuring nanometer scale objects and evaluated the importance of STEM probe size and specimen thickness. While the size of the STEM probe was inconsequential, specimen thicker than 50 nm showed significant depreciation of image quality, which limits our ability to accurately measure particle size. SAXS was performed on dilute suspensions of nanoparticles and fit using a monodisperse, hard-sphere form factor model. For Au11, STEM finds a diameter of 1.3 nm + .14 and SAXS finds a diameter of 1.4 nm. Similarly, both STEM and SAXS determine a diameter of 1.7 nm for Au55. Analysis of these model systems have allowed us to evaluate several factors of potential importance in reconciling STEM and SAXS data from ionomers.

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Date submitted: 29 Nov 2004 Electronic form version 1.4