Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

NEXAFS Spectra of Conjugated Polymers: Contrast Mechanisms for Soft X-ray Characterization of Electronic Polymer Structures
TOHRU ARAKI, BENJAMIN WATTS, North Carolina State University, JAN LUNING, Stanford Synchrotron Radiation Laboratory, HARALD ADE, North Carolina State University — Electronic devices based on conjugated polymers promise to revolutionize both display and solar cell technologies with significant advantages over conventional inorganic based devices. However, progress in this field is hampered by the fact that many conventional characterization techniques, such as electron microscopy and neutron and hard X-ray scattering and reflectivity, are difficult to apply to polymer blend structures due to poor contrast. On the other hand, polymer structures can be similarly characterized via a variety of soft X-ray techniques that have a strong intrinsic contrast mechanism based on the near edge X-ray absorption fine structure (NEXAFS) resonances of the component polymers. Here, we present a database of calibrated NEXAFS spectra of conjugated polymer materials, including polythiophene, poly phenylenevinylene and polyfluorene based polymers. These spectra illustrate the level of contrast that is achievable with soft X-ray techniques when utilizing specific resonant photon energies, which will be demonstrated with some example data.

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Date submitted: 20 Nov 2006 Electronic form version 1.4