Soft x-ray spectromicroscopy of polymer blends and polymer nanocomposites

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For the polymer blend research, chemical sensitivity with sub micron spatial resolution as provided in Near Edge X-ray Fine Structure (NEXASF) microscopy is the key characterization technique. We have been studying a number of polymer blends, including immiscible polymers with inorganic additives, such as nano-clays and carbon nanotubes, and blends exposed supercritical carbon dioxide treatment. All measurements were done at Polymer STXM (Scanning Transmission X-ray Microscopy) station, beamline 5.3.2 at Advanced Light Source. An example of the raw data prior to collapse of the information into a single RGB image is shown in Fig. 1, clearly showing the observed blend morphology in a tertiary PS/PMMA/PVC blend.

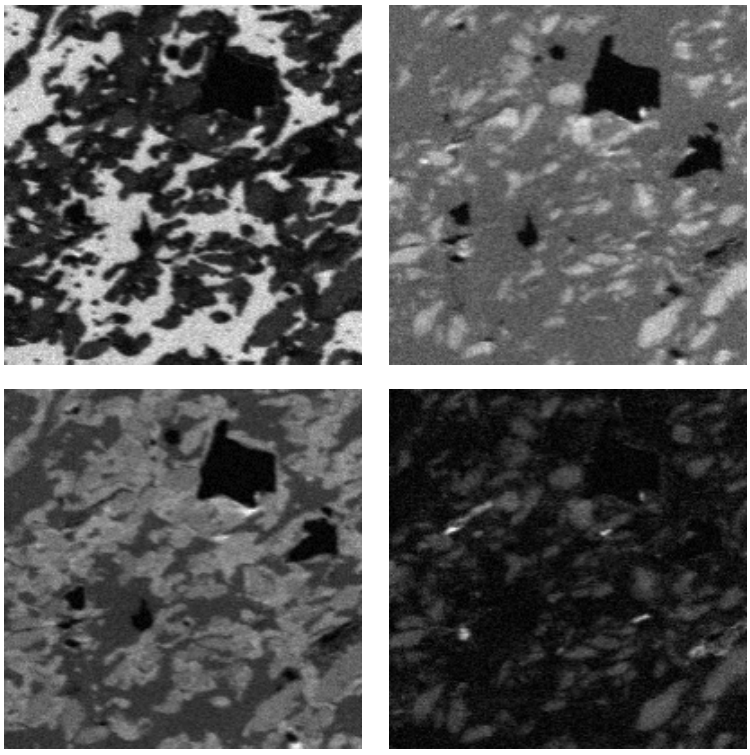

Figure 1: Images show the STXM optical density images of PS/PMMA/PVC polymer blends with nano-clay samples. Each image were taken at the characteristic photon energies for each component (left top : PS, right top : PMMA, left bottom : PVC, right bottom : clay). $(20\ \mu m)^2$, 100 nm/pixel