

Title: Soft x-ray characterisation of organic semiconductor devices

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Abstract:

Organic semiconductor devices such as organic solar cells and organic field-effect transistors are based on blended and/or multilayered structures. Many organic semiconductors used in high-performance devices are also semicrystalline or liquid crystalline with a complex relationship between film microstructure and device performance. Unravelling structure–function relationships in organic semiconductor devices therefore requires structural probes that have high chemical specificity, sensitivity to molecular orientation and order and high spatial resolution. Soft X-rays have proven to be versatile in spectroscopy, microspectroscopy and scattering experiments providing contrast derived from differences in the near-edge X-ray absorption spectra of different organic semiconductors. Furthermore, the sensitivity of polarised soft X-ray beams to the orientation of bonds in organic materials makes them a unique probe of molecular orientation. In this talk, I will provide an overview of the range of microscopy, reflectivity and scattering techniques based on soft X-rays that have been developed in recent years and their utility for providing new insight into the complex structure of organic semiconductor thin films.