Polymer and hybrid nanostructures for applications in organic solar cells investigated with advanced x-ray techniques

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The investigation of nanostructures at surfaces, interfaces and in thin films requires dedicated analytical techniques, which provide information from a molecular to a mesoscopic scale. In particular, it is challenging to detect the complex morphologies which are necessary to have high efficiency organic solar cells. In such solar cells the active layer is sandwiched between multiple other layers, the devices make use of a thin-film geometry and structures need to be detected from the crystalline arrangement of the molecules to mesoscopic domain sizes. The advanced scattering techniques grazing incidence small and wide angle x-ray scattering (GISAXS and GIWAXS) allow for a determination of such structures [1-4]. The use of different scattering geometries including micro-focused x-ray beams as well as novel techniques such as grazing incidence resonant soft X-ray scattering (GI-RSoXS) using different X-ray energies are applied to investigate organic solar cells. Examples based on conducting photoactive polymers and hybrid nanostructures are presented [5,6].

References