Poster Presentation

MS87.P04

Synchrotron X-ray Scattering techniques for soft matter industrial research and development

M. Sztucki[1], M. Burghammer[1], O. Konovalov[1], E. Mitchell[1], T. Narayanan[1]

[1]*European Synchrotron Radiation Facility, Grenoble, France*

Consumer products based on soft matter technology often exhibit macroscopic properties which are strongly dependent on their micro- and nano-structures extending over multiple size scales. Synchrotron scattering techniques are ideally suited for probing these multilevel structures and deliver complementary and in some cases unique information as compared to real space methods like confocal microscopy, cryo-electron microscopy or atomic force microscopy. The European Synchrotron Radiation Facility (ESRF) is a world-leading synchrotron light source which operates several state-of-the-art instruments for the investigation of soft materials and offers expertise to academic and industrial users. Fast and flexible access for proprietary experiments with a modular, fine-tuned service is guaranteed. A range of dedicated sample environments which mimic industrial processing conditions are available. This presentation will illustrate the state-of-the-art performance of the following synchrotron scattering techniques by recent examples of industrial relevance. Simultaneous small and wide angle X-ray scattering (SAXS/WAXS) is a powerful method to determine the microstructure and phase behavior of multi-component systems like detergents, food products, pharmaceutical components, polymer composites, etc. The high photon flux translates to high throughput measurements, while the high degree of collimation and resolution permit to elucidate a wide range of length scales from a few Angstroms up to micron scale. Scanning microbeam SAXS/WAXS and single micro-crystal/fiber diffraction (μXRD) allows elucidating the local nanostructure of very small objects like micro-specimens of composite organic/inorganic materials, teeth, bones, micromechanical parts, polymer fibers, micro fluidics, etc. with micro/nanometric real space resolution. X-ray reflectivity (XR) and grazing incidence diffraction/scattering (GID /GISAXS) can reveal the nanoscale structure and complexity of nano-structured complex fluids at interfaces, organic films, biological membranes, etc.

Keywords: X-ray scattering, soft materials, industry