

X-ray scattering based methods for industrial applications – a focus on the small angles

SAXSLab Sapienza is one of the laboratories for the structural characterization of matter at the nano- and meso-scale by means of X-ray techniques which are available at the Sapienza University of Rome, for the academic community and external users.

The instrument is capable of small angle X-ray scattering (SAXS), wide angle X-ray scattering (WAXS) and grazing incidence small angle scattering (GISAXS) experiments.

By means of SAXS analysis it is possible to characterize electron density inhomogeneities of the order 1-100 nm. It can therefore help answer relevant questions in the fields of formulation science and materials development, by studying size and shape of macromolecules or colloidal aggregates in solution, characteristic distances in partially ordered samples in the form of liquids, gels, pastes and powders, size of pores of porous materials, correlation lengths in networks....

These scattering techniques provide averaged information which is statistically representative of a macroscopic portion of the sample; the relatively simple experimental setup has the big advantage of requiring minimal and simple sample preparation, making it possible to characterize a system as a function of several experimental parameters.

The available setup will be described, and some representative examples of experiments performed at SAXSLab Sapienza in the first two year of operation will be shown, spanning micelles, proteins, liquid crystalline phases, composite and nanostructured materials.