

Poster Presentation

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SUNBIM a package for X-ray imaging of materials with SWAXS & GISWAXS techniques

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SUNBIM (Supramolecular & SUBmolecular Nano & Bio Materials X-ray IMaging Project) is a suite of integrated programs developed, in collaboration with Rigaku Innovative Technologies, to treat Small and Wide Angle X-ray Scattering data, collected either in transmission geometry (SAXS/WAXS) or in reflection geometry (GISAXS/GIWAXS). In addition, a specific routine to collect and analyze data in SAXS scanning transmission microscopy has been developed as additional tool to investigate tissues or material science samples through a focused X-ray beam which is used to raster scan a specimen while acquiring SAXS scattering patterns with a 2D detector. Indeed, a first-generation-synchrotron-class FrE+ SuperBright Rigaku microsource, coupled to a three pinhole S-MAX3000 camera, was recently installed at the X-ray MicroImaging Laboratory (XMI-L@b) and used with success in SAXS/WAXS/GISAXS/GIWAXS experiments (De Caro et al, 2012; 2013) and for SAXS scanning microscopy (Altamura et al, 2012; Giannini et al, 2013). The SUNBIM package was developed and interfaced to the XMI-L@b to perform: i) q-scale calibration and 2D->1D folding on SAXS/GISAXS/WAXS data, including also possible eccentricity corrections studied in the case of WAXS/GIWAXS data (Cervellino et al., 2006; 2008); ii) background evaluation and subtraction, denoising and primary beam angular divergence deconvolution on SAXS/GISAXS profiles (De Caro et al, 2012; 2013); iii) indexing of 2D GISAXS frames (Tate et al., 2006) and extraction of 1D GISAXS profiles along specific cuts; iv) scanning SAXS microscopy: collection of SAXS data in a mesh across mm² area, composite of the as-collected 2D SAXS frames into a single image, analysis of the composed data to derive the transmitted intensity microscopy as well as the distribution and orientation of nano-scale structures over the analyzed area (Bunk et al., 2009).

[1] Altamura, D., Lassandro, R., De Caro, L., Siliqi, D., Ladisa M. & Giannini, C. (2012). *J. Appl. Cryst.* 45 869–873, [2] Giannini, C., Altamura, D., Maria Aresta, B., Sibillano, T., Siliqi, D. & De Caro L., (2013). *Lens Less Scanning X-ray Microscopy with SAXS and WAXS contrast*. Book Title: *Synthesis and characterization of inorganic micro and nano-materials* Edited by: Angela, [3] De Caro, L., Altamura, D., Sibillano, T., Siliqi, D., Filogrosso, G., Bunk, O. & Giannini, C. (2013). *J. Appl. Cryst.* 46, 672-678.



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