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Opportunities for the study of surfaces and interfaces in soft condensed matter at the SIRIUS beamline of Synchrotron SOLEIL

The SIRIUS beamline of the Synchrotron SOLEIL is dedicated to X-ray scattering and spectroscopy of surfaces and interfaces, covering the tender to mid-hard X-ray range (1.1-13 keV) [1,2]. The beamline has hosted a wide range of experiments in the field of soft interfaces and beyond, providing various grazing incidence techniques such as diffraction and wide angle scattering (GIXD/GIWAXS), small angle scattering (GISAXS) and X-ray fluorescence in total reflection (TXRF). Systems studied belong to various fields of interfacial science, and encompass organic layers, block copolymers, MOFs, graphene oxide, solar cells ... SIRIUS also offers specific sample environments tailored for in situ complementary experiments on solid [3] and liquid surfaces. Recently, the beamline has added compound refractive lenses associated with a transfocator, allowing for the X-ray beam to be focused down to $10\ \mu\text{m} \times 10\ \mu\text{m}$ while maintaining a reasonable flux on the sample. We have also equipped our Langmuir trough with a UV-visible spectrometer, to extend the range of in situ measurements complementing the X-ray acquisitions.

[1] P. Fontaine, G. Ciatto, N. Aubert and M. Goldmann, *Science of Advanced Materials* 6, 2312–2316 (2014).

[2] A. Hemmerle, N. Aubert, T. Moreno, P. Kékicheff, B. Heinrich, S. Spagnoli, M. Goldmann, G. Ciatto and P. Fontaine, *Journal of Synchrotron Radiation* 31, 162-176 (2024).

[3] M. Galerne, B. Heinrich, A. Hemmerle, P. Fontaine, N. Giuseppone and P. Kékicheff, *ACS Appl. Polym. Mater.* 3, 661-670 (2021).

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Thin films and interfaces in soft matter and materials science

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