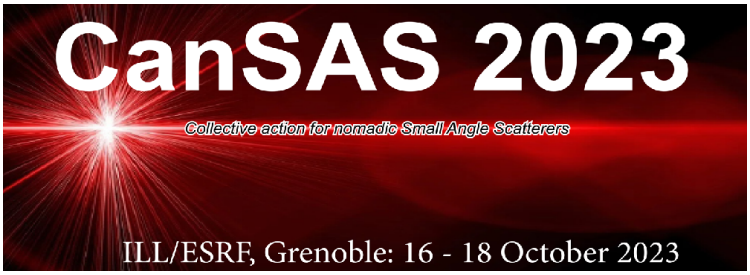

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Real Space and Reciprocal Space Mapping in Small Angle

Tuesday, 17 October 2023 09:00 (30 minutes)

The Advanced Photon Source of the Argonne National Laboratory in the United States is currently undergoing a shutdown in order to upgrade its storage ring to a multi-band achromat. The expectation is to recommence operations of the ring in the year 2024. Accordingly, the 12-ID-C beamline, which is a dedicated Small-Angle X-ray Scattering (SAXS) beamline, has been actively developing a setup to maximize the potential of the coherent property and high brilliance of the new beam.
The primary focus of the setup is to facilitate micro-focus SAXS/WAXS (Wide-Angle X-ray Scattering) experiments. Leveraging advanced fast positioning and counting electronics, this setup will allow a range of applications including scattering imaging, radiography, and reciprocal space mapping for crystallography. In addition, the new x-ray source will also unlock the capability of coherent scattering imaging. Consequently, both real space and reciprocal space can be comprehensively mapped in a single configuration.
During this presentation, I will present two science cases on supercrystals [1, 2]. These supercrystals are composed of DNA grafted gold nanoparticles achieved through DNA hybridization interactions. To decipher the spatial distribution of these crystals, a combination of real space ptychographic imaging and reciprocal space mapping, along with scanning imaging, have been employed in a complementary manner. These methods collectively provide insights into the intricate arrangement of the crystals, offering a comprehensive understating of the structures.

1. H. A. Calcaterra, C. Y. Zheng, S. Seifert, Y. Yao, Y. Jiang, C. A. Mirkin, J. Deng, B. Lee, Hint of Growth Mechanism Left in Supercrystals, ACS nano, 2023, 17, 15999
2. C.Y.Zheng, Y. Yao, J. Deng, S. Seifert, A.M. Wong, B. Lee, C.A. Mirkin, Confined Growth of DNA-Assembled Superlattice Films, ACS nano, 2022, 16, 4813

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