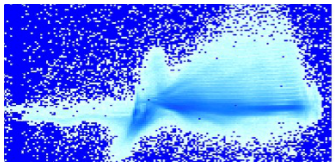

COHERENCE 2024
11th International Conference
on Phase Retrieval
and Coherent Scattering

MAX IV

Contribution ID: **61** Type: **Oral**

Unlocking the potential of ptychographic imaging with upgraded coherent sources

Monday, 17 June 2024 16:50 (15 minutes)

Recent breakthroughs in electron storage rings have enabled a notable increase in coherent X-ray flux, promising a potential acceleration in coherent imaging speed by several orders of magnitude. However, realizing this speed enhancement requires concurrent advancements in instrumentation and computation algorithms for X-ray ptychography. At the Advanced Photon Source, we have developed high-speed ptychographic scanning that offers distinct advantages in handling decoherence effects, mitigating radiation damage, and providing capability of imaging large 3D volumes. With a prototype pixel area detector operating continuously at 20 kHz, a fast ptychographic scan was showcased at a remarkable scanning speed of 4 mm/s. Furthermore, we demonstrated high-speed ptychographic tomography on lithium nickel manganese cobalt oxide (NMC) samples with dimensions of approximately 10 microns, achieving completion within just a few minutes. These developments will unlock new possibilities for utilizing X-ray ptychography to expolre samples into the fourth dimension. This includes enabling the observation of chemical states across relevant energy edges and monitoring sample evolution in in-situ environments.

This work was performed at the Advanced Photon Source, a U.S. Department of Energy Office of Science User Facility under Contract No. DE-AC02-06CH11357.

Primary authors: DENG, Junjing (Argonne National Laboratory); JIANG, Yi (Argonne National Laboratory); MARIN, Fabricio (Argonne National Laboratory); PREISSNER, Curt (Argonne National Laboratory); Dr LAI, Barry (Argonne National Laboratory)

Presenter: DENG, Junjing (Argonne National Laboratory)

Session Classification: Instrumentation and method development - S1