Remote Experiments at SRS Beamlines at Advanced Photon Source

Wenqian Xu[1], Andrey Yakovenko[2]

[1]N/A [2]Argonne National Laboratory

wenqianxu@anl.gov

The Structural Science (SRS) group at the Advanced Photon Source (APS) operates four high energy powder diffraction and total scattering beamlines. The user experiments span across a wide range of research fields in chemistry and materials science and concentrate on several major ones such as energy storage, materials synthesis, catalysis and so on. Over 80% of the user experiments are in situ and operando experiments, which post significant challenge for remote operations during the Covid time. To combat the challenges, efforts were made to automate sample change, experiment control and to enable many types of in situ experiments. A sample changer system was developed at 17-BM, handling capillary samples in sequence for temperature-controlled experiment. Also developed was a multi-channel gas flow cell stage, which reduces the frequency of sample change and allows for more automated control. Not only serving experiments that requires gas flow, the stage is also used for solid state synthesis or hydrothermal synthesis experiments with or without a gas pressuring system. A new mail-in service at 11-ID-B and 17-BM launched right before the pandemic provides users with ex situ measurements of PDF and XRD data from area detectors. The APS-wide deployment of the NoMachine software has been crucial for the navigation of our user programs through the past two years.