

Synchrotron high-energy x-rays for materials research with complex sample environments

Yang Ren¹

¹Argonne National Laboratory, Argonne, United States

E-mail: ren@aps.anl.gov

The availability of high-brilliance synchrotron high-energy x-rays generated has significantly advanced the field of materials research, especially for in-situ operando studies of functional materials in realistic conditions. In this talk, we will focus on applications of synchrotron high-energy x-rays in structural characterization of various advanced materials in bulk forms or nanoscale phases under complex sample environments (e.g., low/high temperature, pressure/stress, magnetic/electric fields, electrochemical conditions). Technical details and scientific research opportunities with synchrotron high-energy x-rays will be presented, together with some recent results in different research areas, ranging from in-situ study of the superior mechanical property of transforming metal nanocomposites to in operando characterization of rechargeable Li-ion batteries. (Use of the APS was supported by the U. S. DOE, Office of Science, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.)

Keywords: [synchrotron high-energy x-rays, materials science](#)