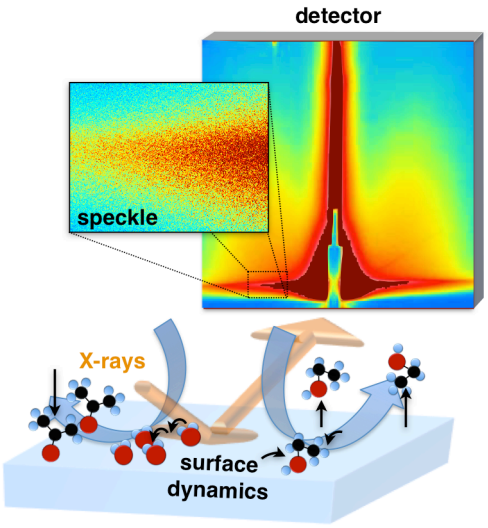
Coherent High-Energy X-ray Sector for *In Situ* Science (CHEX Sector)

Point of Contact:
Brian Stephenson
Materials Science Division
Argonne National Laboratory
630 252 3335 stephenson@anl.gov

Principal Developers:
Hawoong Hong (ANL/APS)
Hua Zhou (ANL/APS)
Paul Fenter (ANL/CSE),
Tim Fister (ANL/CSE)
Nenad Markovic (ANL/JCESR)
Paul Fuoss (ANL/MSD)
John Mitchell (ANL/MSD)
Bilge Yildiz (MIT)
Michael Bedzyk (Northwestern Univ.)
Sossina Haile (Northwestern Univ.)
Fred Walker (Yale Univ.)



Images courtesy of D.D. Fong and K. F. Ludwig [Rainville 2015].

Abstract:
The Coherent High Energy X-ray Sector for *In Situ* Science will advance the frontier for *in situ,* real time studies of materials synthesis and chemical transformations in natural operating environments using the unprecedented coherence of the high-energy x-ray beams provided by the APS Upgrade. Coherent diffractive imaging and photon correlation spectroscopy will provide transformative insight into materials structure, its heterogeneity and disorder, chemical and long-range interactions, dynamics, and evolution under real-world conditions and time frames. Beamlines will be optimized for coherent x-ray techniques at the high energies (15-60 keV) needed for *in situ* studies. Multiplexed, simultaneously operating beamlines will efficiently accommodate large, complex apparatus and amplify the beamtime available for programs to address high-impact problems.