

Progress in nuclear resonant and inelastic x-ray scattering studies under high pressure

E. E. Alp⁽¹⁾, W. Bi^(1,2), J. Zhao⁽¹⁾, M.Y. Hu⁽¹⁾, T. S.Toellner⁽¹⁾, A. Alatas⁽¹⁾, A. Said⁽¹⁾, J. Bass⁽²⁾

⁽¹⁾Advanced Photon Source, Argonne National Laboratory, Argonne Illinois 60439

⁽²⁾Department of Geology, University of Illinois at Urbana-Champaign, IL 61820

Nuclear resonant scattering (NRS) and inelastic x-ray scattering (IXS) studies under pressure continues to be very popular among COMPRES Users. We made some methodological and instrumental advances in the last year based on the feedback we receive from the User community. At present, Advanced Phonon Source has dedicated beamlines for high- energy resolution (1-2 meV) IXS studies (Sector 3 and 30). Additional capabilities exist at Sector 16 for NRS studies. Some of these beamlines have temperature control (4-4000 K), on-line pressure readout systems, and gas membrane DAC's. There are attempts to coordinate beamtime to combine x-ray diffraction with inelastic or nuclear resonant studies, but the coordination efforts are in their infancy, as the proposals to different beamlines are not linked.

We will present new results on iron, and tin based nuclear resonant studies, including isotope fractionation measurements in iron and tin compounds, kinetics of phase transformations under varying temperature and pressure in iron. We will highlight the use of APS Hybrid mode for synchrotron Mössbauer Spectroscopy. We will point out some of the expected changes in the near future.

This work is supported by U.S. Department of Energy (DOE), Office of Science, Basic Energy Sciences under contract DE-AC02-06CH11357, and the Consortium for Materials Properties Research in Earth Sciences (COMPRES) [National Science Foundation (NSF) EAR 06-49658]. E. Alp thanks W. Sturhahn and N. Dauphas for discussion of the data analysis.