Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Micro-Focused MHz Pink Beam for Time-Resolved X-Ray Emission Spectroscopy[1] MING-FENG TU, GILLES DOUMY, Argonne National Laboratory, ANDRE AL HADDAD, Paul Scherrer Institute, ANNE MARIE MARCH, STEPHEN SOUTHWORTH, Argonne National Laboratory, YOSHIAKI KUMAGAI, Tokyo University of Agriculture and Technology, DONALD WALKO, LINDA YOUNG, Argonne National Laboratory, CHRISTOPH BOSTEDT, Paul Scherrer Institute — X-ray emission spectra (XES) in the valence-to-core (vtc) region offer direct information on occupied valence orbitals. They emerge as a powerful tool for the ligand identification, bond length, and structural characterization. However, the vtc feature is typically two orders of magnitude weaker than Kα emission lines, making it hard to collect, especially for transient species. To overcome the difficulty, pink beam excitation capability was demonstrated recently at Sector 7 of the Advanced Photon Source. A water-cooled at mirror rejects higher harmonics, and beryllium compound refractive lenses (CRLs) focus the reflected fundamental beam (pink beam) to a $40\mu m$ x $12\mu m$ elliptical spot at sample target that matches the laser spot size used for photoexcitation. With an X-ray flux of 10^{15} photons per second, non-resonant XES spectra were taken on iron(II) hexacyanide and on photoexcited iron(II) tris(2, 2-bipyridine). We could reproduce previous measurements with only a fraction of the acquisition time, demonstrating the ability to measure high quality spectra of low concentration species.

[1]This work was supported by the U.S. Department of Energy, Office of Science, Basic Energy Sciences, Chemical Sciences, Geosciences, and Biosciences Division.

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Date submitted: 01 Feb 2019 Electronic form version 1.4