Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Micro-Focused Pink Beam For Time-Resolved X-Ray Emission Spectroscopy[1] MING-FENG TU, ANDRE AL HADDAD, GILLES DOUMY, STEPHEN SOUTHWORTH, ANNE MARIE MARCH, YOSHIAKI KUMAGAI, DONALD WALKO, LINDA YOUNG, CHRISTOPH BOSTEDT, Argonne National Laboratory — 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 $K\alpha$ 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 flat mirror rejects higher harmonics, and beryllium compound refractive lenses (CRLs) focus the reflected fundamental beam (pink beam) to a $40\mu m$ x $10\mu m$ 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) ferrocyanide 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]Work was supported by the U.S. Department of Energy, Office of Science, Chemical Sciences, Geosciences, and Biosciences Division

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Date submitted: 26 Jan 2018 Electronic form version 1.4