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Time-resolved x-ray excited optical luminescence studies of II-VI semiconductor nanowires[1] R.A. ROSENBERG, G.K. SHENOY, Argonne National Lab, S.-T. LEE, City University of Hong Kong, China, P.-S. G. KIM, X.-T, ZHOU, T.K. SHAM, University of Western Ontario, Canada — Due to quantum confinement effects nanostructures often exhibit unique and intriguing fluorescence behavior. X-ray excited optical luminescence (XEOL) provides the capability to chemically map the sites responsible for producing low energy (1-6 eV) fluorescence. By taking advantage of the time structure of the x-ray pulses at the Advanced Photon Source, it also possible to determine the dynamic behavior of the states involved in the luminescence. In this presentation we show how this technique can be utilized to understand the XEOL from ZnS, ZnTe, and ZnO nanowires. Time-gated optical spectra show that the high-energy, band-edge states have a short lifetime while the lower-energy, deep-levels have a relatively long lifetime. X-ray excitation curves are obtained using the relevant optical photons as signals and compared to the corresponding x-ray absorption spectra. We will show how these results enable us to determine the local structure of the luminescent site(s).

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