CENTER FOR SCIENTIFIC STUDIES IN THE ARTS

A COLLABORATION BETWEEN NORTHWESTERN UNIVERSITY AND THE ART INSTITUTE OF CHICAGO

New Inorganic and Analytical Chemistry Enabled by Modern Benchtop XAFS and XES Spectrometers: Batteries, Catalysts, Nuclear Materials, Nanophases, and More

X-ray absorption fine structure (XAFS) and very high resolution x-ray fluorescence spectroscopy, usually called x-ray emission spectroscopy (XES), are premier x-ray spectroscopies that have led to many important discoveries in contemporary chemistry. However, XAFS and XES have an access model that is unlike the overwhelming majority of other analytical methods: they have been almost exclusively available only at world-class facilities, i.e., the synchrotron x-ray light sources, without any lower-capability, higher-access modes to allow for education, routine analytical use, or 'ordinary' research activities.

In this talk, I'll describe my group's work that has helped lead to an ongoing renaissance of lab-based XAFS and XES using only conventional x-ray tubes. After summarizing the technology, I'll emphasize many applications that share a common characteristic: progress requires iterated rapid (often daily) feedback to answer a specific analytical metric. Such problems are of course technically feasible at synchrotron light sources, but they are a poor fit with both the facility's mission and its access model. Instead, the specialist techniques of XAFS and XES need to be made routine. Examples will include undergraduate education, improving InP quantum dot LED's, *in situ* studies of pouch cells batteries, the quantification of hexavalent Cr faction for regulatory purposes and for nuclear storage glasses, and oxidation state analysis of uranium that could someday be used for in-line monitoring of molten salt reactors.

Gerald Seidler
University of Washington
Thursday, Sept. 20th, 2018
Segal Design Inst. ITW Classroom, #1-350
10:00a.m.-11:00a.m.

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