

### **APS WK #3: Biological Studies via X-ray Fluorescence and Ptychography at the Bionanoprobe**

Time: 1 ½ days

Date: Tuesday, April 21 – Wednesday, April 22

Workshop location: Building 446, APCF Conference Room (Tuesday) LOM 433 Conference Room (Wednesday 1/2 day)

Organizers: Si Chen (APS) and Gayle Woloschak (Northwestern University)

Description: The Bionanoprobe (BNP) at the APS is a facility optimized for the visualization of structure and trace elemental content of biological samples at both room temperature and in cryogenic conditions. The instrument is routinely operated at sub-100 nm spatial resolution for elemental mapping, and recently enables ptychography with a pixelated detector to achieve 15 nm resolution. Both fluorescence and ptychographic measurements are extendable to 3D imaging via tomographic method to obtain internal information of individual cells non-destructively. Many science areas have been revolutionized by the use of the BNP including elemental homeostasis, molecular pathology, bionanotechnology, intra/extra-cellular signaling, etc. To exploit the opportunities of the upgrade of the APS, a second-generation BNP is under design with the goal to enable high-throughput studies with sub-10 nm resolution and 'a-few-atoms' elemental sensitivity. Optimization in sample preparation is also essential to fully realize the potential of nanoimaging. This workshop will serve to strengthen collaborations between communities of biological/biomedical research and nanoimaging. It will stimulate discussions to identify and explore new scientific opportunities to make the most use of the next-generation facility. The workshop will also include a half-day hands-on training session on the operation of x-ray fluorescence microscopy instrument as well as some of the principles behind sample preparation and data analysis.