

## **APS WK#1: Ultrafast X-ray Techniques for Monitoring Dynamic Structural and Electronic Responses at the Nanoscale**

**Organizers:** Burak Guzelturk (APS) and Donald A. Walko (APS)

Interconversion of energy between light, electricity, and heat is at the heart of many important technologies such as optoelectronics, photocatalysis, and thermoelectrics. Developing next-generation devices reaching thermodynamic efficiency limits requires developing a deeper understanding of energy conversion processes at the nanoscale as well as the ability to manipulate these processes on demand. To this end, it is important to realize techniques that can track evolution of energy conversion and transport in nanostructured materials with high temporal and spatial resolution--however this has proven challenging using existing conventional methods.

In this workshop, we will bring together researchers from different disciplines investigating energy conversion dynamics using materials that are either intrinsically nanosized (quantum dots, nanowires, etc.) or have heterogeneities at the nanoscale (e.g., halide perovskites). Particular attention will be paid to measurement techniques that will benefit from the APS-U, such as picosecond pair-distribution function (TR-PDF) and time-resolved nanoprobe x-ray microscopy, via the improvements in high-energy flux and brightness, respectively. We will further discuss potential needs to resolve picosecond thermal and electronic dynamics in nanostructured materials.