**Introduction of XAFS and its applications**

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**Abstract**

X-ray absorption fine structure (XAFS) is a powerful tool to investigate local atomic structures in matter. XAFS can select a specific type of atom as a probe atom and measure the structural environments near the probe atom. XAFS can therefore describe the bond lengths, bond-length distributions and the species of the atoms located around the probe atom. XAFS does not depend on the density of material, nor on the types of the specimens, such as, powder, thin film, or even liquid. XAFS is used to examine the structural properties of nanostructures, amorphous, and crystalline materials. Orientation-dependent structures are also precisely determined using polarization-dependent XAFS measurements. XAFS is sensitive to the chemical valence state of a selected element in matter. In the talk, I will introduce the XAFS techniques and present some results of its applications to nanomaterials and metal-to-insulator transition VO2.