



International Nanotechnology Conference & Expo

April 4-6, 2016 Baltimore, USA

Electronic properties of energy materials investigated by in situ x-ray spectroscopy

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The global extreme climate and gradual shortage of nature resources remind us the rising energy crisis. A new era of renewable energy is dawning and material scientists are devoted to search new sources of clean energy that can satisfy the human demand for energy. The new energy material that has efficient energy conversion/generation/storage is the most pressing challenge. In many important energy-material systems such as artificial photosynthesis, nanostructured catalysts, and smart materials, the change of atomic and electronic structure near the interfacial region upon the reaction provide the fundamental understanding of the physical and chemical properties of a material. Investigation of these interfacial phenomena provides the critical information to better design the material and thus optimize its performance. Synchrotron x-ray spectroscopies, including x-ray absorption and x-ray emission spectroscopies can be used to study the local unoccupied and occupied electronic structures. Use of the in situ/in operando technique, determination of the change of atomic/electronic structures of the energy material under its real working condition now becomes possible. This presentation will report the emerging in situ/in operando characterization on energy relevant materials by x-ray spectroscopy. New characterization tool and a number of recent studies of electronic structure of energy-related materials will be presented.

Biography:

Chung-Li Dong is an assistant professor of Department of Physics, Tamkang University, Taiwan. He received his Ph.D. in Physics from Tamkang University in 2004. He worked as a postdoc in Institute of Physics, Academia Sinica (2005-2009). Concurrently he also worked as postdoc in Advanced X-ray Inelastic Scattering group at the Advanced Light Source, Lawrence Berkeley National Laboratory, USA. He joined the scientific research group as an assistant scientist at National Synchrotron Radiation Research Center in 2009. He has published more than 100 papers in reputed journals. His research focuses on x-ray spectroscopic study of the electronic structure of energy materials.