

Poster Presentation

XA.P02

Effects of Annealing and X-ray Exposure in (Y,Co)-Codoped CeO₂ Probed by XAFS

T. Wu¹, H. Jeng¹, S. Chang^{1,2}, Y. Soo^{1,2}

¹National Tsing Hua University, Department of Physics, Hsinchu, Taiwan, ²National Synchrotron Radiation Research Center, Hsinchu, Taiwan

Local structures surrounding Co dopant atoms in (Y,Co) codoped CeO₂ nanocrystals prepared by a chemical method followed by a series of thermal annealing and x-ray exposure have been probed using x-ray absorption fine structure (XAFS) techniques. These material systems are of great interest for catalytic applications. Our x-ray results show systematic variation of local structures surrounding Co atoms due to thermal annealing at different temperatures. It was also found that x-ray exposure with sufficient incident photon energy can substantially neutralize the structural effects of annealing. A theoretical model based on calculation using the Vienna ab initio Simulation Package (VASP) was proposed to identify relevant dopant locations that lead to the observed XAFS results and to explain the migration of Co in the CeO₂ host due to the x-ray and thermal treatments. Manipulation of dopant atoms using x-ray exposure may provide unprecedented opportunities for tuning the physical properties of these materials for catalytic applications.

Keywords: catalytic, local structures, XAFS