

Real-time observation of solid state electrochemical processes at atomic scale by in-situ TEM

Bai, X.D.¹

¹ Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China

In-situ transmission electron microscopy (TEM) method is powerful in a way that it can directly correlate the atomic-scale structure with physical and chemical properties. In this presentation, we will report on the construction and applications of the in-situ TEM setup including electrical and optical holders, which were built by scanning probe microscopy technique. So the nanomanipulation and quantitative nanocharacterization have been realized inside TEM. In this presentation, real-time imaging of solid state electrochemical processes at atomic scale has been carried out by in-situ TEM.

We studied the dynamic electrochemical lithiation/sodiation processes of MoS₂ nanosheets. It is found that MoS₂ undergoes a trigonal prismatic (2H)-octahedral (1T) phase transition upon lithium/sodium intercalation. A systematical study has been performed on the structural properties of MoS₂ nanosheets during the lithiation/sodiation processes. And the further studies on the dynamic lithiation process of CuO nanowires will be reported. Furthermore, the forming, migration and repairing of oxygen vacancy ordering under the external electric field in CeO₂ will be also included.

Thank the contributions from Drs. Lifen Wang, Xiaomin Li, Muhua Sun, and Qianming Huang et al. to this work.