Poster Presentation

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In-situ nanoscale imaging of charge transfer of BiNiO3 under high pressure

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Over last decades, both synchrotron radiation techniques and high pressure research have made great progress. Advanced synchrotron capabilities with high spatial resolution, high flux, and high energy resolution provides us many new avenues to conduct advanced high pressure researches. In this talk, we will focus on the new developments of the nanoscale imaging techniques on the pressure induced phase separation in three dimensions. BiNiO3 under goes a charge transfer induced phase transition under high pressure or temperature, which shows excellent colossal negative thermal expansion effect [1]. Co-exist of both high density and low density phases over a wide range pressure or temperature plays the key roles on the negative thermal expansion behavior. We utilized a newly developed X-ray absorption near edge spectroscopy tomography method, and successfully resolved the mixture of high/low pressure phases as a function of pressure at tens of nanometer resolution. By choosing incident x-ray energy near Ni absorption edge, the pressure induced valence transition can be mapped at tens of nanometer scale in 3d, which provides crucial information on the HP-LP phase boundary [2]. As temperature driven grain growth upon heating, we can draw fundamental information on the pressure-induced phase growth mechanism.

[1] *M. Azuma, W. Chen, H. Seki, et al., Nat. Commun. 2, 347 (2011).,* ***[2]*** *Y. Liu, J. Wang, M. Azuma, et al., Appl. Phys. Lett. 104, 043108 (2014)*

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