



3rd ICQMT 2025

3rd International Conference on Quantum Materials and Technologies

Real-Time Atomic-Scale Observation of Topotactic Phase Transformation



Distinguished Professor Woo Seok Choi

- Yonam International Joint Research Professor by LG Yonam Foundation (November 21, 2018)
- TJ Park Science Fellowship by POSCO TJ Park Foundation (September 18, 2015)
- Bombi Award by The Korean Physical Society (April 24, 2014)
- 2012 ORNL Award for Outstanding Accomplishment in Scientific Research by UT-Battelle at 2012 Awards Night Achievement (November 16, 2012)
- Prize for outstanding papers for graduate students, Korean Synchrotron Radiation User's Association (KOSUA) (November 22, 2009)
- Springer Prize for the Best Presentation, The 10th Asia Pacific Physics Conference (August 21-24, 2007, Pohang, Korea)
- Three Best Poster Awards, Korean Physical Society Annual Meetings (Spring 2005, Fall 2006, and Spring 2009)
- Two Best Poster Awards, The 2nd and 5th Joint Symposium on Ferroelectricity (February 2006 and February 2009, Muju, Korea)
- Best Poster Award, The 10th. Anniversary Workshop of APCTP "Strongly Correlated Electron Systems". (November 2-7, 2006, Pohang, Korea)
- Seoul Science Fellowship, 2005-2006 (Seoul Metropolitan Government)
- Brain Korea 21 Scholarship for Graduate Students, 2004-2009
- Scholarship for excellent record for graduate students, 2004

Date and Time:
From 26 April to
3 May 2025, exact
day&time will be
announced later.

Lecture Room:
TBD

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10th International Conference on Superconductivity and Magnetism

Abstract

Oxygen plays an essential role in determining the materials properties of transition metal oxides. By changing the oxygen concentration only by ~30%, the electronic ground state of complex oxides may vary from insulator to metal to superconductor. Despite the general lattice structural similarity offered by the topotactic phase transformation, the change in the oxygen content necessarily accompanies the surrounding electronic environment of the transition metal - oxygen polyhedra, and the dimensionality and anisotropy of the polyhedral network. This largely modifies the electronic and phononic energy band dispersion along with the change in the apparent valence state of the transition metal ions. Hence, after the discovery, the topotactic phase transformation has been frequently employed to explore novel hidden physical properties with metastable structures. A real-time atomic-scale observation of the topotactic phase transformation, if plausible, would provide microscopic understanding of the dynamic evolution of the oxygen removal of conventional perovskite oxides, from octahedral to tetrahedral to square planar polyhedral configurations. Here, we present a prototypical example of such evolution in SrFeO_x epitaxial thin films. In particular, the anisotropic brownmillerite structure promote unexpected sequential structural evolution associated with the facile movement of the oxygen within the structure. Our study would help construct a design principle in obtaining novel oxide phases with diverse transition metal - oxygen polyhedral configurations.

Biography

Woo Seok Choi is a professor in the Department of Physics, Sungkyunkwan University, Korea.

He received his Ph.D. degree in physics from Seoul National University, Korea, in 2010. From 2010, he worked as a postdoctoral research associate in the Oak Ridge National Laboratory, USA.

Since 2013, he has been a professor in Sungkyunkwan University. His research interest lies in the field of emergent physical and chemical properties in complex oxide heterostructures with a particular emphasis on the growth of the epitaxial thin film and heterostructures with atomic scale precision.

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