**Controlling phases in epitaxial complex oxide thin films via redox reactions**

**Hyoungjeen Jeen**

*Department of Physics, Pusan National University, S. Korea*

Mixed ionic and electronic conducting behaviors in transition metal oxides (TMO) have attracted lots of attentions for many energy devices such as solid oxide fuel cells and electrochemical sensor applications, where redox reactions and catalytic activity at the interfaces of gas-solid and solid-liquid play critical roles for the performance of such devices. Such ionic reactions can also be used for controlling phase in epitaxial complex oxides. In this talk, redox reactions in epitaxial complex oxides and resultant physical properties will be presented with few model system. The first example is reversible redox reaction in oxygen sponge, SrCoO*x* and Sr(Fe,Co)O*x* (2.5 ≤ *x* ≤ 3.0) at low temperature. In this work, two topotactic phases such as ferromagnetic metallic perovskite SrCoO3 and antiferromagnetic insulating brownmillerite SrCoO2.5 mediated by oxygen content can be reversibly transformed at drastically reduced temperatures (< 200 °C) in considerably short time. Scattering-based real-time experiments are used for probing phase transformations. Second example will be about our recent attempt on possible redox-driven phase reversal in 4*d* binary oxide, MoO*x* (2 ≤ *x* ≤ 3). We observed similar low temperature oxidation from metallic MoO2 to insulating MoO3. Such redox reactions in expitaxial complex oxides provide useful route for designing fuel cells, sensors, and smart windows. Lastly, if time is available, other research activities including collaborative works with Hokkaido University will be briefly introduced.