平成 30 年 12 月 2 日

応用物理学会北海道支部
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応用物理学会北海道支部

講演会のお知らせ

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演題：Controlling phases in epitaxial complex oxide thin films via redox reactions
講師：Hyoungjeen Jeen 氏
（Department of Physics, Pusan National University, Associate Professor）
日時：平成 30 年 12 月 17 日（月） 15:00～16:00
場所：北海道大学電子科学研究所セミナー室 1-3
共催：応用物理学会北海道支部 （共催団体：北海道大学 電子科学研究所 学術交流委員会）

講演の要旨

Mixed ionic and electronic conducting behaviors in transition metal oxides (TMO) have attracted lots of attention 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 $SrCoO_3$ and antiferromagnetic insulating brownmillerite $SrCoO_{2.5}$ mediated by oxygen content can be reversibly transformed at drastically reduced temperatures (< 200 ^oC) in the considerably short time. Scattering-based real-time experiments are used for probing phase transformations. The second example will be about our recent attempt on possible redox-driven phase reversal in 4d binary oxide, MoO_x ($2 < x < 3$).

We observed similar low-temperature oxidation from metallic MoO_2 to insulating MoO_3. Such redox reactions in epitaxial complex oxides provide a 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.

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