

新学術「複合アニオン」レクチャーツアー

(Lecture tour on mixed anion compounds)

【講師/Speaker】

Prof. M. A. Hayward

Inorganic Chemistry Laboratory, University of Oxford



【題目/Title】

Topochemical reduction and anion exchange as a route to novel electronic materials

【日時、場所/Date and Time, Location】

- 2017. 07. 03 (Mon) 16:00~
東大本郷キャンパス 工学部 6号館大会議室/
Large meeting room in Faculty of Engineering Bldg.6, Hongo Campus, University of Tokyo
- 2017. 07. 05 (Wed) 15:00~16:00
東大物性研究所本館 6階 A615/
Seminar Room 5 (A615), 6th Floor, ISSP
- 2017. 07. 07 (Fri) 10:00~12:00
NIMS 並木地区共同研究棟 409-410号室/
Rooms 409-410, Collaborative Research Building, Namiki site, NIMS
- 2017. 07. 10 (Mon) 13:30~15:00
京大化学研究所 共同研究棟 4階 CL-401室/
Room CL-401, 4th floor, Joint Research Laboratory Building, Institute for Chemical Research, Uji Campus, Kyoto University
- 2017. 07. 11 (Tue) 13:30~15:00
京大桂キャンパス A2棟 303号室/
Room 303, A2 Bldg., Katsura Campus, Kyoto University

【連絡先/Contact person】

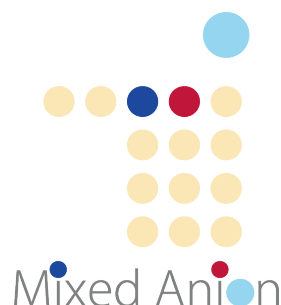
7/3(Mon) 石渡晋太郎(Shintaro Ishiwata) 03-5841-6821

7/5(Wed) 広井善二(Zenji Hiroi) 04-7136-3445

7/7(Fri) 辻本吉廣(Yoshihiro Tsujimoto) 029-859-2553

7/10(Mon) 島川祐一(Yuichi Shimakawa) 0774-38-3110

7/11(Tue) 陰山洋(Hiroshi Kageyama) 075-383-2506



【要旨/Abstract】

Transition-metal oxides are the subject of intensive study due to the wide variety of physical and chemical properties they can exhibit. However, the search for new transition-metal oxides is hampered by the refractory nature of metal oxides, which requires the majority of synthesis approaches to operate at high temperature under thermodynamic control, precluding the preparation of metastable phases and thus limiting the variety of compounds that can be prepared.

The topochemical (structure conserving) manipulation of complex oxides offers access to metastable phases by exploiting the small differences in the low-temperature mobility of the different species in extended oxide lattices. For example, in many complex metal-oxide lattices the oxide anions are more mobile than the cations at low temperatures. Thus, if the correct reagents are used, oxide anions can be removed, inserted or exchanged, while the cation framework remains largely unchanged, allowing the preparation of phases which cannot be synthesised by conventional high-temperature routes.

Binary metal hydrides can act as highly effective reducing agents for the extraction of oxide anions from complex transition metal oxides, allowing the preparation of novel phases containing transition metal centres in unusually low oxidation state and/or unusual coordination environments. Alternatively hydride-for-oxide anion exchange can occur to yield highly metastable oxide-hydride phases.

By applying these reagents to complex oxides containing heavy transition metals, novel reduced oxide, or oxide-hydride, phases can be prepared which contain 4d or 5d transition metals (Ru, Rh, Ir) in extremely low oxidation states, and their electronic interactions studied.

In this talk the synthesis and physical properties of a series of highly reduced 3d-4d and 3d-5d transition metal systems will be described and contrasted with the behaviour of 'conventional', oxygen stoichiometric phases.

