

Research frontier of transition-metal compounds opened by advanced spectroscopies

Novel science brought through new materials and the spectroscopic measurements were discussed in this workshop. The state-of-the-art techniques such as the time-resolved spectroscopy, which potentially uncovers the magnetization dynamics of domain wall and Skyrmions, were reported. The complementally use of quantum beams at large facilities for the newly discovered materials was also discussed.

In transition-metal compounds, various novel quantum phenomena emerge from the interplay of charge, spin, and orbital degrees of freedom with lattice vibration. Behind the phenomena, there are novel electronic states controlled by multi-scale dynamics over energy and space. It is, therefore, important to understand their electronic states by spectroscopic tools scanning a wide range of energy as well as real and momentum spaces. To discuss a future direction and make a progress in the research field of transition metal compounds, we held an international workshop "Research frontier of transition-metal compounds opened by advanced spectroscopies" on Sep. 30th-Nov. 2nd, 2014 at Institute for Materials Research, Tohoku Univ.

We selected following topics as the main target.

- 1: Skyrmion and magnetic domain wall,
- 2: Strong spin-orbit coupled systems, e.g., Iridates, magnetostriction and negative

thermal expansion,

3: High-Tc superconductivity in cuprate oxides and related phenomena,

4: Superconductivity in Fe-based compound and the mechanism.

The advanced spectroscopic technique also discussed. In particular, we focus on time-resolved spectroscopy, which is being advanced very quickly in the world followed by the development of femtosecond laser and free electron laser.

This workshop provided a unique opportunity to discuss a different type of spectroscopy measurements and exchange the ideas on recent and long-standing researches. More than 100 people, including a lot of students and young researchers, took part in the workshop, and the workshop received a favorable impression. We would like to thank all participants and the support from ICC-IMR for the successful workshop.



Fig. 1 A group photo of workshop. More than 100 researchers including many young scientists participated in the workshop.

Keywords: high-tc iron-based pnictide superconductivity, electronic material, neutron scattering

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