Research and Education on Cutting-Edge Energy Materials by Structural and Carrier Control at the Atomic Level

Collaborative Research Center on Energy Materials

In order to attain clean and economical energy systems, new technology is needed to improve efficiency of energy generation and consumption. To that end, it is essential to create technological breakthroughs, such as the discovery of high-performance energy materials that efficiently convert and transport energy.

At the Center, research and development will focus on the creation of advanced energy materials as well as the design of devices that make optimal use of superior material properties. Through joint efforts in science and engineering, we will make inroads into new research frontiers. In addition to promoting top-level research, efforts will be made to expand the human resource potential of young talents trained in trans-disciplinary integrated collaborations.

The following four research divisions are constructed by mixing science- and engineering-field researchers.

1) The Spin Energy Materials Division, led by Prof. G.E.W. Bauer, will carry out theoretical and experimental studies on materials, such as ferromagnets, in which the spin degree of freedom significantly affects the charge and energy transport. This division will strive to understand multi-scale physics and materials science in order to develop new material combinations that realize highly effective conversion between heat and electronic currents.
2) The Ion Energy Materials Division, led by Prof. H. Miyasaka, will conduct research in both fundamental and applied studies of materials for effective ion transport and chemical energy conversion. The development of novel solid electrolytes and electrode materials toward the realization of high-performance all-solid-state secondary batteries and multi-functional batteries will contribute to building a sustainable society.
3) The Light Energy Materials Division, led by Prof. K. Fujiwara, will contribute to the development of a sustainable renewable energy society through the fusion of research on crystal growth physics and electronic engineering.

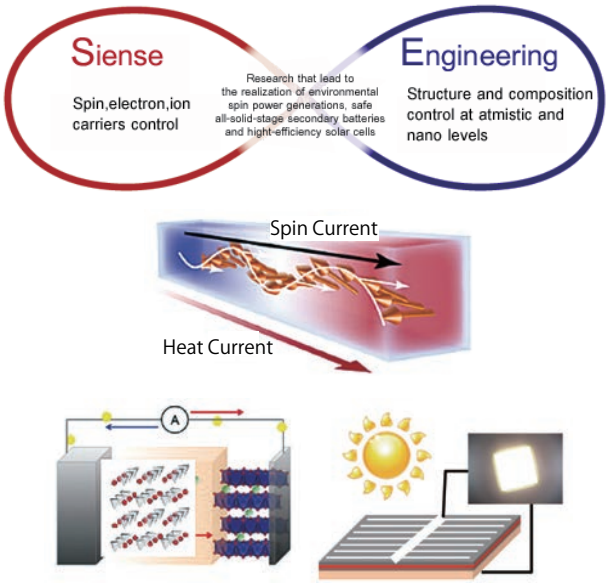

Fig. 1 Realization of environmental spin power generation, advanced all-solid-state secondary batteries, and high-efficiency solar cells, by joint efforts in science and engineering.

4) The Material Processing and Social Implementation Research Division, led by Prof. H. Kato, will make research efforts in material processing to produce high-quality and cost-effective energy materials and in developing evaluation techniques to demonstrate performance materials and device abilities. This division will contribute to the construction of a new energy system based on cutting-edge energy materials with the aim of applying the research output of this center to a sustainable society.

Shin-ichi Orimo (Head of Collaborative Research Center on Energy Materials)
E-mail: e-imr@imr.tohoku.ac.jp
URL: http://www.e-imr.imr.tohoku.ac.jp/ index.html