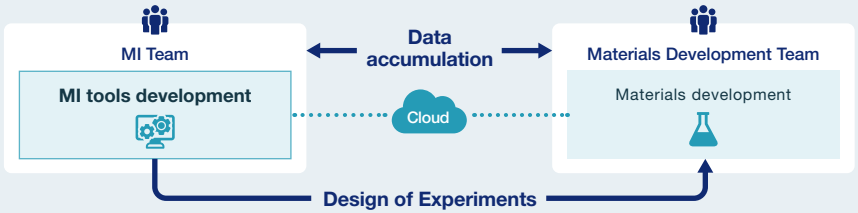
Advanced Case Study

Materials Informatics

Using materials informatics to dramatically increase development productivity

JSR's materials informatics development structure



JSR's main product group focuses on composite materials that mix various raw materials, and their functions are expressed by the formulation. There are countless combinations of these composites, and we have invested a great deal of time in their development. By implementing MI technology, which combines data science and conventional chemistry, as a tool used daily by our team for materials development, we are continuously improving MI tools in-house with the aim of dramatically improving the productivity of materials development. MI is a rapidly developing field and it is also characterized by the ability to immediately introduce the latest algorithms developed in academia into the field of materials development. For this reason, we are collaborating with external organizations such as the Institute of Statistical Mathematics and the Nara Institute of Science and Technology, and are also focusing on incorporating the latest technologies.

We want to create a situation where MI tools become commonplace at work, and they continue to evolve while constantly incorporating the latest algorithms. The interesting challenge of creating tools that no one has seen before has boosted the morale of team members.

Yuya Onishi

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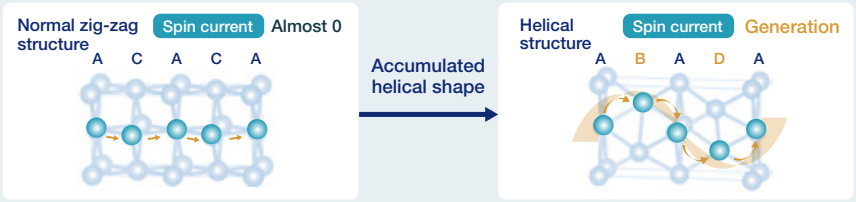
Advanced Case Study

Open Innovation

Joint research with department of physics, graduate school of science, The University of Tokyo to predict high-performance materials for next-generation memory

Predicted tungsten with helical structure



Following the explosion of information processing volume due to technological advances such as high-density arithmetic, AI, and communications, reducing the power consumption of semiconductors has become a serious social issue. Currently, the physical phenomenon of spin current without energy loss is attracting attention, and many studies are underway to utilize it in next-generation semiconductors.

The JSR-UTokyo Collaboration Hub called CURIE is conducting joint research with several laboratories of The University of Tokyo's Graduate School of Science to search for materials that generate spin currents using a computational method called evolutionary algorithms. As a result, we succeeded in predicting the formation of a giant spin current in a helical-distorted structure of tungsten crystals. This prediction method is expected to serve as a new guideline when looking into materials that generate giant spin currents, and to lead to the early realization of new functional devices that solve social issues.

This research result represents one example of an output that takes advantage of the merits of the JSR-UTokyo Collaboration Hub CURIE, which can closely conduct joint research with multiple laboratories of the Graduate School of Science of The University of Tokyo. With CURIE as a focal point, we will continue to contribute to society by accumulating materials innovation, bringing together theoretical calculations, solid-state physics, and materials technology and knowledge.

Kotaro Kubo

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