平成25年度広島大学インキュベーション研究拠点

Center for Chiral Science

HIROSHIMA UNIVERSITY

Group Leader： Katsuya Inoue
（Graduate school of Science）

Aims to gain uniform understanding and control of all chiral materials/phenomena in nature

"Chirality" characterized by asymmetry between an object and its mirror image.

Goals

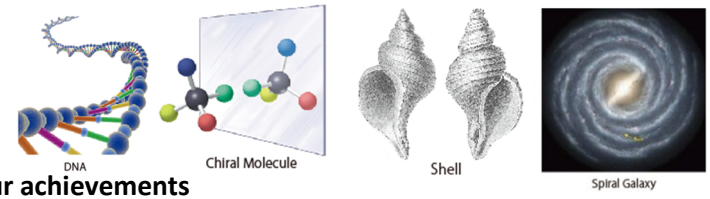
Through the integration of chemistry and physics, we aim to lead innovation in materials science, create a new field of science, and contribute toward a sustainable society by accomplishing the following objectives:

1. Elucidate the mechanism for chirality expression as material functions using theoretical and experimental methods.
2. Generalize the concept of quantum mechanical "spin phase", which associates "material" with "information", and establish a method to control spin phases.

Background

Our position in the world of science

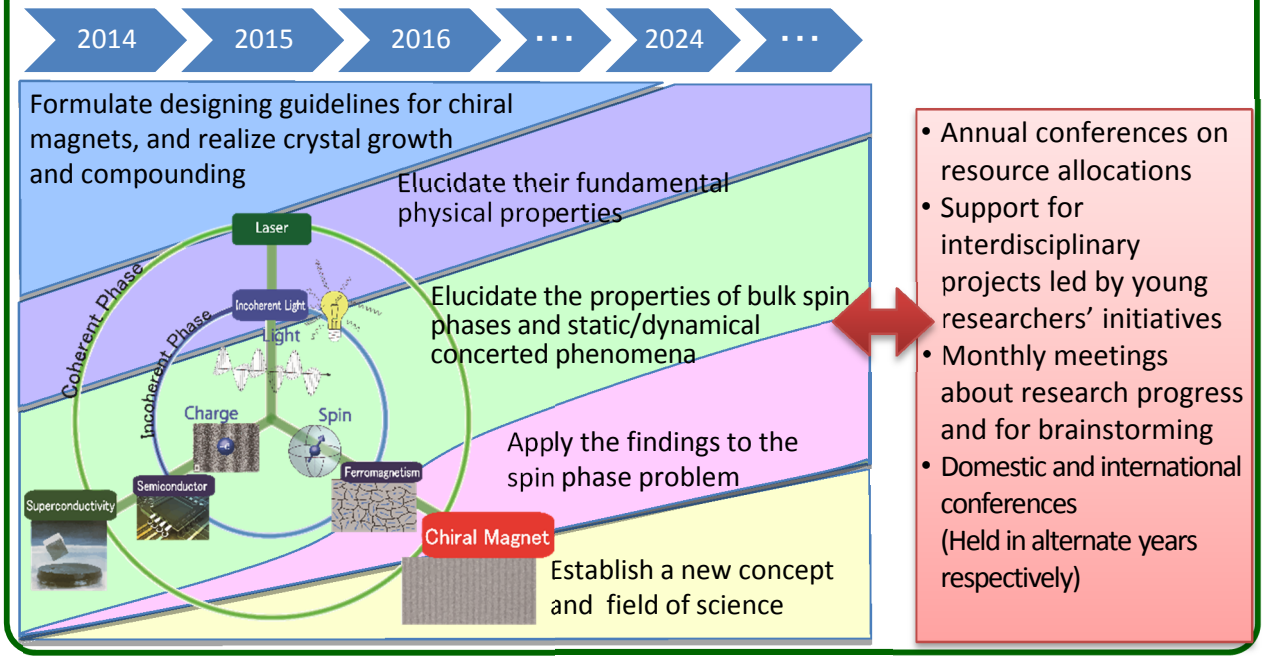
- Recently, studies of materials such as multiferroics and topological materials, like chiral magnets, characterized by specific asymmetries have been globally popular. Moreover, attempts to understand chiral materials involve several of the primary problems being investigated in materials science.
- The concept of "chirality" can be considered a universal one: exhibited by molecules, elementary particles, spin arrangements, polarization arrangements in liquid crystals, galaxy structures, and so on. Elucidating "chirality" may lead us to a uniform understanding of these phenomena.



Our achievements

- We have successfully compounded about 90% of the chiral molecule-based magnets and nearly half of the chiral inorganic magnets reported in literature.
- We have reported a variety of peculiar physical properties of these chiral magnets. They are drawing immense attention as new materials in the field of spintronics.

Plans



- Annual conferences on resource allocations
- Support for interdisciplinary projects led by young researchers' initiatives
- Monthly meetings about research progress and for brainstorming
- Domestic and international conferences (Held in alternate years respectively)

Outcomes

Develop a method for asymmetric synthesis	Develop techniques to control chiral domains	Conversion of chiral-crystal functions to devices	Develop techniques for spin phase control
New advances in the field of crystallography	New-Class Nano-device	Information revolution using spin phase control	Unification of quantum mechanical and classical techniques
•Self-repair polymers •Self-repair hydrogels	•Multiple-valued memory •Sensitive magnetism sensors	•New signal transduction •Highly efficient methods for signal transduction	•Application to organic reactions •Design guidelines for phase materials

We will introduce materials with controllable spin phases and these control techniques to the industry and create a new concept and field based on "chirality".