HAKUBI RESEARCHERS' ACTIVITIES IN ICR

Hakubi Project: Fosterage and Support of Young Researchers, Kyoto University

Research Topic

Synthesis and Exploration of Novel Charge Transition Oxide Materials for Future Multifunctional Devices

Program-Specific Assist Prof
DENIS ROMERO, Fabio
(Ph D)

Host Laboratory Laboratory of Advanced Solid State Chemistry

Host Professor SHIMAKAWA, Yuichi

Outline of Research

The wide range of electronic, magnetic, and transport properties exhibited by oxide materials has led to their widespread adoption as the basis of electronic devices and consequently contributed greatly to the exponential technological development over the past century. Continuing progress is fundamentally dependent on the discovery of new materials and the tunability of their fundamental properties. However, traditional synthetic methods are fundamentally unsuited to the preparation of a wide range of materials that could be imagined, and thus the development of new synthetic protocols is necessary to drive materials discovery forwards. My research focuses on the use of low-temperature topochemical methods and extreme conditions in order to prepare new materials with technologically useful properties for future devices.

Research Topic

Optoelectronic Energy Recycling and Quantum Cooperative Effects in Semiconductor Nanostructures

Program-Specific Assoc Prof
TAHARA, Hirokazu
(D Sc)

Host Laboratory Laboratory of Nanophotonics

Host Professor KANEMITSU, Yoshihiko

Outline of Research

Semiconductor nanostructures are attractive materials that provide a platform to enhance quantum effects. In nanomaterials, strongly-confined electrons and holes form unique quantum states such as multiexcitons, which are hardly generated in bulk semiconductors. Since multiexcitons consist of a few electrons and holes, their generation and dissociation processes have a great potential to increase electric signals in photon-to-current conversion. My research focuses on applications of quantum effects and control of photon-to-current conversion processes in semiconductor nanostructures. I will clarify the microscopic mechanism of photocarrier generation processes in coupled nanostructures and establish a way to recycle thermal and radiative energies.