SAKURA SCIENCE EXCHANGE PROGRAM – 2025

Guest Seminar

Kyutech Kyushu Institute of Technology

ゲストセミナー

SAKURA SCIENCE Exchange Program

Date: 2025.12.18
Time: 9:00 – 10:30
Location: Porto building 101・102

Speaker : Prof. Rohit Medwal

Indian Institute of Technology, Kanpur, India

Charge to spin conversion and its applications

Efficient charge-to-spin conversion is crucial for the development of next-generation pure spin current-driven logic and memory devices, which aim to reduce energy consumption and improve performance. The spin Hall effect (SHE) in heavy metals (HMs), such as Pt, Ta, and W, provides a convenient mechanism for generating pure spin currents from charge currents. However, the charge-to-spin conversion efficiency in bulk HMs typically remains limited to single-digit values due to intrinsic scattering and spin diffusion losses. Enhancing conversion efficiency requires optimising interfacial electronic structures, where differences in work function and chemical potential can play a significant role in modulating spin transparency and spin–orbit coupling strength. Here I will discuss the different schemes to improve the charge-to-spin conversion efficiency by controlling interfacial effects. I will also discuss the how the charge to spin conversion will help to develop the spin devices suitable for various application such as magnetization switching, spin Hall auto-oscillators, and THz emission. This enables us to design energy-efficient spintronic devices for logic and memory device applications.

Speaker : Dr. Ekta Rani

Amity University, Noida, India

Advances in Hydrogen Storage in Thin

Hydrogen storage in thin films of metal hydrides presents a promising route towards lightweight, efficient, and reversible solid-state hydrogen storage. Thin film architectures enable rapid hydrogen absorption and desorption kinetics, stable cycling performance, and tunable structural and electronic properties. Notably, Mg-Ti and Pd-based thin films have demonstrated excellent hydrogen storage capacities with maintained structural integrity over thousands of cycles. This presentation reviews the synthesis, characterization, and hydrogen storage performance of these thin films, highlighting the role of crystal structure and composition in storage dynamics. Furthermore, the emerging interface between hydrogen storage and spintronics is explored, where hydrogenation modulates magnetic and spin-dependent transport properties in thin film heterostructures. This linkage opens avenues for multifunctional devices combining hydrogen energy storage with spintronic information processing, signaling a new frontier in materials innovation.