

## **Looking for PhD applications in the following interdisciplinary areas at BITS Pilani Hyderabad Campus**

### **Environmental Sciences interdisciplinary programme (Biological Sciences and Social Sciences)**

- Waste and wastewater treatment with environmental governance. Hands-on experience in the waste and wastewater treatment with extensive fieldwork in municipal solid waste management, preferably in Telangana and Andhra Pradesh. Good knowledge of Telugu in speech and writing is essential.

### **Materials Science interdisciplinary programme**

- The selected candidate will work on the development and optimization of advanced catalytic materials for CO<sub>2</sub> valorization by electro-catalytic and thermo-catalytic routes.
- The selected candidate will work on the development of advanced catalytic materials for biomass valorization and CO<sub>2</sub> hydrogenation via thermo-catalytic routes. Using high-end equipment is essential for the project. Thus, the basics of analytical techniques are expected from the applicant.
- The scholar will fabricate single junction and multi-junction solar cell architectures. The fabricated solar cells will be characterized for their structural optical and electrical properties. The scholar will also be involved in developing theoretical models to calculate the quantum efficiencies of the developed solar cells. Additionally, the scholar will develop techniques based on nanophotonics and integrate them to improve the efficiencies of the fabricated solar cells.
- The scholar will fabricate self-powered flexible nanosensors for monitoring various physiological signals. Self-powering would be performed using piezoelectricity/triboelectricity. The project will involve end to end development of a wearable self-powered system starting from synthesis of materials, device fabrication and optimization, lab based testing and then real time prototype with
- The work involves the synthesis of suitable microporous adsorbents for hydrogen storage and determining its hydrogen uptake.
- The selected candidate will work on the synthesis and characterization of various catalysts. Different chemical compounds will be tested for their ability to give hydrogen.
- The selected candidate will be primarily working on molecular adsorption on emerging two dimensional (2D) materials using density functional theory (DFT) based first principle calculations. At some later stage, candidate will explore the electrochemical properties of potential 2D materials for cathode design of Lithium/Sodium ion batteries. The research will involve 2D materials simulation and design using DFT simulation packages like ATK and VASP.
- The selected candidate will be working on the synthesis of 0d, 1d, and 2d materials using techniques such as hydrothermal synthesis, chemical vapor deposition, electrochemical anodization, and physical vapor deposition. The material will be characterized using techniques such as SEM, TEM, XPS, and XRD. The materials will be engineered for the efficient photoelectrochemical splitting of water. The material will be analyzed for hydrogen evolution reaction, chemical stability, and photocurrent. The second part of the project is focused on the separation and storage of hydrogen.

### **Humanities and Social Sciences**

- Buddhist Philosophy
- Indian English Poetry
- Philosophy of Religion
- Spirituality Studies