National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Sustainable Water Purification Using Biomass-Derived Photothermal Floating Hydrogels
Speaker	: Bibek Chaw Pattnayak (Rollno : 520cy6011)
Supervisor	: Sasmita Mohapatra
Venue	: Seminar room, CY department
Date and Time	: 19 Jun 2025 (10 am)
Abstract	: **Research on generating freshwater from alternative water sources like seawater and wastewater is a global research target aligning with sustainable development goals (SDG6). Solar-powered distillation is receiving heightened attraction as solar energy supersedes all other fossil-based energy resources in the matter of abundance, sustainability, and environmental benignity. A feasible solar-driven water purification system requires efficient solar energy capture, solar-to-thermal conversion efficiency as well as a high rate of clean water production. Photothermal floating materials have attracted increasing attention in solar water purification because of their several merits including easy preparation, less energy-intensive, and highly efficient solar absorption and utilization. The main strategies to achieve higher conversion efficiency include choosing good solar absorbers, constructing a surface to reduce light reflection, and reducing heat loss. Adjusting wettability, tuning the physio-chemical properties of internal channels, and increasing the intermediate water content to lower the water vaporization enthalpy are the three main approaches for rapid water transport. In this doctoral research program, we aim to develop hydrogel-based floating materials with an enhanced evaporation rate/efficiency, eco-friendliness, and low cost for an effective solar-driven interfacial evaporation process. We have produced porous carbon from different plant sources and utilized it as photothermal materials in the floating hydrogels to enhance its heat-absorbing capacity. Further, we have added multiple functions such as salt-mitigation, photocatalytic degradation, adsorption of heavy metals, and antifouling behavior to the floating materials to expand its application scope.**