National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Treatment of Textile Wastewater by Sulfate Radical Based Advanced Oxidation Processes (SR-AOPs
Speaker	: Rajeev Kumar
Supervisor	: Dr. M. Gattu
Venue	: Seminar Hall CE Department
Date and Time	: 01 May 2025 (03:30 pm)
Abstract	: Textile wastewater contains various persistent pollutants, including dyes, heavy metals, and organic compounds, which pose significant environmental hazards. Conventional treatment methods often struggle to eliminate these contaminants entirely, highlighting the need for advanced oxidation processes. Among these, sulfate radical-based advanced oxidation processes (SR-AOPs) have gained attention for their ability to generate highly reactive sulfate radicals ($SO_4^{\bullet-}$) that effectively degrade resistant pollutants. This study investigates Fe/Mn-biochar, a biochar-based catalyst enhanced with iron (Fe) and manganese (Mn), for activating persulfate (PS) and accelerating textile effluent degradation. The catalyst's porous structure, large surface area, and redox-active sites contribute to enhanced radical production and pollutant breakdown. Structural and functional properties were analysed using X-ray diffraction (XRD), scanning electron microscopy (SEM), and Fourier-transform infrared spectroscopy (FTIR). Experimental results demonstrated that Fe/Mn-biochar efficiently degraded Rhodamine B dye, following second-order reaction kinetics. Factors such as catalyst dosage, pH, temperature, and initial pollutant concentration significantly influenced degradation efficiency. Quenching studies confirmed that sulfate radicals played a dominant role in the oxidation process.