National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Innovative and Sustainable Approaches for Removal of Oil from Industrial Wastewater in Eco-Friendly approach
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Venue	: Chemical Engineering Department's Seminar Hall
Date and Time	: 06 Dec 2024 (11 AM)
Abstract	: Addressing oily wastewater treatment is critical to mitigating environmental damage caused by industrial discharges that harm marine and terrestrial ecosystems. Conventional techniques like centrifugation, gravity separation, and chemical-physical membrane separation often struggle with stable and microemulsified oil in wastewater. Additionally, many rely on toxic chemicals, posing risks to aquatic life and highlighting the demand for sustainable, eco-friendly alternatives. This thesis explores recent advancements in oil removal methods, including superhydrophobic sponges, magnetic coagulants, and electrocoagulation with biocompatible coatings. Superhydrophobic sponges, incorporating materials like titanium dioxide, carbon soot, and hexadecyltrimethoxysilane (HDTMS), achieve a 99.9% oil absorption rate and a water contact angle of 151°, offering a low-cost, recyclable solution for scalable wastewater treatment. Magnetic coagulants, formed by combining chitosan with ferrous ions through one-step coprecipitation, exhibit 99.26% oil separation efficiency and potential applications in environmental cleanup, microbiology, and medicine. Electrocoagulation using chitosan-coated aluminum electrodes provides a chemical-free approach, with 99% separation efficiency for artificial oil-water emulsions. By optimizing parameters like electrode spacing, voltage, and treatment duration, this method enhances sustainability and reduces operational costs through electrode reuse. These innovations demonstrate significant progress in eco-friendly wastewater management, offering effective and sustainable alternatives to traditional methods while reducing chemical dependence and environmental risks.