National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Silane and Plasma Treated Kapok Fibre/Epoxy Composites for Potential Applications
Speaker	: Ramyaranjan Das (Rollno : 520ph1003)
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Venue	: MC 126
Date and Time	: 12 Mar 2025 (11.00 AM)
Abstract	: The growing demand for lightweight and eco-friendly materials has driven research into high-performance, cost-effective composites. This thesis investigates structurally modified kapok fibre-reinforced polymer composites (KFRPCs) with a focus on their mechanical, viscoelastic, and electrical properties for potential applications in printed circuit boards (PCBs) and aircraft cabin interiors. The study explores kapok fibre (KF) modification through dewaxing, silane, and RF cold plasma treatments to improve fibre-matrix compatibility. Kapok fibre, a naturally buoyant and low-density material, contains wax-coated surfaces, which can hinder adhesion with hydrophobic polymer matrices. Treatment strategies enhance mechanical interlocking and crosslinking, leading to significant improvements in composite properties. Dewaxed KF/epoxy composites (DKFRPC) show a 40% increase in flexural strength, 38% in tensile strength, and 54.92% in storage modulus compared to raw KF/epoxy composites (RKFRPC). These properties of the composites are further enhanced by silane and RF cold plasma treatment on KF. Dewaxed KF/epoxy composites exhibit lower dielectric constant, dielectric loss, and conductivity due to reduced polar groups. Silane and plasma treatments further minimize dielectric loss by reducing dipolar polarization and enhancing electrical insulation properties. Impedance spectroscopy confirms the interplay between crystalline and amorphous regions of KF, validating the potential of silane and plasma-treated KFRPCs for PCB and aircraft cabin interior applications.