National Institute of Technology Rourkela

Defence Seminar

Seminar Title	: Inorganic porous framework-based hybrid materials for effective energy and environment applications
Speaker	: Debabrata Panda (Rollno : 519ch1017)
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Venue	: online (https://meet.google.com/cqs-uzha-ibd)
Date and Time	: 22 Aug 2024 (10.30 AM)
Abstract	: In recent years, the global warming potential caused by the emission of greenhouse gases has been a significant concern for climate disasters and rising temperatures in the environment. Conventional insulators (glass fiber, mineral wool, gypsum board, extruded polystyrene) have more significant potential in the market share due to their high performance per unit cost. Owing to the low thermal conductivity, the hydrophobic characteristics of such materials retards heat loss or gain for green buildings. A facile and cost-effective modified sol-gel synthesis is employed to synthesize flexible silica-cellulose hybrid aerogels (SCHA) using recycled cellulose fibers (RCF) of three-dimensional cellular skeletons, Kymene cross-linker and inorganic framework-based methyltrimethoxysilane-derived silica aerogels as filler through simple freeze-drying. The effect of cellulose fiber concentrations and ambient temperature conditions on the thermal, acoustic, and oil absorption characteristics was quantified comprehensively. The experiments were conducted by considering the range of weight fractions from 1 to 4 wt.% from waste tissue paper with a crosslinker and tetraethylorthosilicate (TEOS) as silica precursors. A similar attempt in the preparation of inorganic graphene oxide (GO) and ferrous oxide was also made by controlling the mass fraction of phase change materials (PCM) for photothermal conversion and thermal energy storage in heat exchangers. The synthesized hybrid inorganic porous frameworks were characterized by XRD, FTIR, SEM, TGA, FESEM, thermal conductivity, DSC, and BET to identify the physical, chemical and thermal characteristics of the developed sample along with suitable applicability.