National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Development of Clean-Label, Sustainable, and Functional Bakery Systems for Food Processing Applications
Speaker	: Debmalya Banerjee (Rollno : 523bm1006)
Supervisor	: Kunal Pal
Venue	: BM Seminar Room (BM-140)
Date and Time	: 29 Aug 2025 (11:00 AM)
Abstract	: Bread remains one of the most widely consumed staple diets globally, serving as an epicentre for innovation in sustainable food systems. In this context, despite having multiple nutritional advantages, whole wheat flour presents myriad technological drawbacks in bread systems. To alleviate these limitations, hydrocolloids, a special type of polysaccharide, are employed to improve the structural and functional performance of whole wheat bread systems. Although numerous studies have been conducted on the effect of conventional hydrocolloids in bread systems (e.g., xanthan gum, guar gum, hydroxypropylmethylcellulose, etc.), the impact of gellan gum, a microbial, clean-label polysaccharide, is underexplored. Preliminary investigations have revealed that incorporating GeG in whole wheat bread at 0-2% w/w concentration exhibited concentration-dependent effects. Optimal characteristics were achieved at 0.125% GeG, including uniform porosity, balanced viscoelasticity, and molecular homogeneity. These observations demonstrate the importance of GeG in creating clean-label bakeries with technological and nutritional benefits. Building upon these findings, the research framework is designed along three integrated trajectories: first, exploring the functional perfomance of GeG in steamed whole wheat bread and compare hydration-dominant and dry-heat processes second, optimization of banana peel powder (BPP) production as a part of waste valorization and third, developing synergistic GeG&ndashBPP formulations to achieve structural integrity alongside enhanced nutritional and sustainability credentials. This combined strategy offers a mechanistically informed, clean-label pathway for the bakery sector, aligning product innovation with consumer demand and circular bioeconomy principles. From a critical perspective, the project demonstrates originality, methodological rigor, and high potential to advance sustainable, functional, and consumer-acceptable whole wheat bread systems.