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Departmental Seminar

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Seminar Title	: Return Seminar-Designing Biopolymer-Based Encapsulation and Lubrication Systems: Advances in Controlled Delivery and Tribology for Next-Generation Food Colloids
Speaker	: Mohd Khalid Gul
Supervisor	: 2910
Venue	: CH-113
Date and Time	: 07 Jul 2025 (17.30)
Abstract	: The development of biopolymer-based encapsulation and lubrication systems presents a promising approach to enhancing the stability, bioavailability, and sensory perception of food colloids. While traditional encapsulation strategies focus primarily on protecting bioactives and ensuring controlled release, emerging research highlights the importance of oral tribology in determining the texture, mouthfeel, and overall acceptability of food systems. Biopolymers such as polysaccharides and plant-based proteins not only serve as encapsulating agents but also influence lubrication properties by modulating interactions with oral surfaces and saliva. Recent studies have demonstrated that protein-stabilized emulsions and polysaccharide matrices can be engineered to regulate friction and improve sensory attributes in food systems. By integrating soft tribology with advanced encapsulation technologies, it is possible to optimize the oral lubrication, adsorption behaviour, and controlled release of bioactives, thus enhancing both functionality and consumer experience. This synergy is particularly relevant in the formulation of plant-based dairy and meat analogues, where texture modification plays a crucial role in mimicking conventional products. We will discuss the latest advancements in biopolymer encapsulation, focusing on how structural design, surface modification, and tribological analysis can improve delivery efficiency and sensory performance. Key challenges, such as achieving long-term stability, controlled bioactive release, and desirable oral lubrication, will be discussed. Understanding the interfacial dynamics between encapsulated bioactives and oral processing conditions will pave the way for designing the next generation of sustainable, functional foods. Keywords: Biopolymer Encapsulation, Food Tribology, Controlled Release, Oral Lubrication, Sensory Perception, Plant-Based Proteins, Functional Foods, Soft Matter Science, Alternative Dairy.