National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Development of Novel Millet Starch-Based Pickering Emulsions for Enhanced Bioavailability and Controlled Release of Curcumin
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Venue	: CH 113 Department of Food Process Engineering
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Abstract	: Curcumin (CUR) is a proven anticancer, antioxidant, anti-inflammatory, and cardioprotective compound found in plants of the *Zingiberoside* family. However, low bioavailability, poor water solubility, and sensitivity to light and heat limit CUR&rsquos use in food applications. Recently, emulsion-based approaches have gained attention to encapsulate curcumin and improve its stability and bioaccessibility. Commonly, synthetic emulsifiers such as polysorbates, stearoyl lactylates, and mono- and diglycerides with an appropriate hydrophile-lipophile balance were used to prepare emulsions with long-term stability. Even though the U.S. Food and Drug Administration (FDA) considers the use of these synthetic emulsifiers safe, excessive consumption can harm the gut microbiota and lead to inflammation, obesity, and cardiovascular diseases. Solid particle-stabilized emulsions, so-called Pickering emulsions, offer a promising alternative to conventional synthetic emulsifiers due to their long-term stability without the use of surfactants. Also, the high energy of particle desorption from the interface makes the emulsions more stable, which protects the active compounds inside for a long time from adverse conditions. Among the biological particles used as emulsifiers, starch has attracted considerable interest owing to its widespread availability, cost-effectiveness, GRAS status, and non-allergenic nature. However, the large particle size and hydrophilic nature of native millet starch granules make adsorption at the oil-water interface difficult. Therefore, modifications of starch for its granule size and hydrophobicity are necessary to make it more suitable for preparing highly stable Pickering emulsions. Starches are commonly modified using chemical methods such as acid hydrolysis for size reduction and esterification with fatty acids and anhydrides for hydrophilization. However, these methods have several disadvantages, such as high cost, chemical residues, time consumption, and serious health effects. Therefore, developing novel green processes for starch modification is necessary to address these issues. Therefore, this study is centered on the adoption of novel green techniques for the preparation of millet starch with improved interfacial properties and delayed gastric digestion that could serve as a potential alternative to conventional emulsifiers for the delivery of curcumin, thereby enhancing its bioavailability.