Protein particle fillers in non-aqueous media: procolate

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Aims

The dispersion of solids in non-aqueous media is a challenging topic, both in terms of understanding the interactions between the particles and how this affects material properties, e.g., stability and mechanical properties, but also in terms of characterization of such systems, e.g., particle size and aggregation, microstructure and internal transport properties. This project seeks to develop a better understanding of such materials in the context of a filled fatty matrix: chocolate with added insoluble plant protein particles. Thus the non-aqueous phase is the complex mixture of cocoa lipids, generally solid at room temperature but melting at mouth temperature, whilst the filler is lipid-insoluble protein. This will aid development of products that are more healthy in terms of lower sugar and fat, but also higher in protein, whilst maintaining the texture and melting attributes of traditional chocolate, which so far seems difficult to achieve. Our strategy will be to test colloidal particle behaviour on a range of well characterized hydrophilic and hydrophobic particles in a representative cocoa butter phase, then extend this understanding to highly purified plant protein particles and finally test these findings on less pure protein particle powders.

Skills/training

The student will receive excellent training in core soft matter characterization techniques: shear rheometry and texture analysis; particle sizing techniques - particularly in non-aqueous media; state of the art confocal microscopy for identifying trace components and the state of aggregation; state of the art cryo- and non-cryo SEM and TEM techniques; training in SAXS/WAXS techniques and analysis enabling exploitation of the special Diamond Leeds (DLS) SAXS/WAXS facility based at Diamond. Linking these measurements with sensory properties will be largely based in Nestlé (York), but the student will be encouraged to engage with these aspects as far as possible to gain understanding and experience of the translation of such work to industry. The student will be part of the major food colloids group in the world and eligible to join the Bragg Centre for Material Science at Leeds. There will be the opportunity to spend time at Nestlé Product Technology Centre Confectionery in York, and quite possibly at Nestlé's International Research Headquarters in Lausanne, plus the student will be encouraged to engage with other relevant leading academic groups around the World with which we have links.