

FoodBioSystems DTP - PhD Project Advertisement Text

Project Title: FOODBIOSYSTEMS - Fundamental study of the inter-relationships between structure, physicochemical properties and sensory profile of **emulsions** to evaluate their potential as **fat replacers**

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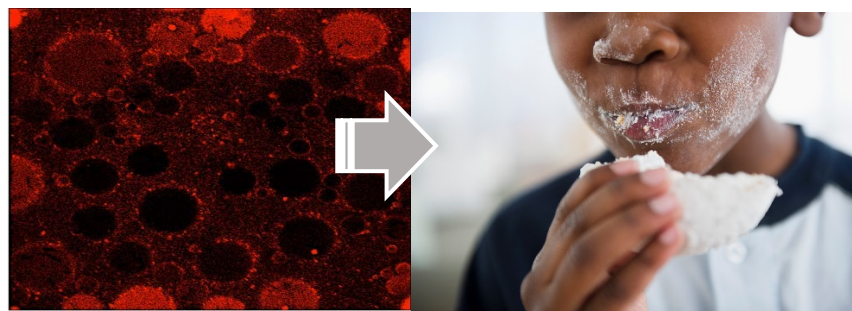
Project ID: FBS2020-07

Research Group: FOODBIOSYSTEMS BBSRC DTP

Application Deadline: 6 March 2020

Project Description: There is a growing need to reduce calorie, fat, saturated fats and sugar intake, and a constant release of unsuccessful reformulated products onto the market. This proposal takes a fundamental approach to fat replacement design. This project will explore the interactions between physical properties (structure and rheology), oral processing (break down) and sensory perception of emulsions structured designed as fat replacers. During the project, the student will study the physical and mechanical properties of fats and relate this to its structure. Then, emulsion composition and formation will be explored to form structures that can deliver the required (fat) properties. In order to get a detailed understanding of the physical and mechanical properties of the systems the student will be trained and support in the use of techniques such as rheology (UoR), interfacial rheology (UoR), spectroscopy (QUB), imaging techniques (small angle x-ray scattering (SAXS) at Diamond Light Source, and microscopy techniques (Confocal Light Scanning Microscopy and Electron Microscopy (UoR)). The student will evaluate how emulsions are processed and digested during oral cavity processing. Oral processing studies (mechanical breakdown) will be performed using a jaw tracking device and electromyography (UoR); *in-vitro* oral digestion (chemical breakdown) will be also simulated with artificial saliva (UoR) to understand how structured emulsions behave in the first part of the digestion system. The physicochemical relationships between measurable differences in oral processing and sensory perception will be correlated (UoR). Data evaluation from instrumental and sensory analyses will be systematically modeled to evaluate properties of emulsion composition and structure and map "structure: function" relationships using state-of-the-art multivariate analysis algorithms (QUB). Finally, emulsions will be incorporated into model matrices to explore the effect of structural elements and processing operations into the delivery of fat technological and sensory functionalities.

The project will be based at the University of Reading in conjunction with Queen's University Belfast and Cargill R&D Centre Europe. At least a 3 months placement will be at Cargill.



Funding Notes: This project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants. Due to restrictions on the funding, this studentship is only open to UK students and EU students who have lived in the UK for the past three years.

This project is a **CASE studentship with Cargill**.

The FoodBioSystems DTP is a collaboration between the University of Reading, Cranfield University, Queen's University Belfast, Aberystwyth University, Surrey University and Brunel University London. Our vision is to develop the next generation of highly skilled UK Agri-Food bioscientists with expertise spanning the entire food value chain. We have over 60 Associate and Affiliate partners. To find out more about us and the training programme we offer all our postgraduate researchers please visit

<https://research.reading.ac.uk/foodbiosystems/>.

Training opportunities: This project will train a doctoral researcher to become a world expert in both the measurement and interpretation of food physiochemical properties and how these relate to sensory perception; skills that are much needed in the UK food industry and expertise that is currently underrepresented in UK academia. They will benefit from their access to facilities and expertise at the University of Reading (food physics, microscopy, and sensory science), at Queens University Belfast (oils and fat chemical profiling, oxidative stability, mid infrared Spectroscopy; untargeted data exploration and multivariate classification modelling using linear and non-linear algorithms) and at **Cargill** (food physics, structural imaging, analytical science, applications science). One unique aspect of training will be using the **Diamond** Light Source UK, a centre with imaging and microscopic facilities, which give the student skills currently unique in UK for food scientists. The three-month placement at Cargill will enable the student to undertake applications research and understand how innovation in an international environment at a leading industrial food ingredients R&D centre.

Student profile: The student should have a background in physical science (soft materials science) ideally coupled with some knowledge of nutrition and sensory. Graduates of physics, chemistry, chemical engineering and food science and related courses are most likely. The student should be able to perform mathematical analysis of results.