2022_11_Chemistry_Talbot: Food-grade protein extraction from microalgae using cutting edge clean and green separation methods

Supervisors: Dr Agi Brandt-Talbot (mailto:agi@imperial.ac.uk); Prof Jason Hallett, Chemical Engineering, Imperial College London

Department: Department of Chemistry

The world’s food system is responsible for around one-quarter of excess greenhouse gases that humans generate each year. Protein is an important component of the human diet, but particularly contributes to climate change through greenhouse gas intensive farming practices: livestock farming produces roughly the same amount as the entire transportation sector. Microalgae are photosynthetic cells that can contain up to 50% protein, generated directly from CO2 and sunlight by highly efficient algal photosynthesis. This protein fraction as high potential to provide a sustainable source of protein, however, it needs to be separated from the other biomolecule fractions, such as lipids and carbohydrates and purified to meet food quality standards.

The aim of this project is to explore the purification of protein obtained from microalgae to produce a high quality and appealing protein source that can be used in sustainable foods. The project will investigate solvent based purification, especially food grade ionic liquids. Ionic liquids are a novel class of designer solvents that have a low vapour pressure, resulting in low solvent emissions and high solvent recovery, which is beneficial for the economics and sustainable processing. The project will compare the performance of ionic liquids to industrial purification methods and determine suitability of the purified for application in food.

The PhD project is supported by start-up company Arborea (http://arborea.io/) who are developing a breakthrough cultivation technology that mimics the functioning mechanisms of a real leaf to self-maintain the ideal growth conditions with minimal energy inputs. It uniquely sequesters CO2 even at very low concentration and atmospheric pressure and efficiently transforms the CO2 into algal biomass.

The successful candidate will have a strong background in chemistry, biochemistry, chemical engineering or a related subject. Experience of an extended laboratory research project, including working with solvents and biopolymers is of advantage, as is a demonstrated interest in climate change and promoting and implementing sustainable practises is desirable. The studentship only covers home fees.

For more information on how to apply to us please visit: https://www.imperial.ac.uk/grantham/education