Centre for Sustainable Chemical Technologies

UNIVERSITY OF BATH

Centre for Sustainable Chemical Technologies; University of Bath

Project Title:	Sustainable Development of Non-aqueous Rheology Modifiers for the Personal Care Industry
Lead Supervisor and co-supervisors:	Professor Matthew Davidson, Professor Karen Edler, Professor Janet Scott (Department of Chemistry)
Industrial Partner:	Scott Bader Company Ltd.

Project Summary

The term Personal Care Product is a blanket term used to describe items used in cosmetic and hygienic consumer products. Examples include shampoo, moisturiser, lipstick, makeup, sun screen, tooth paste etc. Polymeric microbeads in rinse-off products have attracted a lot of negative attention in recent years due to their pervasion into waterways and ingestion by marine life. A number of countries have subsequently banned the manufacture and sale of microbead-containing rinse-off cosmetics (UK since 1st October 2018) and many of the larger personal care companies have since phased out the use of microbeads in their products.

Another source of oil-based, and often non-biodegradable, polymers in personal care products are rheology modifiers – materials added to modulate viscosity and flow properties of a product. Recently the EU has proposed a restriction on microplastics entering the environment and, whilst this legislation would not cover the types of polymers that we use as rheology modifiers, it is very likely that the regulations will evolve to encompass these in the not-too-distant future and Scott-Bader and our customers need to be prepared.

We envisage rheology modifiers that are both bioderived in origin and biodegradable in the waste stream as next generation products for the personal care industry. The products must be sustainably sourced, efficient in application and suitable for their intended market(s). Commercially available options include natural waxes, polysaccharides and modified fatty acids, however they lack the efficiency and speed of thickening demanded by our customer(s) and there is a captive market for next generation products.

The PhD project would include: synthesis and molecular characterisation of new bioderived rheology modifiers; evaluation of the effect of varying molecular weight on viscosity and flow properties as well as control of molecular weight during synthesis; (for polymeric rheology modifiers) testing of the rheological properties of the novel materials, first in simple systems and then in conjunction with typical formulation ingredients; characterisation of the structures formed in solutions, thickened liquids and gels containing these rheology modifiers, including, where appropriate scattering studies. Thus, this project allows development of a range of skills from synthesis to physicochemical characterisation, while focusing on a potentially new class of sustainable formulation ingredients. The PhD student will have opportunities to work both at the University of Bath and with the industrial partner, Scott-Bader, in their well-equipped facilities.

Sustainability issues addressed

This project aims to make personal care products and the ingredients they are made of more sustainable for the environment. It will investigate rheology modifiers that are both bioderived in origin and biodegradable in the waste stream. Besides being sustainably sourced, these products will have to be efficient in application and suitable for their intended market(s).