The Mode of Action of Polymeric Deposition Aids

Associate Prof. David Harbottle[1*], Dr Paul Thornton[2] and Dr Nils Wedler[3]
1 School of Chemical and Process Engineering, University of Leeds
2 School of Chemistry, University of Leeds
3 Reckitt Benckiser Group plc
E: D.Harbottle@leeds.ac.uk

Modern household cleaning products include polymeric deposition aids that are multi-functional to enhance cleaning performance and interact with minor additives to deliver improved product quality factors such as long-lasting disinfection and aroma. Effective deposition aids also contribute to the overall sustainability of household products, significantly enhance consumer safety and experience, and consequently are essential to next-generation household cleaning products.

In this project you will work at the interface of polymer chemistry and surface science to create and critically evaluate novel polymers as deposition aids. Different polymerization routes will be explored to synthesize polymers of varying molecular weight, architecture, and functionality. Only degradable materials from renewable feedstocks will be used, ensuring the ecological credentials of the deposition aids produced. Moreover, the novel polymers will be studied using an array of surface science techniques to critically evaluate the role of polymer structure on key performance properties including, deposition kinetics, surface coverage, deposit conformation and stability.

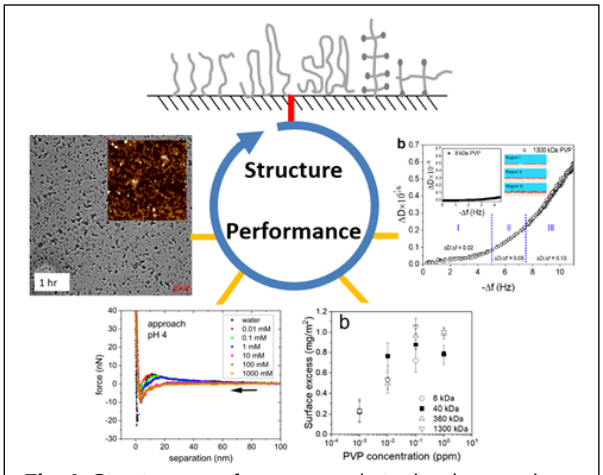

Fig. 1. Structure – performance cycle to develop novel deposition aids for the next-generation cleaning products.

The project will provide you with training in synthetic polymer chemistry and surface science measurements. The research problem gives scope for you to pursue your interests, taking ownership of the project and directing the research to prepare the next generation of deposition aids. You will familiarize yourself with the technology by undertaking an initial placement at Reckitt Benckiser, and regularly revisit the industry partner to ensure timely knowledge transfer. You will also complete a research placement at an international academic institution to access equipment and/or methods that will provide greater insights to the problem, but also promote your growth as an independent researcher.

This project is an exciting collaboration between academia and industry to develop the next generation of deposition aids that will transform the performance and sustainability of future household cleaning products.

Selected publications:

Hodges, C.S. et al., *Investigating adsorbing viscoelastic fluids using the Quartz Crystal Microbalance,* ACS Omega, 5, 35, 22081-22090 (2020); Yu, K., et al., *Polymer molecular weight dependence on lubricating particle-particle interactions,* Industrial and Engineering Chemistry Research, 57 (6), 2132-2138 (2018); Kuznicki, N. et al., *Probing mechanical properties of water-crude oil emulsion interfaces using atomic force microscopy*, Energy and Fuels, 31 (4), 3445-3453 (2017); Natarajan, A., et al., *Molecular Interactions between a Biodegradable Demulsifier and Asphaltenes Immobilized on Hydrophilic Solids in an Organic Solvent*, Energy and Fuels, 30 (12), 10179-10186 (2016); Bakhtiari, M. T. et al., *Role of Caustic Addition in Bitumen-Clay Interactions*, Energy and Fuels, 29 (1), 58-69 (2015); Boardman, S. J. et al., *Polymers for dye transfer inhibition in laundry applications*, Journal of Applied Polymer Chemistry, 138 (1), 49632 (2021); Boardman, S. J.et al., *Chitosan hydrogels for targeted dye and protein adsorption*, Journal of Applied Polymer Chemistry, 134 (21), 44846 (2017); Rowley, J. V. et al., *Antimicrobial dye-conjugated polyglobalide-based organogels*, ACS Applied Polymer Materials, 2 (7), 2927 (2020).