



Coatings for Agriculture: Food Security without a Microplastics Problem

Lead Supervisor: Peter J. Roth, University of Surrey , Department of Chemistry

Email: p.roth@surrey.ac.uk

Co-supervisors: Maya Al Sid Cheikh, University of Surrey, Department of Chemistry and Joseph L. Keddie , University of Surrey, Department of Physics

Agricultural coatings are applied directly onto seeds and leaves to make pesticides and other active ingredients more effective, to increase crop yields, and to contribute to global food security. However, there are concerns that such coatings can form microplastics: microscopic polymeric particulates that can negatively affect marine food chains and that may transfer pathogens.

This project will develop biodegradable coatings for agriculture and investigate whether they can biodegrade without forming harmful microplastics. This interdisciplinary project will require the chemical synthesis of polymers, the casting and characterisation of coatings, and the synthesis of model microplastics. The polymer biodegradation will be analysed using a combination of analytic methods, including ellipsometry, dynamic light scattering, nanoparticle tracking analysis, optical/electron microscopy, and various NMR spectroscopic methods. Specifically, we aim to compare different types of established and novel polymers under identical conditions including simulated environments, and, working with a leading agricultural company, real soil samples. We expect that the project can provide clear guidelines on the future design of agricultural coatings that contribute to food security without posing a microplastics risk.

Training opportunities:

This project includes training and mentoring in all associated chemical, physical, analytical, and environmental methods. The successful applicant will be part of the SCENARIO doctoral training partnership cohort and will have access to training and networking events. Funding is available to attend (international) conferences. The PhD student will also spend 3 months on an industrial placement with Syngenta.

Student profile:

This project is suited for applicants with a first class or upper second-class BSc or Master's level degree (or international equivalent) in chemistry or a closely related subject area.

Funding particulars:

This project has CASE co-sponsorship from Syngenta and includes a 3-month placement with this industrial partner.

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