



**Scenario**  
DOCTORAL TRAINING PARTNERSHIP

**NERC**  
SCIENCE OF THE  
ENVIRONMENT

## **Coatings for Agriculture: Food Security without a Microplastics Problem**

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

This project will develop biodegradable coatings and investigate whether they can biodegrade without forming harmful microplastics. This interdisciplinary project will involve the chemical synthesis of polymers, the casting and characterisation of thin films, and the synthesis of model microplastics. Their 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 at comparing 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 at an industrial placement with Syngenta.

### **Student profile:**

This project is suited for applicants with a first class or high second-class BSc or Master's level degree (or international equivalent) in chemistry or a closely related subject area. Funding is available at "home" fees status and is open to applicants from the UK, EU, EEA, and Switzerland.