

Further information – A3258

The Innovative Training Network “SOPLAS – Macro and Microplastic in Agricultural Soil Systems” is funded by the European Commission under the Horizon 2020 programme (Marie Skłodowska-Curie Actions) and offers 14 fully-funded PhD positions (for early-stage researcher (ESR)) with attractive complementary training activities and generous travel, laboratory and research budgets. The successful candidates will be hosted by a member of a European Consortium of universities, research institutions and companies in Germany, United Kingdom, Czech Republic, Spain, Austria, Netherland, Belgium, Switzerland and Portugal. Successful candidates will have the necessary background education and a research interest in a field that matches the respective topic, including in natural, environmental, technical, social or economic science. The selected PhD students will participate in a multidisciplinary and inter-sectoral research and training network aimed at accelerating the applicants scientific careers.

SOPLAS is unique in that it will combine the expertise from scientists from diverse research fields to work in an interdisciplinary team to deliver significant advances in understanding the specific fate and effects of plastic within agricultural soils and, more generally, the sustainability of plastic use in agriculture.

SOPLAS will:

- Train scientists (ESRs) able to tackle the critical knowledge gaps related to the fate and impacts of plastics in agroecosystems. You will be part of a multi-disciplinary and inter-sectoral training network delivering significant advances in understanding the specific fate and effects of plastic within soils and, more generally, the sustainability of plastic use in agriculture.
- Develop operational techniques to detect plastics in soils, with a focus on microplastic (MiP)
- Provide a first comprehensive assessment of the ecotoxicological effects of MiP in soils systems
- Analyse different technical and socio-economic options, including the use of biodegradable plastics, to lower plastic accumulation in soils systems
- Analyse and model MiP fluxes from arable land into freshwater systems
- Provide the scientific evidence to support the development of new environmental policies, agricultural practices and industrial opportunities related to plastics in agriculture in Europe.

Lancaster University will host two of the SOPLAS PhD researchers:

- Studentship 1. **Development and application of fluorescence-based techniques to quantify microplastic pollution in soils (lead supervisor Professor Cris Halsall).**

The detection and quantification of primary and secondary MiP in soil amendments and in soils will build on recent advances in analytical methodologies for MiP (e.g. FT-IR and Raman spectroscopy, pyrolysis-GC-MS). Based on earlier studies with soil amendments, SOPLAS will be the first to adapt the different **methodologies to accurately isolate, identify and quantify MiP in**

a range of soil matrices and subsequently compare the results obtained using different methodologies. Since the isolation of MiPs from soil and soil amendments is still unsatisfactory (particularly for small MiP particles), we will first work towards optimizing protocols to isolate MiPs from soil and soil amendments. This work will involve optimizing filtration, oxidative and enzymatic degradation protocols.

This PhD project has three main objectives:

- (i) Optimize protocols for isolation of MiPs from a range of soil matrices
- (ii) Develop fluorescence microscopy-based techniques for quantification of MiPs in soils, allowing high sample throughput;
- (iii) Establish a baseline quantification of MiP pollution across a wide range of European soils, using fluorescence-based techniques and comparing these to other spectroscopy-based microscopy techniques.

- **Studentship 2. Transport of microplastics in overland flow (lead supervisor: Professor John Quinton).**

The potential pathways of MiPs from soils to aquatic systems have yet to be addressed in the scientific literature. Therefore, we will be among the first to work in this area. In SOPLAS we will use advanced techniques from hydrology and erosion research to estimate the potential fluxes of MiP into aquatic systems coming from soils. Three critical pathways will be investigated: transport to groundwater via the subsurface; the mixing and movement of plastics in the soil due to tillage and bioturbation and the movement of plastics to surface waters in overland flow (the focus of this PhD).

This PhD will focus on the processes governing transport of MiP which will first be studied in laboratory flume experiments utilising high resolution particle tracking and tracing methods. These experiments will subsequently be upscaled to the field and small catchment scale using traceable MiP.

Specifically the studentship will:

- (i) Develop a methodology for tracing MiP in overland flow
- (ii) Carry out laboratory experiments investigating the controls on the detachment of MiP and its transport during rainstorms in the laboratory
- (iii) Collect evidence of MiP transport from soils to water in the field

Deadlines and applications

Applications should be made through the Lancaster University

Qualifications. Applicants should have a an above-average master's degree in soil science, chemistry, biological sciences, agricultural engineering, physical geography or related fields. Laboratory and fieldwork skills, alongside a desire to work in environmental sciences and with local stakeholders, will be an advantage. Very good knowledge of spoken and written English is required.

For further information, please contact Professor Cris Halsall (C.Halsall@lancaster.ac.uk) (Studentship 1) and Professor John Quinton (J.Quinton@lancaster.ac.uk) (Studentship 2).

Studentship funding: Full studentships (tuition fees and salary in line with EU_ITN norms for EU students for 3.5 years.

Mobility and early career requirements: The rules of Innovative Training Networks require applicants to be in the first four years (full-time equivalent) of their research careers and have not been awarded a doctoral degree. To foster international exchange of early stage researchers the **applicants should not have resided in the United Kingdom for more than 12 months in the last 3 years (except refugees)**. Interested applicants that do not meet this criteria should visit <https://www.euraxess.de/de/node/579284> for details of other PhD researcher opportunities in the SOPLAS project with our European partners.

The salary follows the fixed regulations of MSCA-Projects for scientific employees within the Horizon 2020 framework and is set at £39,820 per year.

Deadline for applications: 31 January 2021

Provisional Interview Date: TBC

Start Date: 1st July 2021