



M2ex – Exploiting metal-microbe applications to expand the circular economy

Marie Skłodowska-Curie Action H2020-MSCA-ITN-EJD-2019

ESR7-UNINA: Multiscale mathematical modelling of the fate of TMs after digestate land applications

Job description

We are looking for a motivated Early Stage Researcher (ESR) in the field of multiscale mathematical modelling of the fate of TMs after digestate land applications. The research fellow will be hosted at the Università degli Studi di Napoli Federico II (UNINA). This group has long expertise in mathematical modelling of biological processes in the context of bioremediation and wastewater treatment, leading several projects in this area. He/she will be recruited by UNINA for a period of 36 months with the aim of obtaining a joint PhD degree between UNINA and Universidad Pablo de Olavide (UPO).

The M2ex European Joint Doctorate offers to the ESR7 an innovative series of Network-wide training events to ensure a high-quality, engaging and inspirational training environment including secondments in CSIC (Spain), COGEI S.r.l. (Italy) and IDENER (Spain).

Objectives

The fate of TMs in the soil after metal contamination is very really difficult to predict. The mechanisms of mobility are very heterogeneous and are strongly affected from: i) the physical-chemical nature of the soil; ii) the retention capacity of soil water; iii) the permeability characteristics of the soil. The main reason of the complexity in mathematical modelling of this phenomenon is its intrinsic multi-scale hierarchical organization. Specifically, it will be necessary to combine chemical models at molecular scale in order to model phenomena of chemical speciation, fractionation, adsorption / desorption, absorption, precipitation or dissolution (typical of a microscopic scale) with models at macroscopic scale able to describe transport and diffusion of TMs in a porous medium.

Expected Results

Development of a multiscale model for understanding and quantifying TMs dynamics in soil. Definition of mass balance equations for substrates, products, microbial species and TMs taking into account surface complexation, formation of soluble and solid products, bio-precipitation. Literature review and specific experimental activities during host secondments will provide data for calibration and validation.



Candidate's profile

Requirements of the ideal candidate:

- M.Sc. degree in Mathematics, Applied Mathematics, Engineering, Computer Science, Physics or a related discipline;
- Strong mathematical and computational skills;
- Prior experience in mathematical modelling of biological systems;
- Integrated language, communication and environment skills, especially in an international context.

Our Offer

You will receive an employment contract for 3 years according to the EU contribution for ITN recruitments and general conditions at the host institution. It includes full social security coverage and will start in September 2020. The candidate will also benefit from:

- International collaborations;
- Support to develop new skills;
- Participation in international conferences and workshops;
- Support in application for additional funding and scholarships;
- Creative, innovative and friendly work environment.

Enrolment in Doctoral degree(s): UNINA / UPO