



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

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

### **ESR11-UNINA: Mathematical modeling of regulatory effect of TMs in microbial biofilms**

#### **Job description**

We are looking for a motivated Early Stage Researcher (ESR) in the field of mathematical modeling of regulatory effect of TMs in microbial biofilms. The research fellow will be hosted at the Università degli Studi di Napoli Federico II (UNINA). This group has long expertise in biofilm modeling and TMs dynamics, 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 National University of Ireland Galway (NUIG).

The M2ex European Joint Doctorate offers to the ESR11 an innovative series of Network-wide training events to ensure a high-quality, engaging and inspirational training environment including secondments in NUIG (Ireland), C&F Società Agricola S.r.l. (Italy) and IDENER (Spain).

#### **Objectives**

Biofilms consist of groups of bacteria attached to surfaces and encased in a hydrated polymeric matrix. Microbial communities establishment and development is a dynamic process that has been shown to be affected by TMs. In this context, mathematical modeling can represent an appropriate tool to provide basic information on the mechanisms regulating the process. The objective of this research project is to propose a new mathematical approach to model the effect of such cations on biofilm growth and development.

#### **Expected Results**

Definition of mass balance equations for substrates, products and bacterial groups involved in multispecies biofilm formation and development, taking into account the effect of TMs on the kinetics of microbial growth and decay, EPS production, attachment and dispersal. Development of a mathematical model able to simulate the TM effect on biofilm growth. Development of a TM dosing strategy to enhance or disadvantage biofilm formation and further development. 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 / NUIG