

## PHD POSITION IN APPLIED GEOMICROBIOLOGY

**Project title:** Harnessing bacterial-fungal interactions for the biorecovery of valuable metals from urban waste

**Background:** E-waste is a growing fraction of the waste produced worldwide. It contains plastics, ceramics and metals. At present-day, the recycling of its components is still in its infancy, in particular regarding metals, which typically represent a non-renewable resource. Only about 20 metals are currently recycled, with a recovery rate of around 50% for elements such as gold. Besides this, there are other valuable metals that are not or only very poorly recycled, such as rare earth elements (REEs) and platinum group metals (PGMs) for instance. Current methods in metal recycling consist in relatively polluting approaches (pyro- and hydrometallurgy). As a result, the field of metal recycling from e-waste (urban-mining) is a timely issue that requires the development of innovative and sustainable approaches. E-waste typically consists of a heterogeneous matrix of materials and thus a parallel can be drawn to other complex systems such as soils. In soils, microbial interactions are essential to maintain biogeochemical cycles. For this reason, this project hypothesizes that it is possible to take advantage of both bacterial and fungal biogeochemical capabilities towards metals, along with bacterial-fungal interactions (BFI), in order to recover metals in minute concentrations from heterogeneous matrices. This will allow getting insights into how BFI may be harnessed to elaborate innovative biometallurgical processes for the biorecovery of selected valuable metals from e-waste.

**PhD work description:** The experimental plan will include the isolation and selection of metal-resistant bacterial-fungal consortia from metal-rich environments. For this, new ways to approach the “microbial cultivability bias” will have to be developed. The isolated (or enriched) microbes will be screened for their capabilities towards the mobilization and immobilization of selected valuable metals: e.g. Au, REEs, PGMs. Then, the best microbial candidates will be used in microcosms trials with actual e-waste and finally in pilot-scale conditions to assess the feasibility of using bacterial-fungal consortia in an industrial setting.

**Requirements:** We are seeking a PhD student with skills in both microbial ecology and mineralogy. Applicants are expected to have knowledge in both fungal and prokaryotic biology. Additionally, experiences in methods such as electron microscopy and associated micro-analytical tools, X-ray diffraction and other approaches at the micro-scale are required. Applicants should have a high interest for interdisciplinary work at the microbe-mineral interface. Besides research activities, the hired PhD student will be involved in teaching laboratories in microbiology and should therefore have interest in communication, as well as to be able to communicate in French (both written and spoken, with the possibility to learn during the PhD). A good level of spoken and written English is also required.

**Supervision:** Dr Saskia Bindschedler and Prof. Pilar Junier.

**How to apply:** Send a single pdf file including a motivation letter, a full CV, and the names and contact information of two reference persons to [saskia.bindschedler@unine.ch](mailto:saskia.bindschedler@unine.ch). **The deadline to apply is 01.05.19 and the planned starting date is 03.06.19.**

**Information:** Dr Saskia Bindschedler, Laboratory of Microbiology, Institute of Biology, University of Neuchâtel, [saskia.bindschedler@unine.ch](mailto:saskia.bindschedler@unine.ch)