

Description of Research Project

The ERC-funded project aims to investigate interactions of various metallophilic chemolithoautotrophic microorganisms with complex mineral materials. We examine laboratory and environmental microbial-mineral interfaces at the micrometer and nanometer scale and characterise microbial fingerprints left on minerals of terrestrial and extraterrestrial origin (<https://www.nature.com/articles/s43247-021-00105-x#Ack1>; <https://www.frontiersin.org/articles/10.3389/fmicb.2019.01492/full>). Towards biotransformed mineral materials we will apply techniques based on synchrotron light that are promising tools for non-destructive investigation of the biogenicity of geobiological structures. Exploring the microbial-mineral interfaces under the X-ray will provide insights on morphology, elemental composition, crystalline structure, oxidation states, magnetic properties, and others, significantly adding to the investigation of the biogenicity of microbial nano-lithologies and the search of biosignatures.

Description of CBM

The Center for Molecular Biophysics (CBM, <http://cbm.cnrs-orleans.fr>) is a research unit of the French National Center for Scientific Research (CNRS), affiliated with the University of Orléans. At the Exobiology Group of the CBM in Orléans, PostDoc positions are available in the field of geomicrobiology, biogeochemistry, astrobiology, and the study of microbial interactions with various minerals within the framework of a project funded by the ERC. The Exobiology Group at the CBM provides extensive supervision and expertise for cultivation and physiological characterisation of metallophilic microorganisms, biochemistry of extremophiles, molecular techniques, electron microscopy and analytical spectroscopy techniques, as well as participation in a continuously evolving scientific projects.

Activities

Domains of the research: synchrotron-assisted spectroscopy and crystallography, geomicrobiology, biogeochemistry, astrobiology, analytical chemistry, transmission and scanning electron microscopy.

The activities of the recruited person:

- Participation and implementation of research projects with a focus on microbial-mineral interactions, including field campaigns, analysis of environmental samples from extreme environments or microbial samples after exposure outside the International Space Station (ISS);
- Supervision of students and participation in the administration of the laboratory, teaching and research;
- Process and interpret experimental data;
- Present and promote the results obtained (reports, publications, conferences);
- Collaborate with team and consortium members, exchange and share knowledge;
- Ensure compliance with milestones and deliverables.

Specificities

Service / Laboratory

Centre de biophysique moléculaire (CBM) d'Orléans, France.

Starting date of the employment

As soon as possible. The vacancy is available for 3-4 years with the subsequent opportunity to apply for a permanent position.

Required research profile

Expected skills:

- PhD in (geo)microbiology, biogeochemistry, materials science, analytical chemistry, biophysics or similar.
- Fundamental techniques of synchrotron-assisted spectroscopy and/or crystallography.
- Previous work experience with synchrotron-based tools (spectroscopy and/or crystallography), transmission electron microscopy.
- A strong interest and a passion for science and research.
- Excellent command of written and spoken English.

Tools:

- synchrotron X-ray diffraction (XRD),
- synchrotron X-ray absorption spectroscopy (XAS),
- synchrotron X-ray emission spectroscopy (XES),
- conventional laboratory techniques, such as Raman, IR spectroscopy, transmission and scanning electron microscopy.

Qualities :

- Strong interest in experimental work;
- Autonomy and a taste for teamwork (5 other persons from the CBM are involved in this ERC project);
- English: excellent read, written and spoken;
- Know how to communicate and promote research;
- Spirit of initiative, analysis and synthesis;
- Organised, rigorous, respectful of safety instructions.

Applications

If you are interested, please send your application including CV, list of publications, and 3 references to Prof. Tetyana Milojevic: tetyana.milojevic@cns-orleans.fr (Chair of Exobiology at the University of Orléans, Head of Exobiology Team, CNRS-Centre de Biophysique Moléculaire, Rue Charles Sadron, 45071 Orléans cedex 2, France).

