



Institut de Biologie Structurale
UMR 5075 CEA- CNRS – Univ. Grenoble-Alpes
Microbial Metabolism team



Postdoctoral position in anaerobic structural biology to investigate a hyperthermostable nitrogenase

A 2-year postdoctoral position is available **to investigate the chemistry behind biological N₂-fixation**. The project is part of a scientific European consortium gathering multidisciplinary experts devoted to **understanding the principle of enzymatic N₂-reduction to inspire synthetic chemistry**. The position will be hosted in the newly established Microbial Metabolism team, with a preferred starting date of early summer 2025.

Working on **hyperthermophiles** from the archaeal realm **unlocks new models** to characterize **metalloenzymes** capable of **outstanding chemistry**. Their extremely slow catalytic rates under standard temperatures allow **to catch them in action**. Based on robust and reproducible preliminary work, the candidate will dissect a hyperthermostable nitrogenase from a methanogenic archaeon through cryo-trapping, cutting-edge structural methods developed at the synchrotron, and anaerobic biochemistry. By being at the center of the consortium offering state-of-the-art genetic manipulation, enzymology, spectroscopies, computational modeling, and synthetic chemistry, the candidate will deliver structural insights on reconstituted and engineered semi-synthetic nitrogenases provided by partners. The long-term goal of the study is to generate synthetic models improving manmade catalysts for N₂-fixation based on snapshots derived from the nitrogenase trapped at different catalytic stages.

The **ERC MicroMet team** led by Dr. Tristan Wagner has long-standing expertise in methanogenic archaea and is capable of going from their culture to the structural description of their native metalloenzymes. For this, the new laboratory will be equipped with five glove boxes before April 2025. This facility will contain state-of-the-art equipment to purify, crystallize, and characterize O₂-sensitive enzymes. Collaboration at the IBS and within the consortium will allow the candidate to access new structural methodologies and an advanced set of experimental tools to uniquely describe all the facets of nitrogenases, including the one coming from a deep-sea volcano.

Selected publication.

On N₂-fixation in methanogen:

Maslać et al. *mBio*. **2022**. 10.1128/mbio.02443-22.

Maslać et al. *FEBS J*. **2024**. 10.1111/febs.17148

Our philosophy of exploring metabolism through structural work:

Jespersen and Wagner. *Nat Microbiol*. **2023**. 10.1038/s41564-023-01398-8.

Lemaire et al. *Nat Commun*. **2024**. 10.1038/s41467-024-53338-7.

And publication within colleagues from the consortium:

Sahin et al. *Angew Chem Int Ed Engl*. **2023**. 10.1002/anie.202311981.

Cadoux C et al. *JACS Au*. **2023**. 10.1021/jacsau.3c00567



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The MicroMet team hosted by the Extremophiles and Large Molecular Assemblies Group (ELMA) group benefits from the infrastructure gathered at the **IBS** (<https://www.ibs.fr/>) and the expertise of neighbor groups in structural biology, biophysics, and biochemistry. **Grenoble** is a prominent university city in France, hosting over 58,000 students from over 70 countries. Thanks to a leading university, various state-owned research organizations, top-tier international scientific facilities like the ESRF synchrotron and ILL neutron facilities, and significant high-tech industries, it boasts a globally recognized research community. This diversity creates a vibrant atmosphere, buzzing with activity day and night. Additionally, Grenoble is renowned for its exceptional location in the French Alps, with major ski resorts reachable in under an hour, along with breathtaking natural sites to explore in other seasons.

The ideal candidate must hold a Ph. D. in biochemistry and have a solid background in structural biology, particularly X-ray crystallography. Candidates with experience in anaerobic handling, from microbial production to crystallization, are encouraged to apply and will be treated as a priority. Cultivation of anaerobic microbes and knowledge of native purification are welcomed but not mandatory. Interest in metalloenzymes, extremozymes, and reaction mechanisms will be advantageous. Due to the nature of the consortium, the candidate must be highly motivated, open-minded, and have strong communication skills in English. Moreover, the talented candidate will work in a collaborative and respectful environment thrived by an enthusiastic multidisciplinary group of top scientists from the European consortium. Following the commitments made by the CEA in favor of integrating people with disabilities, this position is open to everyone.

To apply, please use the following link and attach a detailed resume, a summary of your past research activity, a letter to describe how you would fit the requested profile, the transcripts of your academic records and Ph.D. degree and two reference letters before the 3rd of March:

<https://www.emploi.cea.fr/Pages/Offre/detailoffre.aspx?idOffre=35001&idOrigine=502&LCID=1036&offerReference=2025-35001>