Master internship position at IFP Energies nouvelles (IFPEN)
In Environmental microbiology
Towards a better understanding of subsurface microbial hydrogenotrophic activities using synthetic consortia

Intermittent renewable energies such as wind turbines and solar panels can produce electricity in excess. A promising technical solution to deal with this surplus consists in converting electricity into “green” hydrogen (H2) through electrolysis and to store produced H2 in geological formations. Compared to surface storage, underground hydrogen storage (UHS) in geological formations has numerous benefits: a huge storage space, safety brought by the solid caprock seal, lower cost than large-scale surface tanks, and high availability in existing underground storage sites. Due to its high reactivity and mobility, the major risk associated with UHS is the consumption of H2 by subsurface microorganisms. Hydrogenotrophic populations can use H2 in their metabolism and thus may lead to a variety of undesired side effects such as H2 loss, H2S formation, methane formation, acid formation, clogging and corrosion. H2 reactivity questions the capacity of these systems to keep the quantity and composition of the gas injected during seasonal injection / withdrawal cycles. In this context, this internship focuses the characterization of hydrogenotrophic microbial populations in H2-rich deep environments using cultivation methods. Besides, it will focus on pure cultures and synthetic consortia consisting of methanogenic archaea, sulfate-reducing and homoacetogenic bacteria representative of deep surface environments. Abiotic factors such as salinity, temperature and substrate concentration will be modulated to assess the sensitivity of kinetics parameters. Microbial populations will be monitored using molecular biology techniques (qPCR) and microscopy. These data enable the development of synthetic hydrogenotrophic microbial consortia and numerical simulations to study and model their activity.

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Keywords: Hydrogen, UHS, anaerobic cultivation, qPCR

Location IFP Energies nouvelles, Rueil-Malmaison, France
Duration and start date 6 months, February-July 2024
Employer IFP Energies nouvelles, Rueil-Malmaison, France
Academic requirements Bachelor degree in microbiology
Language requirements Fluency in French or English
Other requirements Knowledge in microbiology, anaerobic cultures

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To apply, please send your cover letter and CV to both IFPEN and FORTH/IG supervisors indicated here above by Friday 3rd of November 2023.

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IFPEN offers a stimulating research environment, with access to first in class laboratory infrastructures and computing facilities.