



Thesis
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Ecological engineering and maintenance of methane oxidation in photogranules under selection pressure

Doctoral candidate

Tiffany GARIN

Doctoral adviser

Alain SARNIGUET (IRHS,
SPE)

Matthieu BARRET (IRHS,
SPE)

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We propose to explore the ecosystemic functioning of the microbiome in methanotrophic photogranules. Methane removal in photogranules is a potentially fragile ecosystem function as it competes with other heterotrophic processes for oxygen.

Finding ways to ecologically create a stable methanotrophic community is a prerequisite for a biotechnological application, in which methane, a potent greenhouse gas, must be removed from the waste stream. The PhD student will measure the activity of photogranules as a function of their phenotypes, light exposure and selection pressure resulting from coalescence with allochthonous microbial communities.

The data will enable the PhD student to propose levers for the assembly and maintenance of a photogranulated and methanotrophic industrial microbiome that eliminates methane, a greenhouse gas, from effluents. A new mathematical model linking the scale of individual photogranules and the bioreactor will be calibrated using the data. An international network of existing collaborations supports this thesis, which will provide opportunities for the PhD candidate.

