

## Research Seminar

**“Gas bioconversion into value added molecules with anaerobic microbial consortia”**



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**Title:** Gas bioconversion into value added molecules with anaerobic microbial consortia

**Summary:**

CO<sub>2</sub> is a globally available, non-toxic and stable carbon resource. Its use in chemistry and energy industries is crucial for the development of carbon circular economy. The production of fuels from CO<sub>2</sub> is a promising market, although it faces scientific hurdles, particularly in terms of energy efficiency. Indeed, the reduction of CO<sub>2</sub> into fuels requires large amounts of energy supply, mostly in the form of H<sub>2</sub>. Hence, the technology will be dependent on the development of sustainable H<sub>2</sub> production.

The use of biological catalysts, and in particular microbial consortia, is getting more and more attention in the scientific community, because it offers the possibility to operate at mild conditions of temperature and pressure. Additionally, working with consortia at industrial scale does not require sterile conditioning of the materials. However, engineering of consortia for a targeted biological function is a challenging task. It is necessary to have good knowledge of the microbes that will co-exist or compete in the system, and how to control and optimize an equilibrium between them.

One approach presented here consists in engineering natural consortia by controlling its metabolic orientations with the process parameters. Experimental and modeling studies have been implemented during the past years at TBI (INSA Toulouse, France) to better understand the microbial competitions in bioreactors converting H<sub>2</sub>/CO<sub>2</sub> with microbial consortia. Some studies aim at producing methane (biological methanation), and some others have been developed for the production of acetate, ethanol, and other VFA and alcohols. The development of reliable methods of biological activities measurements, and in particular H<sub>2</sub> consumption rates measurements are also addressed to be able to characterize the systems.