The Sulphur and & Phosphorus cycles in the MELiSSA loop

Key words: Sulphur, Phosphorus, MELiSSA cycles,

Abstract: The MELiSSA loop as a regenerative life support system has to maximize the recovery of the main elements, as a key to develop a closed and self-sustainable process. After the well-known top four (i.e. C, H, O, N), Sulphur and Phosphorus are the main elements, and there is a clear need to progress on the understanding of the two cycles within the MELiSSA loop.

Although some knowledge exist at microbial and plant physiology, today, there is limited knowledge on the several S&P pathways within the MELiSSA processes. Starting from this, the proposed PhD project would first analyse these 2 cycles, or one of them, in the context of the MELISSA loop, considering the inputs, the intermediate bioprocessing and the outputs and their point of use. For this, the required forms of S & P, and all the associated metabolic pathways, in the different MELiSSA Compartments should be identified and ideally quantified. From this preliminary cycle analysis, the project may also comprise, on some critical or demonstration issues, some experimental bench or pilot scale work on existing MELiSSA processes. This work shall be supported with simulation tools.

Aattention will be given to the mineralization processes occurring in the first compartment and to the diffusion/transport of S and P anions or oxyanions, or organic derivatives inside the loop

Impact on MELiSSA: Definition of technologies and strategies for Sulphur and Phosphorus recovery in the MELiSSA loop

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Desired knowledge: Candidates preferably possess a degree in biology, chemistry, biotechnology or bioengineering. They have to be familiar with metabolic pathways analysis and process engineering.