University of Stuttgart
Stuttgart Research Center Systems Biology

Systems Biology Seminar Talk

Engineering Microbial Partnerships for Syngas Fermentation

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Host:
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Abstract:

Carbon-rich wastes can be converted to CO-rich syngas via gasification, which can be fermented into valuable chemicals. While ethanol is the primary product of syngas fermentation (commercially implemented), expanding the product spectrum requires either genetic engineering of acetogens or the design of synthetic microbial co-cultures. Our group pioneered the latter, first demonstrating a co-culture of *Clostridium autoethanogenum* and *Clostridium kluyveri* converting syngas into even-chain medium-chain carboxylic acids (MCCAs) and alcohols. To expand this platform beyond even-chain products, we introduced *Anaerotignum neopropionicum*, enabling the production of odd-chain MCCAs and alcohols, such as valerate and pentanol. More recently, we developed a system combining non-sulfur purple bacteria with acetogens to produce polyhydroxyalkanoates (PHAs) from CO. These studies highlight co-cultures as a powerful strategy to diversify syngas-derived products and advance sustainable bioprocessing.

CV:

Diana Z. Sousa is professor at Wageningen University & Research where she heads the Microbial Physiology group within the Laboratory of Microbiology. Her research interests are in the study of the metabolic pathways, microbes and microbial networks that anaerobically convert one-carbon molecules such as carbon monoxide, carbon dioxide, methane and methanol, and their application to produce chemicals. Examples of her research include the study of natural microbial syntrophic associations and the design of synthetic co-cultures for the conversion of syngas (produced from wastes or lignocellulosic materials) to medium-chain fatty acids, alcohols and other low solubility added-value products. Diana studied Biological Engineering at the University of Minho and obtained her PhD from the same university, where she also worked as Assistant Professor in the field of Environmental Biotechnology before moving to Wageningen. Diana seeks for a better understanding of microbial communities and microbial interactions, while searching for biotechnological applications of these communities in circular economy approaches.