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Today's chemical production and energy supply strongly depend on fossil feedstocks. This is not only linked to problematic greenhouse gas emissions. The limitation of fossil resources also means there is an imminent end to traditional hydrocarbon economy and industries will need to deploy production concepts on the basis of renewable commodities[1]. Mixed culture biotechnology holds promise to become a corner stone in next generation chemical production platforms[2]. Unlike microbial pure cultures requiring sterile substrates, mixed cultures can produce valuable chemicals from low-value feedstocks and even waste streams. However, controlling the product spectrum in mixed microbial bioconversions remains a key challenge and progress in this direction is hampered since generalized process models are not yet encompassing the formation of higher value products[3].

Here we present general extensions to state-of-the-art process models that allow an improved implementation of resource and energy recovery in the frame of mixed microbial conversions. Taking the example of butanol, an energy-rich biofuel with properties similar to gasoline, we demonstrate how continuous production strategies can be established. These strategies rest on ecological selection principles aimed to direct the microbial population structure towards a desired product space[4]. We anticipate our model framework to be the starting point for intensified research at the intersection of environmental and industrial biotechnology with a mission to leverage the full potential of circular economy.

Literature

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☑ Oral contribution

☐ Poster contribution

Stream:

☐ Industrial-scale bioprocess operation

☐ Process analytical technologies (PAT) for understanding bioprocess scale up

☐ Bioprocess development and intensification

☐ Single use processes

☑ Scaling of bioprocesses for the circular economy

☐ Micro sensors for bioprocesses

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