



Università degli Studi di Napoli Federico II

PhD in Biotechnology - 38th cycle

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Production of solvents and commodity chemicals via syngas fermentation

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C-based feedstocks may be converted in energy/chemicals according to a wide spectrum of processes. Processes include the gasification, a quite versatile process for several feedstocks (biomass, tyres, plastics, etc.) that produces syngas, an intermediate vector in the conversion path of C-based streams into biofuel/chemicals. CO, H₂, and CO₂ are the main components of syngas and of some industrial CO-rich waste gaseous streams (Yaxue et al., 2022). Syngas fermentation is a promising technology for the future sustainable biobased economy (Phillips et al., 2017). Only a few microorganisms are able to utilize syngas C₁ compounds as substrate for growth and for synthesis of interesting industrially end-products. These microorganisms include phototrophic bacteria (*Rhodospirillaceae* family) and acetogenic bacteria (*Clostridia* family) (Dhakai et al., 2021).

The present project focus on production processes and technologies for chemicals production by syngas fermentation. The attention is paid on the characterization of kinetics of the cell growth of the selected microorganism and the production of metabolites under different operating conditions. The design and set-up of an appropriate three-phase bioreactor system to enhance the performances of the selected microbic system is scheduled. Guide lines to optimize yields and productivity of the proposed system – microorganism plus bioreactor – will be addressed.

References

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3. Dhakai N., Acharya B. Syngas Fermentation for the Production of Bio-Based Polymers: A Review. *Polymers* 13, 3917 (2021)