



innovations from nature



acib Project Offer

Continuous biocatalysis using liquid membrane technology (BioMemTec)

The combination of liquid membrane permeation with multiphasic biocatalysis provides a sophisticated and profitable concept for continuous bioprocessing. Permanent phase separation in the reactor prevents emulsion formation and enables continuous processing. Key element of the present reactor is a supported liquid membrane. The liquid state of the membrane outperforms classical membranes with regard to flux efficiency by far (diffusion coefficients in thin organic liquid layers are >1000fold higher than in solid membranes). The specific set-up of the reactor guarantees a high stability of the membrane.

Background

The switch from batch to continuous processes is a pressing request of industry. Key drivers are cost savings through reduced energy consumption, downsized plants, and timely and faultless production without batch to batch variations. However, the development of continuous bioreactions is usually extremely challenging: Aside from the required multidisciplinary team and expertise, especially low biocatalyst half-lives restrict operation times and multiphasic reaction mixtures complicate the process design. Therefore, the vast majority of biocatalytic reactions are still operated in batch and the biocatalyst is wastefully disposed after the reaction.

acib-Technology

The developed liquid membrane permeation unit proved continuous heavy metal ion recycling for >42 days (TRL 4*). The operation mode of the membrane reactor perfectly suits the requirements of instable biocatalysts: The liquid membrane keeps concentrations of hydrophobic substrates and products in the catalyst containing aqueous phase low. The presented concept is hence suitable for the two general cases of *in situ* product removal and *in situ* substrate supply. Close cooperation of Ass. Prof. Regina Kratzer (ACIB key researcher) with Prof. Siebenhofer guarantees efficient project handling. The workflow includes the identification of the optimal biocatalyst form, the optimization of the liquid membrane composition and coupling of the biotransformation with continuous liquid membrane permeation. (*Siebenhofer M, Noll H, Fritz M. 2015. Separ Sci Technol, 50, 2937-2947.)

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Under protection of a CDA we offer continuous process development of biocatalytic reactions with *in situ* product removal and/or *in situ* substrate supply. We provide strong expertise in biotechnological and chemical engineering. The interdisciplinary project at acib will be jointly supported by the Institutes of Biotechnology & Biochemical engineering (IBB) and Chemical Engineering and Environmental Technology (CEET) at the Graz University of Technology.

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