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ROMEO – A Major Step Toward Heterogeneous Hydroformylation

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Abstract

The hydroformylation is one of the most prominent industrially applied reactions. More than 10 million tons of chemical products rely on this homogeneously catalyzed reaction step every year; thus, a permanent improvement of the hydroformylation process is of utmost interest for many chemical companies like Evonik. Especially, it is the researcher´s and company´s aspiration to find a heterogeneous-like catalyst. The improvement done within Evonik followed several approaches in the past including optimization of process technology as well as optimizing the catalytic system. Most of these developments were achieved by public funded projects together with experts from academia.

This tandem presentation gives an overview of the developments in the field of hydroformylation achieved in the past years. It focuses on the most relevant results leading to the currently running EU funded project ROMEO (Reactor Optimization by Membrane Enhanced Operation). This project aims at the combination of a catalytic reaction with the separation step on a single support structure. This combination in an innovative “2-in-1” reactor opens the possibility to omit or at least significantly downsize the separation units. In case of catalytic processes that are performed close to the chemical equilibrium the constant removal of one reaction partner from the reaction enhances the efficiency.

The concept allows increasing the yield of catalytic reactions not only by immediately removing undesired side products from the reaction zone but also by using new heterogenized catalyst systems. ROMEO’s approach is to use and combine existing or only slightly modified building blocks such as supports, coatings and catalysts which independently from the membrane separation process allow a high increase of reactor efficiency. The consortium further focuses on the development of a new reactor methodology. In addition to the actual technical developments, a universal modelling tool will be implemented in order to allow the accurate prediction of ROMEO’s benefit for other homogeneously catalyzed reactions. The European Commission is providing financial backing to the project and its nine academic and industrial partners through the Horizon 2020 research program.
The presentation will give an overview of the project and its potential as well as insight in first results.