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From batch to continuous conversion of bio-derived platform chemicals: Aqueous phase hydrogenolysis of furfuryl alcohol into 1, 2-pentanediol using a trickle bed reactor

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1, 2-pentanediol (1, 2-PeD) is widely used as a monomer for polyesters, as a key intermediate of low-toxic microbicides and is an ingredient of various cosmetic products. Nowadays, fossil non-renewable resources are the common basis for the production of chemicals and fuels. In this context, 1, 2-PeD is currently produced via a cost-intensive multi-step route by selective oxidation of pentene to pentene oxide and a subsequent hydrolysis. The displacement of exhaustible raw materials through biomass as a sustainable source of energy and organic carbon is clearly desirable. While the direct selective conversion of biomass into valuable chemicals is still a challenging research topic, various bulk chemicals like Furfuryl Alcohol (FA) are already available via established production routes. Since FA can be converted into 1, 2-PeD by aqueous phase hydrogenolysis, it is representing a promising alternative and sustainable production route for 1, 2-PeD. But so far, most of the catalysts reported for the hydrogenolysis of FA are lacking in that they are disadvantageous either in regard to their toxicity (e.g. copper chromite), the need of additives or special solvents (e.g. Adams's catalyst) or industrial applicability. In contrast to the aforementioned, supported ruthenium catalysts are non-toxic as well as stable against water under hydrothermal conditions. In order to assure high throughput and a constant product quality, a continuous operation mode is clearly desirable for an industrial application. The trickle bed reactor is representing a promising concept due to its simple and robust build-up while exhibiting a good selectivity for the main products.

Biography

Dominik Götz has completed his MSc in 2013 at the Technical University Darmstadt, Germany. Since 2014, he has been working on his PhD under the supervision of Dr Peter Claus. His main fields of research are the conversion of bio-derived platform chemicals especially using trickle bed reactors as well as the modeling of these reactors using CFD tools.

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