Continuous flow microreactors for catalytic biomass conversion

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The limited reserve of fossil resources and their significant contribution to greenhouse gas emission have directed numerous academic and industrial efforts recently towards the use of more sustainable feedstocks for the production of fuels, chemicals and materials. Within this context, conversion of renewable and abundant biomass into valuable bio-based chemical products is currently one focus of many research and development activities. Microreactor technology is considered a typical example of process intensification, which holds great promises for catalytic biomass conversion. In continuous flow microreactors, high efficient and selective conversion of biomass and its derivatives can be achieved, due to the precise reaction parameter control, significant transport intensification, and improved chemistry [1].
This work will introduce the recent research in our group on the use of continuous flow microreactors for the catalytic transformation of biomass derivatives into a variety of bio-based fuels and chemicals. Typical reaction examples include sugar dehydration to furanic platform chemicals, glucose oxidation to produce gluconic acid, 5-hydroxymethylfurfural oxidation to produce polymer building blocks, levulinic acid hydrogenation to γ-valerolactone, as well as biodiesel synthesis [2-7]. The operating principles of such reaction systems involving both homogeneous and heterogeneous catalysts will be demonstrated in microreactors. The intensification potential of microreactor flow processing, the catalytic mechanisms, kinetic and microreactor modelling aspects will be also discussed.

References

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Dr. Jun Yue received his PhD in Process Engineering from Université de Savoie in France in 2008, supported by a joint PhD program with Dalian Institute of Chemical Physics, Chinese Academy of Sciences in China. Between 2009 and 2014, he has been working as a postdoc in the Laboratory of Chemical Reactor Engineering at Eindhoven University of Technology in the Netherlands. Since August 2014, he has moved to the University of Groningen in the Netherlands and is currently associate professor in green process intensification. The research group of Dr. Jun Yue focus on developing novel reactor and process intensification concepts in general, and their uses combined with catalysis for highly efficient synthesis of green fuels, chemicals and materials in particular. He has published 70 papers in peer-reviewed SCI journals (H-index: 30; total citations > 3700; Source: Google Scholar).