Molecular Catalysis 523 (2022) 112169

Contents lists available at ScienceDirect

Molecular Catalysis

journal homepage: www.journals.elsevier.com/molecular-catalysis

Editorial

Catalytic deoxygenation for production of green biofuels

The conversion of biomass into fuels and chemicals is a critical future industrial technology in bioeconomic systems. Thermal and biochemical conversion methods can be used to convert biomass into fuels and chemicals. Thermal conversion is a more efficient and suitable techno-economic process for biomass conversion than biochemical conversion. However, the products obtained using these processes should still be upgraded prior to the application. Biofuel has been proposed as a suitable fossil fuel replacement; however, oxygen-rich bio-oil presents several shortcomings, such as corrosiveness and low stability. Deoxygenation is an important step of biomass-to-fuel conversion processes for improving bio-oil quality.

In this special issue, we compiled several state-of-the-art and recent reports on catalyst development for the deoxygenation reaction in biofuel production. The technologies used for deoxygenation catalyst development are summarized in several review articles. The recent trends in catalysis of the fatty acid deoxygenation to produce hydrocarbons are discussed. **Prof. Fan** group focused on multifunctional catalysts, which could catalyze deoxygenation, dehydration, and dehydrogenation reactions. Catalyst active site design is critical for controlling reaction pathways. Homogeneous catalysts are effective for fatty acid deoxygenation reactions. **Prof. Juan** group reviewed the homogeneous reaction pathway, radical-based reactions, and transition metal catalysts. It is found that transition metal catalyst for radical-based reactions presented excellent activity for decarboxylation and decarbonylation reactions. Especially, Ni-based catalysts, which are non-noble metal catalysts, presented good performance for fabricating diesel-like bio-fuel oil via fatty acid deoxygenation. **Prof. Prapainainar** group addressed the significant effect of supports on catalytic performance. **Prof. Yuzup** group reviewed the reaction kinetics and process development with a focus on scaling up processes. **Prof. Muraza** group highlighted the potential of third-generation biofuels, such as aqua-resources, which have recently become the most promising alternative fuels owing to their suitable techno-economic characteristics. The research articles in this issue describe the use of catalysts for deoxygenation of vegetable oil, waste cooking oil, and fatty acids. Moreover, the deoxygenation activity of bimetallic catalysts with promoters is reported. The activities of Ni–Mo, Ni_xP_y, Pd–Co, Pd–Fe, and Fe–Cu catalysts are discussed. Several articles focused on in situ analysis and computational modeling of the deoxygenation reaction to elucidate the reaction mechanism. In addition, the deoxygenation of oxygenated compounds from biorefinery platforms, such as levulinic acid, glycerol, and guaiacol are discussed. As mentioned in the reports in this issue, researchers should dedicate considerable efforts to developing deoxygenation catalysts with practical uses; moreover, the guest editors believe that this collection of articles can serve as a platform for supporting further development of catalysts for biomass conversion into fuels and chemicals.

Professor Guoqing Guan
Associate Professor Chanatip Samart
Dr. Dai Viet N. Vo
Assistant Professor Surachai Karnjanakom
Guest editors

Guoqing Guan, Chanatip Samart*, Dai Viet N. Vo, Surachai Karnjanakom

E-mail address: samart.chanatip22@gmail.com (C. Samart).

https://doi.org/10.1016/j.mcat.2022.112169

Available online 9 February 2022