Organized by Endorsed by
8th IUPAC INTERNATIONAL CONFERENCE ON GREEN CHEMISTRY
9 - 14 September 2018, Shangri-La Hotel, Bangkok, Thailand

8th ICGC 2018 Session:

Conversion of extracted lignin from sugarcane bagasse to phenolic compounds via depolymerization in the presence of solid acid catalysts

Panuruj Asawaworarit[1], Pornlada Daorattanachai[1], Weerawan Laosiripojana[2], Chularat Sakdaronnarong[3], Artiwan Shotipruk[4], Navadol Laosiripojana[1,*]

[1]*The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi, Prachauthit Road, Bangmod, Bangkok 10140, Thailand*

[2]*Department of Tool and Materials Engineering, Faculty of Engineering, King Mongkut's University of Technology Thonburi, Bangkok, Thailand*

[3]*Department of Chemical Engineering, Faculty of Engineering, Mahidol University, Thailand*

[4]*Department of Chemical Engineering, Chulalongkorn University, Thailand*

*e-mail: navadol@jgsee.kmutt.ac.th

Abstract:

In the present work, depolymerization of isolated lignin from organosolv fractionation of bagasse in the presence of several homogeneous and heterogeneous acid catalysts was studied. The catalysts included homogeneous acids (i.e. H_2SO_4), and heterogeneous carbonaceous solid acids (CSAs) synthesized from the hydrothermal treatment of biomass compounds. It was found that the highest phenolic monomers yield was achieved from CSA derived from lignin. In addition, this catalyst showed the highest activity and stability after 5 consecutive cycles, which was related to its high acidity as well as its low acid leaching. The effects of catalyst loading, reaction temperature, reaction time, and solvent type (i.e. methanol, ethyl acetate, methyl isobutyl ketone (MIBK), acetone) on the depolymerization performance were also performed. It was observed that the reaction at 350 ºC for 3 h using MIBK as solvent with catalyst loading of 10 wt.% gave the maximum total phenolic yield of 32.8%, from which 4-ethylphenol and guaiacol were the major phenolic products from the reaction. The results in the work suggest that catalytic depolymerization of organosolv lignin in the presence of CSA is a promising way for production of high value-added chemicals.

Prof. Navadol Laosiripojana is working at the Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi. His research interests focus on the study of catalytic processes for alternative and renewable fuel productions. This involves the development of new and industrially practical heterogeneous catalysts for hydrogen-rich gas, biodiesel and biomass-to-liquid (BTL) productions. During 2004-present, Prof. Navadol has published more than 170 articles in international journals with citation more than 2,500 times.