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Efficient Nano-Catalytic Hydrogenation and Etherification of 5-Hydroxymethyl-2-Furaldehyde to 2,5-Bis(Alkoxymethyl)Furans Under Mild Conditions

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The conversion of lingo cellulosic biomass-derived 5-hydroxymethyl-2-furaldehyde (HMF) into liquid fuels or fuel additives is quite attractive for reducing the green house gas emission a major cause of global warming. The HMF was hydrogenated to 2, 5-bis(hydroxymethyl)furan (BHMF) in various n-alcohol solvents with more than 99% yield using nano-catalyst, Ru(OH)x/ZrO2. The observed catalysis of Ru/ZrO2 was truly heterogeneous in nature and the catalyst recovered after reaction could be reused without an appreciable loss of its catalytic performance.

The etherification conditions of BHMF such as temperature, time or amount of catalyst were optimized in 1-butanol with Amberlyst-15 catalyst for high yield of BAMF. The HMF in various n-alcohols (methanol, ethanol, 1-propanol and 1-butanol) was smoothly transformed to BAMFs in more than 70 % yields by simple two-step sequential reaction process. The BHMF in the same solvents was subsequently etherified into 2, 5-bis(alkoxymethyl)furans (BAMFs, 4 examples) as potential biodiesels with moderate to good yields using Amberlyst-15.

Biography:

Jung Won Kim work at Department of Chemical Engineering, Kangwon National University, as a professor. His main research interests lie in the area of heterogeneous nano-catalysis and reaction engineering, especially for the sustainable energy production and the environment protection. The desired innovation can be assisted significantly by an adequate understanding of catalytic reactions and an ability to design catalytic centers. So his research goal is to search for and develop the underlying chemical and engineering rules governing nano-catalysis, especially regarding the relationship between the active sites and product activity/selectivity.