



Levulinic acid from a simple sugars derived from lignocellulose biomass using homo- and heterogeneous catalysts

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The development of building block, intermediate and end use molecules derived from lignocellulosic biomass to promote a full valorization of agroindustrial residues is essential issue nowadays. The target molecule in our studies is levulinic acid, which is a platform molecule that is used as a precursor for pharmaceuticals, plasticizers, and various other additives. It arises as a result of depolymerization and dehydration of the cellulose fraction.

The development of chemocatalytic methods for the conversion of fractions obtained from the hydrolysis of cellulose included an initial screening in the liquid phase using heterogeneous catalysts under controlled conditions of temperature and pressure. Single C6 and C5 sugars have been selected as starting materials and at a later stage the study will be extended to include actual fractions isolated from sugar industry waste products and lignocellulosic biomass conversion. The performed experiments enabled to divide all tested sugars into two different groups: 1) D-glucose, D-fructose, D-mannose and D-galactose) - is characterized by relatively good reactivity, accompanied with a quite good selectivity to levulinic acid, 2) L-xylose, L-arabinose, L-fucose, L-ramnose, sodium gluconate, sodium glucuronate - showed completely different behaviour at high temperature under acidic conditions. Many solid catalysts with the most reactive fructose were tested in this process. The most reasonable results were obtained almost exclusively with acidic resins.

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Biography

Prof. Czekaj has completed her habilitation in 2015 at Cracow University of Technology and PhD in 2004 from Institute of Catalysis Polish Academy of Sciences, she worked as scientist at Paul Scherrer Institute and Institute for Chemical and Bioengineering, ETH, Zürich in Switzerland. She is now the leader of Catalytic and Nanostructured Materials Design group at Cracow University of Technology in Poland. She has published more than 45 papers in reputed journals and has been serving as an editorial board member of repute.

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