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# CELLULOSE DISSOLUTION-HYDROLYSIS-DEHYDRATION OVER SOLID ACID CATALYSTS IN SUBCRITICAL WATER AND WATER/ORGANIC SYSTEMS

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## Abstract

Cellulose is a main component of renewable plant biomass what makes polysaccharide a promising alternative to fossil resources in the production of valuable chemicals and fuel components. Crystalline domains in the structure of the saccharide make cellulose insoluble in water and any organic solvents and prevent depolymerization of cellulose to any desired product. A perspective solution seems to be cellulose processing over solid acid catalysts under high temperatures and pressures.

Dissolution-hydrolysis-dehydration of cellulose will make possible the production of valuable platform molecules (glucose and 5-hydroxymethylfurfural (5-HMF)) and microcrystalline cellulose (MC) All this value added products seems to be perspective in producing polymer materials, resins, solvents, as well as biofuels, fungicides (5-HMF) and food production, in manufacturing of polymers, as filter material (MC). Hence the development of an effective approach which allows the separation of MC and amorphous cellulose (AC) as well as simultaneous “one-pot“ processing of AC to glucose and 5-HMF is a challenge for current chemistry and chemical technology.

The project aims the development of a tandem procedure to process cellulose in a flow reactor in subcritical water for the separation of cellulose on microcrystalline cellulose and soluble oligosaccharides (from amorphous cellulose) with their following hydrolytic-dehydration to produce 5-HMF and glucose over solid acid catalysts. Niobium oxide supported on zirconia $Nb_2O_5/ZrO_2$ and mixed oxide $Nb_2O_5$-$6ZrO_2$ as well as Sibunit carbon systems are used as catalysts in the treatment of oligosaccharides to the target products [1]. To prevent the destruction of 5-HMF under hydrothermal reaction conditions, a procedure processed in diphasic water-organic solvent mixtures is also under investigation.

**ACKNOWLEDGEMENTS**

This work is supported by the Russian Foundation for Basic Researches (Pr. N 17-53-16027) as well as Franco-Russian Groupement de recherche international GDRI “Catalytic valorization of biomass".

**REFERENCES**

[1] Gromov, N.V., Taran, O.P., Semeykina, V.S., et al. Catalysis Letters 147 (2017) 1485-1495.