Zeolite and zeotype-catalysed transformations of biofuranic compounds - DTU Orbit
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Zeolite and zeotype-catalysed transformations of biofuranic compounds
Catalytic valorisation of biomass with solid functional materials has been recognised as a promising approach to produce value-added biochemicals and biofuels. Furanic compounds such as 5-hydroxymethylfurfural (HMF), 5-ethoxymethylfurfural, 2,5-dimethylfuran, 2,5-diformylfuran and 2,5-furandicarboxylic acid can be obtained from hexoses and pentoses via selective dehydration and subsequent etherification, hydrogenation, oxidation reactions, which show great potential for industrial applications to replace petroleum-based chemicals and fuels. Zeolite and zeotype micro- and mesoporous materials with tuneable acidity, good thermal stability and shape-selectivity have recently emerged as promising solid catalysts, exhibiting superior catalytic performance to other heterogeneous catalysts. This review focuses on the synthesis of biomass-derived furanic compounds catalysed by zeolitic materials, firstly introducing zeolite-catalysed hydrolysis of di-, oligo- and polysaccharides and isomerization reactions of monomeric sugars. Subsequently, the catalytic dehydration reactions of hexoses and pentoses to obtain HMF and furfural are reported. Particularly, a variety of reaction pathways towards upgrading of the resulting platform furanic molecules to valuable bioproducts over zeolitic materials are discussed.

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Contributors: Li, H., Yang, S., Riisager, A., Pandey, A., Sangwan, R. S., Saravanamurugan, S., Luque, R.
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