

Role of Halide-containing Ionic Liquids on the Conversion of Cellulose into HMF

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We conducted the step-by-step approach for the transformation of cellulose to 5-hydroxymethylfurfural (HMF) using ionic liquid and/or solid catalyst. First, the catalytic function of 1,3-dialkylimidazolium-based ionic liquids with different counter-anions was investigated in the fructose dehydration to HMF in DMSO. It was believed that 1,3-dialkyl-imidazolium halide contained the dual catalytic function to act as both Brønsted acid and nucleophile for the fructose dehydration to HMF. Next, the role of [bmim]Cl in hydrolysis of cellobiose over Nafion NR50 was investigated. The addition of [bmim]Cl lead to favorable formation of glucose. Thus, the presence of halogen-based ILs was suggested to enhance the catalytic activity of Nafion NR50 in the cellobiose hydrolysis. This feature was believed to be attributed to the interaction between the ILs and terminal SO₃H groups of ion exchange resin, resulting in the release of additional proton. Finally, microcrystalline cellulose was pretreated with [bmim]Cl, followed by hydrolysis over a solid acid. The overall decrease of cellulose crystallinity was suggested to lead to the formation of TRS during the pretreatment.