CATALYTIC OXIDATION OF CELLULOSE TO FORMIC ACID IN THE PRESENCE OF VANADIUM CATALYSTS

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The effective valorization of naturally abundant renewable carbon resources represents a promising route for sustainable production of chemicals and fuels in the future. Among various biomass resources, lignocellulose is the most abundant biomass and its utilization as feedstock can reduce the dependency on the limited fossil fuels. In the last years, several efficient catalytic systems have been developed to convert cellulose into value-added products. Several catalysts were reported for the transformation of cellulose, glucose or disaccharides into the carboxylic acids including levulinic acid, lactic acid, gluconic acid, acetic acid, and formic acid (FAc)[1-2]. FAc is an important raw material widely used in the chemical, textile, pharmaceutical, agricultural and rubber industry. In recent years FAc has been proposed as a reversible source for hydrogen storage, for example for proton exchange membrane fuel cells as possible hydrogen generator[3]. Several studies have demonstrated that FAc can be selectively decomposed to H_2 in metal-catalyzed systems under mild conditions[4-5]. Currently, the production of formic acid is mainly based on the fossil resources. Therefore, the production of formic acid from biomass can be considered as a promising alternative route to get hydrogen from the renewable sources[6-7].

In this work, we demonstrate a heterogeneous catalytic system for oxidation of microcrystalline cellulose to FAc using different supported vanadium oxides as catalysts and water as the solvent. This catalytic oxidation process promises to be a viable route for formic acid syntheses from biomass sources.

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