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New frontiers in the conversion of fructose to 5-hydroxymethylfurfural: the potential of covalent organic frameworks as catalysts in Deep Eutectic Solvents.

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In recent years, there has been a growing interest in the valorization of lignocellulosic biomass since it could be a valid substitute for oil. Indeed, biomass is a zero-emissions source of materials, it is renewable and available [1]. Among the various value-added chemicals that can be obtained from lignocellulosic biomass, 5-hydroxymethylfurfural (5-HMF) stands out because it can be converted into a range of industrially relevant products, thanks to its several functional groups [2]. Herein, we studied the conversion of fructose to 5-HMF, using sulfonic acid-appended covalent organic frameworks (COFs) as catalysts in cholinium-based deep eutectic solvents (DESs). Covalent organic frameworks (COFs) are porous crystalline polymers constructed from organic building blocks with permanent porosities [3]. We prepared and characterized COFs from 1,3,5-trihydroxy-phloroglucinol with 2,4-diamino-benzenesulfonic acid and with 4,4′-diamino-2,2′-stilbenedisulfonic acid to be used as catalysts for the fructose conversion reaction.

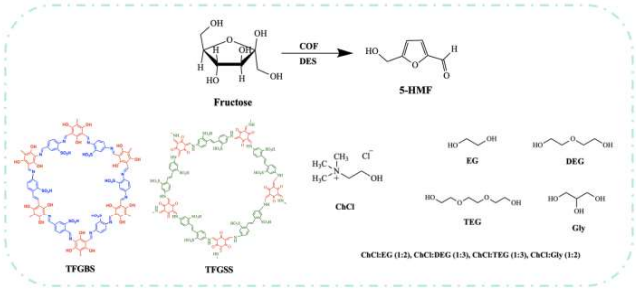

Figure 1: Schematic depiction of reaction, catalysts and solvents.

Both COFs have shown their potential as catalyst for the reaction, leading to obtain high yields in 5-HMF at 120 °C, in particular when we used ChCl:DEG as solvent. Finally, we also explored the recyclability of the catalyst/solvent system.

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