

# Catalytic conversion of carbohydrates into 5-hydroxymethylfurfural by phosphotungstic acid encapsulated in MIL-101 (Cr, Sn) catalyst in deep eutectic solvents

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**Table S1** Viscosity of DESs and its solubility to starch

DESs	HBA <sup>a</sup>	HBD <sup>b</sup>	Abbreviation	mole ratio	Viscosity (m Pa.s)	Starch dissolution <sup>c</sup> (g <sub>DES</sub> /g <sub>starch</sub> )
Acidic	Choline chloride	formic acid	CC/FA	1:2	11.31	0.7085
	Choline chloride	lactic acid	CC/LA	1:2	53.13	0.1036
	Choline chloride	glycerol	CC/Gly	1:2	38.60	0.1281
Neutral	Ethylamine hydrochloride	glycol	ET/EC	1:2	51.50	0.0638
	Choline chloride	Diethanolamine	CC/DEA	1:8	106.70	0.1134

<sup>a</sup> HBA: Hydrogen bond acceptor. <sup>b</sup> HBD: Hydrogen bond donor. <sup>c</sup> Tapioca starch was added to the continuous DESs at a temperature of 100 °C for 2 h until it could not be dissolved. Observe with a polarized light microscope, and if a central cross appears, no more starch is added.

**Table S2** Solubility determination of DESs and extractants

Entry	Organic solvent	V <sub>1</sub> (mL)	V <sub>2</sub> (mL)	DES exist or not
1	MIBK	5	5	-
2	Ethanol	5	/	+
3	Ethyl acetate	5	5	-
4	Acetonitrile	5	/	+
5	Isopropanol	5	/	+
6	$\gamma$ -Valerolactone	5	/	+

V<sub>1</sub>: volume of DES added; V<sub>2</sub>: volume of DES after strong stirring and separation of DES and extractant; /: indicates that DES and extractant are miscible without separation; +: indicates that there is DES residue after evaporation of organic extractant; -: indicates that there is no DES residue after evaporation of organic extractant.