

Catalytic conversion of carbohydrates into 5-hydroxymethyl-furfural 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 ^a	HBD ^b	Abbreviation	mole ratio	Viscosity (m Pa.s)	Starch dissolution ^c (g _{DES} /g _{starch})
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
Alkalinity	Choline chloride	Diethanolamine	CC/DEA	1:8	106.70	0.1134

^a HBA: Hydrogen bond acceptor. ^b HBD: Hydrogen bond donor. ^c 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 ₁ (mL)	V ₂ (mL)	DES exist or not
1	MIBK	5	5	-
2	Ethanol	5	/	+
3	Ethyl acetate	5	5	-
4	Acetonitrile	5	/	+
5	Isopropanol	5	/	+
6	γ-Valerolactone	5	/	+

V₁: volume of DES added; V₂: 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.