Supplementary Information for

Three-step cascade over one single catalyst: synthesis of 5-(ethoxymethyl)furfural from glucose over hierarchical lamellar multi-functional zeolite catalyst

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S1. Textural properties of MFI-Sn/Al catalysts

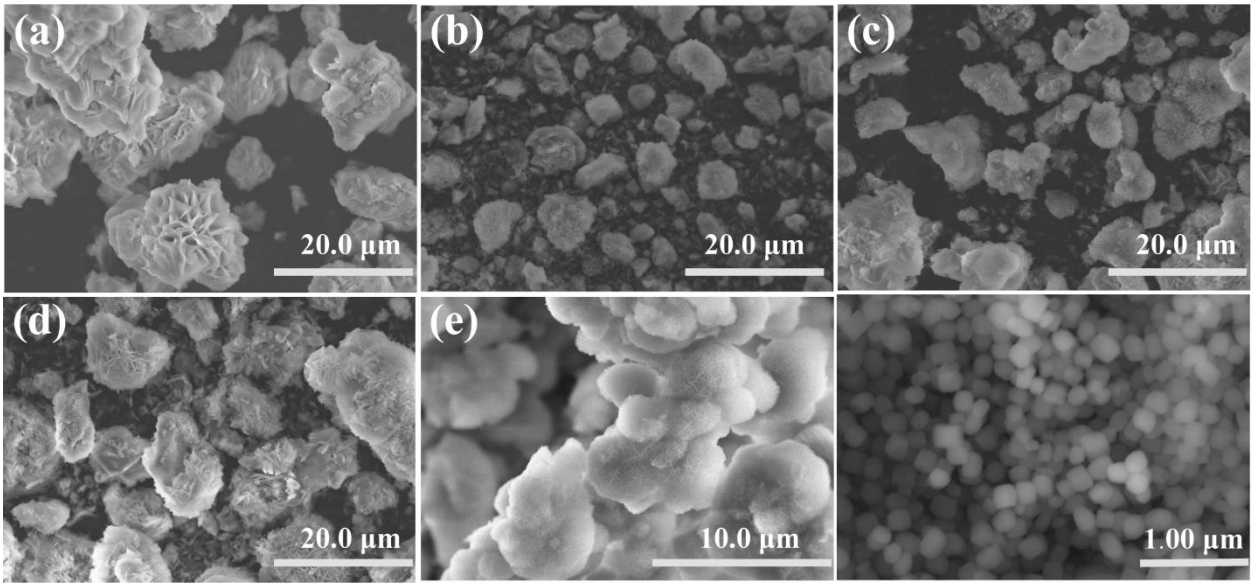

Fig S1. SEM images of (a) MFI-Sn/Al (100/100), (b) MFI-Sn/Al (100/50), (c) MFI-Sn/Al (100/25), (d) MFI-Sn/Al (50/50), (e) MFI-Sn/Al (∞/100) and (f) C-MFI-Sn/Al (100/100), respectively.

Table S1. Texual properties of the MFI-Sn/Al zeolite catalysts with different Sn/Al ratios and synthesis time determined from N_2 isotherms

Zeolite	V_{micro}[a] [$cm^3\ g^{-1}$]	S_{micro}[a] [$m^2\ g^{-1}$]	S_{ext}[a] [$m^2\ g^{-1}$]	V_t[b] [$cm^3\ g^{-1}$]	V_{meso}[c] [$cm^3 g^{-1}$]	S_{BET}[d] [$m^2\ g^{-1}$]
C-MFI-Sn/Al (100/100)	0.144	317	196	0.667	0.523	513
MFI-Sn/Al (50/50)	0.078	150	197	0.488	0.410	347
MFI-Sn/Al (100/25)	0.107	254	221	0.650	0.543	474
MFI-Sn/Al (100/50)	0.108	255	198	0.548	0.440	453
MFI-Sn/Al (100/100)	0.093	215	191	0.470	0.377	406
MFI-Sn/Al (∞/100)	0.092	180	374	0.859	0.767	554

[a] Determined from t-plot method
[b] Determind by NLDFT method
[c] $V_{meso}=V_t-V_{micro}$
[d] Determined from multi-point Brunauer, Emmett, a Teller (BET) method

Table S2 Concentration of Sn and Al in MFI-Sn/Al zeolite catalysts.

Zeolite	MFI-Sn/Al (100/100)	MFI-Sn/Al (100/50)	MFI-Sn/Al (100/25)	MFI-Sn/Al (50/50)	C-MFI-Sn/Al (100/100)	MFI-Sn/Al (∞/100)
Si/Sn[a]	100	100	100	50	100	∞
Si/Al[a]	100	50	25	50	100	100
Si/Sn[b]	75	51	53	31	70	∞
Si/Al[b]	67	32	20	37	65	72

[a] Calculated from synthesis recipe; [b] Determined from elemental analysis (ICP-AES).

S2. Effect of zeolite acidity on EMF synthesis from glucose over MFI-Sn/Al catalysts

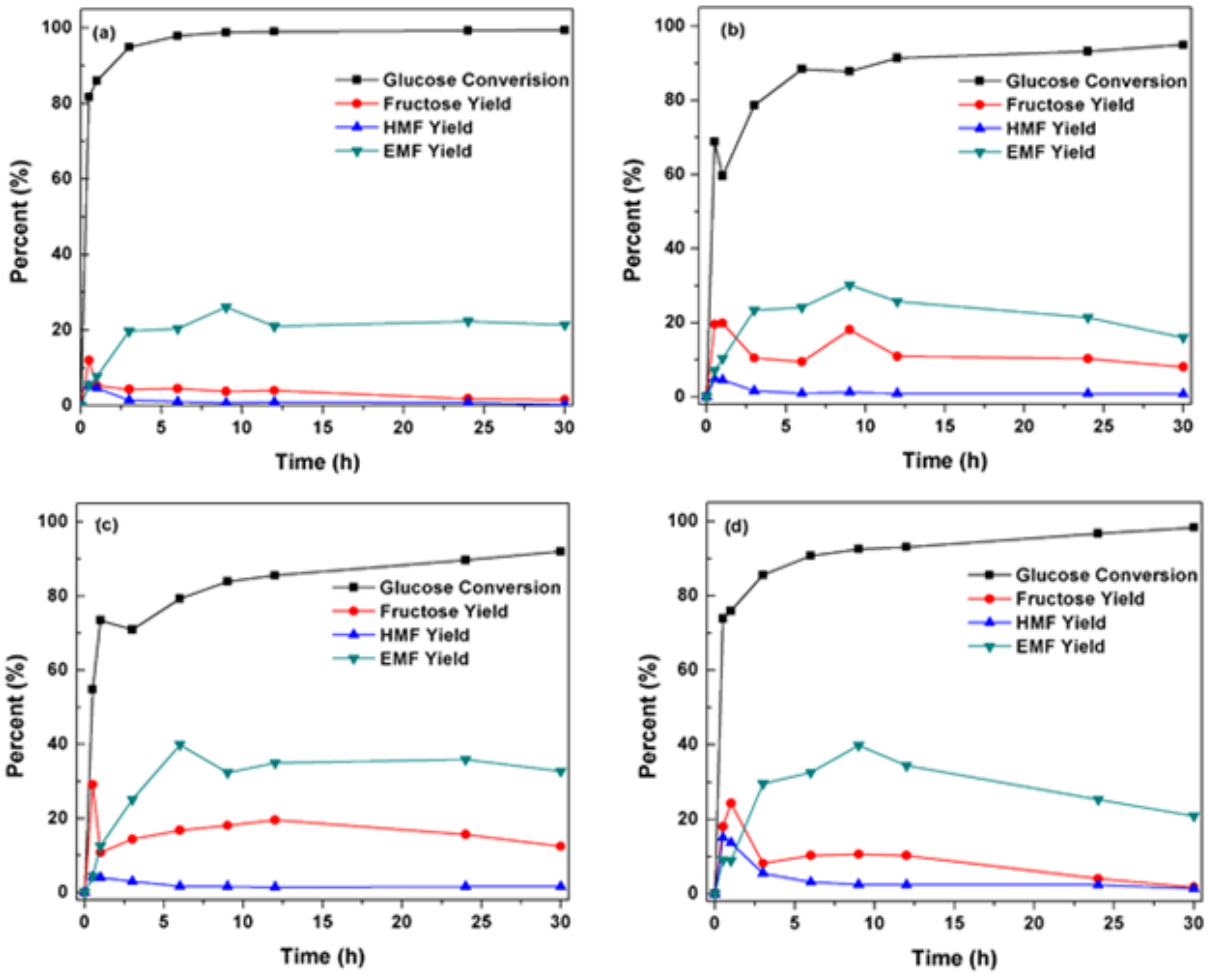

Fig. S2 Catalytic conversion of glucose over MFI-Sn/Al zeolite catalysts ((a) MFI-Sn/Al (100/100); (b) MFI-Sn/Al (100/50); (c) MFI-Sn/Al (100/25); (d) MFI-Sn/Al (50/50)) as a function of reaction time at 413 K.

S3. Effect of carbohydrate type on EMF synthesis over MFI-Sn/Al catalyst

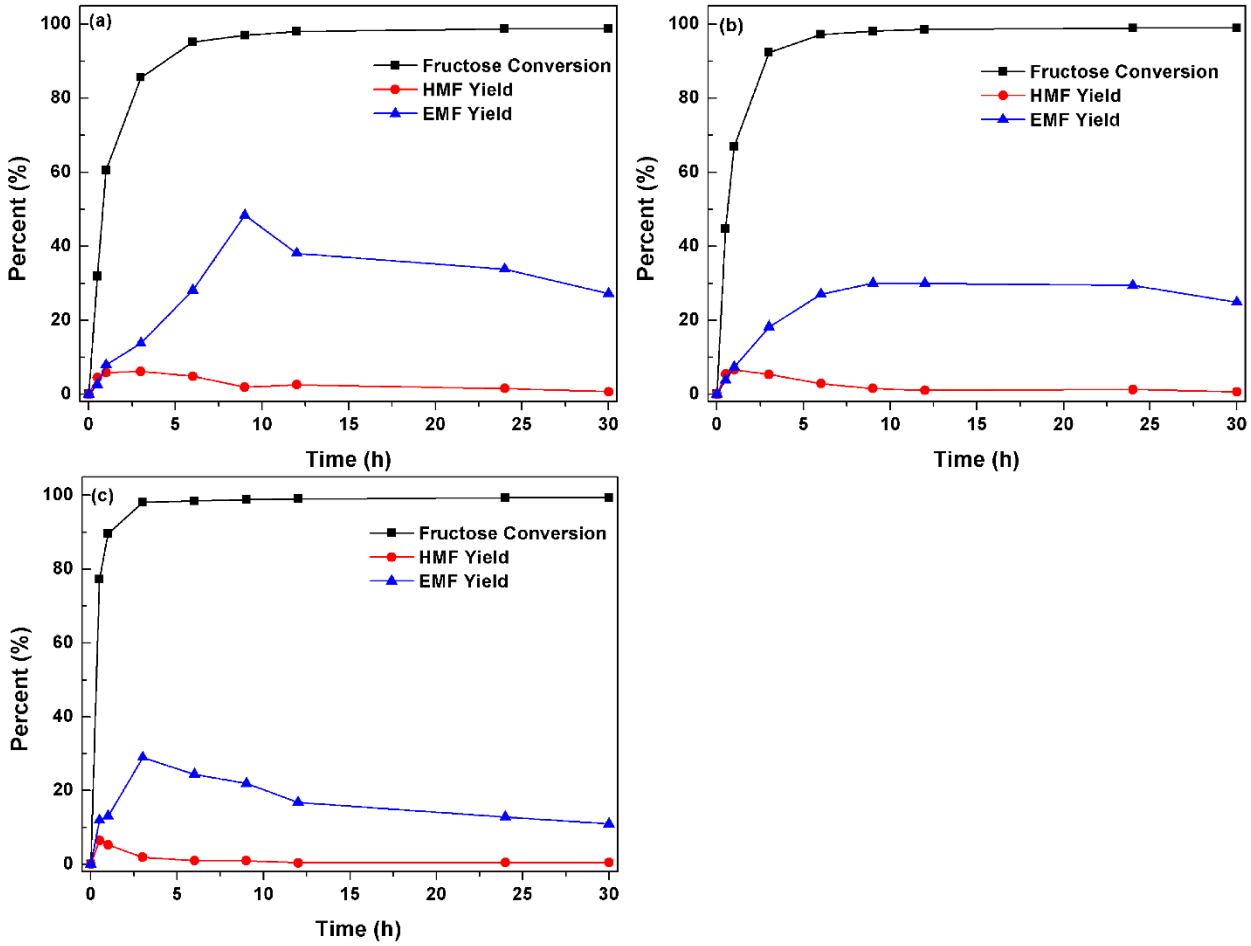

Fig. S3 Catalytic conversion of fructose over MFI-Sn/Al (100/100) versus reaction time at temperature of (a) 398 K, (b) 406 K, and (c) 413 K, respectively.

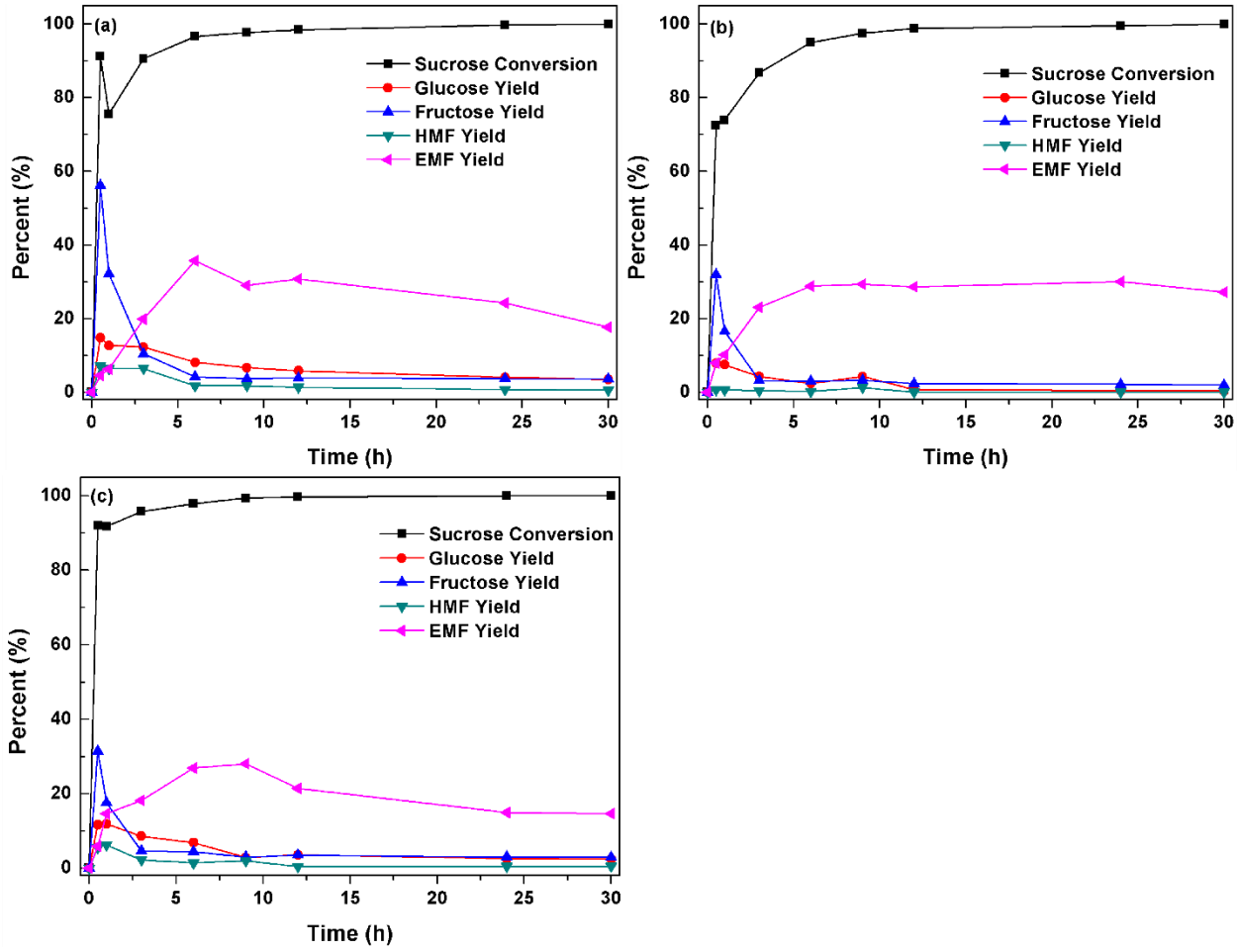

Fig. S4 Catalytic conversion of sucrose over MFI-Sn/Al (100/100) at different tempatures: (a) 398 K, (b) 406 K, and (c) 413 K;

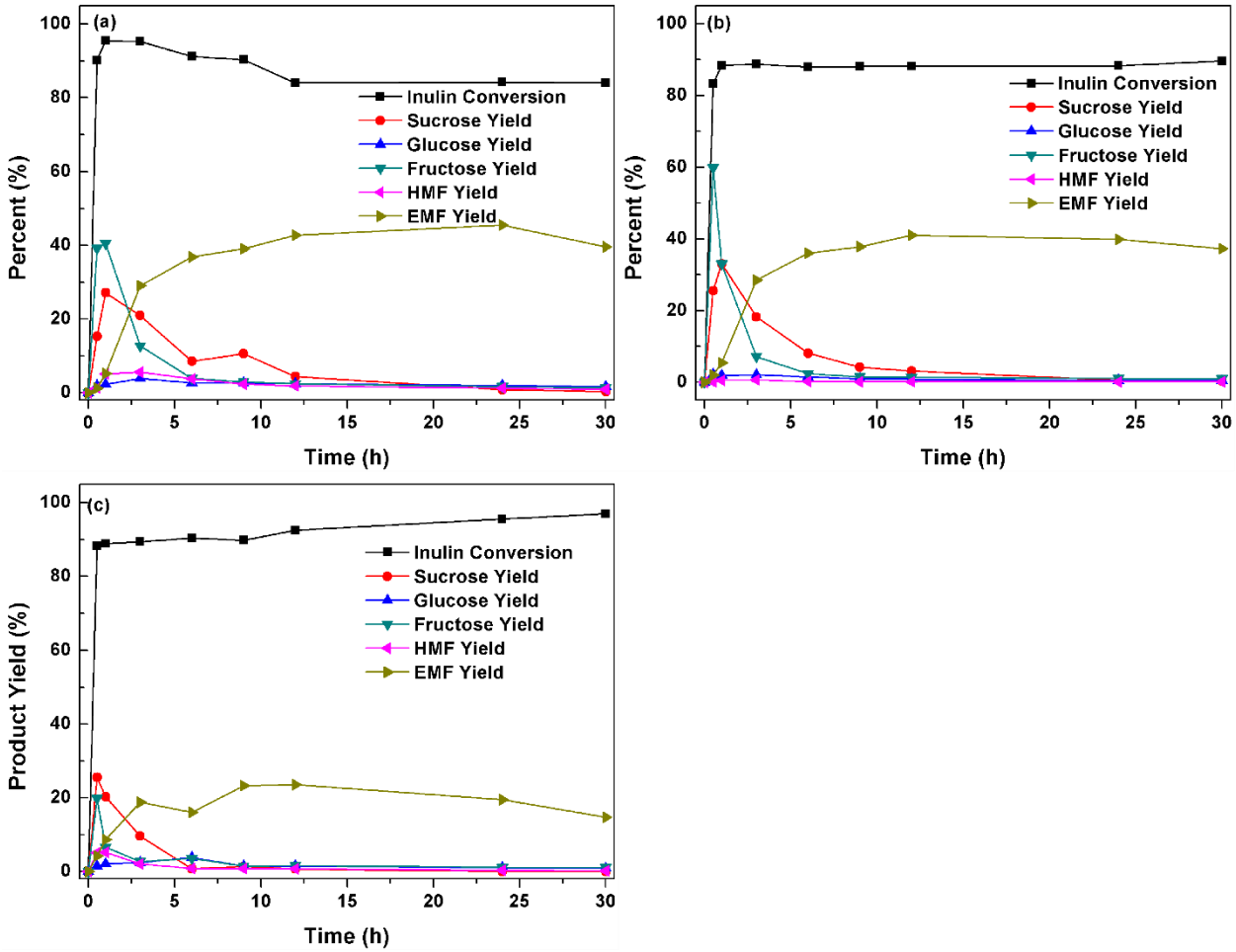

Fig. S5 Synthesis of EMF from inulin by MFI-Sn/Al (100/100) at different tempatures: (a) 398 K, (b) 406 K, and (c) 413 K.