Supporting Information

An enhanced nonpolarity effect of silica-supported perfluoroalkyl sulfonylimide on catalytic fructose dehydration

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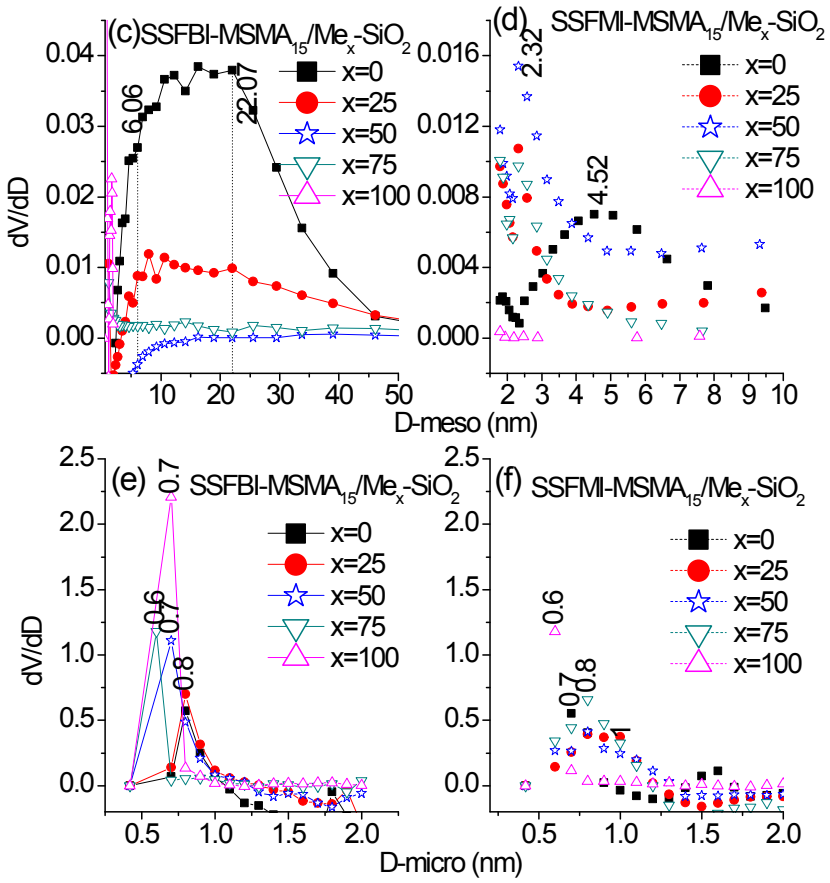

Fig. S 1 PSD of **SSFBI-** (c and e) and **SSFMI-MSMA$_{15}$/Me$_X$-SiO$_2$** (d and f). BJH meso-PSD (c and d) from adsorption branch (**Fig. 2**, a and b), and micro-PSD (e and f) from MP method.

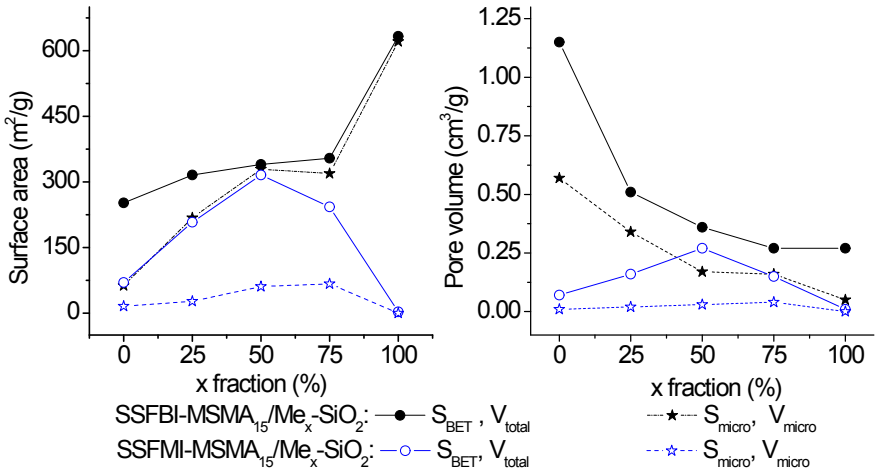

Fig. S 2 The relationship of surface area/pore volume and fraction of induced -CH_3 moiety.

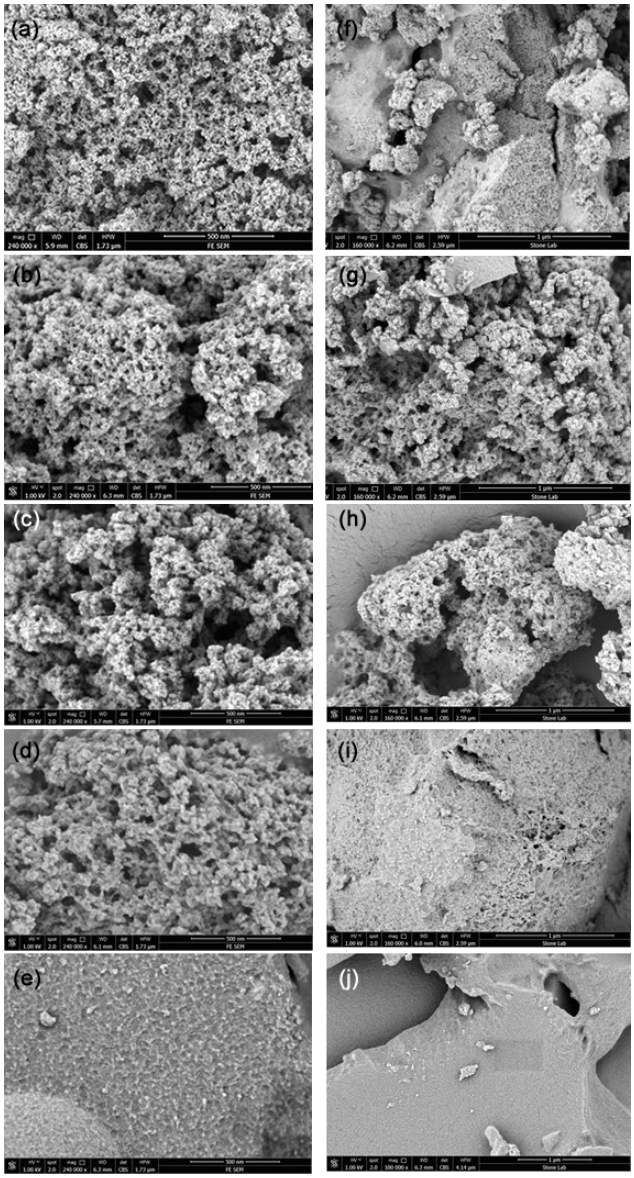

Fig. S 3 SEM images of **SSFBI-** (left column) and **SSFMI-MSMA$_{15}$/ Me$_x$-SiO$_2$** (right column). x=0, 25, 50, 75 and 100, from top to down.

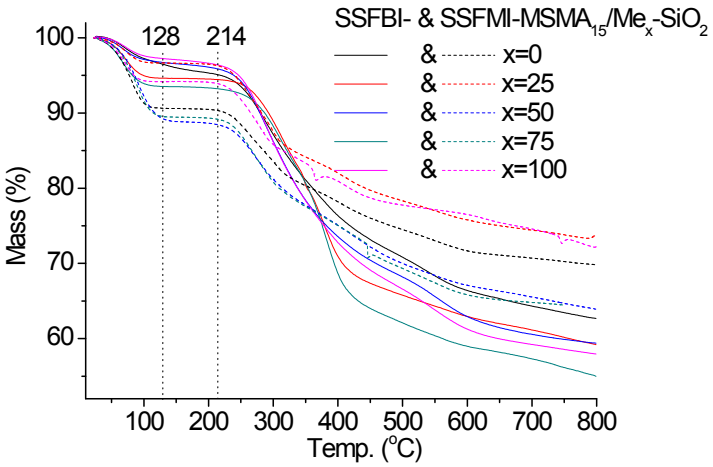

Fig. S 4 TG analysis of SSFBI- and SSFMI-MSMA$_{15}$/Me$_x$-SiO$_2$ (solid line and dash line, respectively).

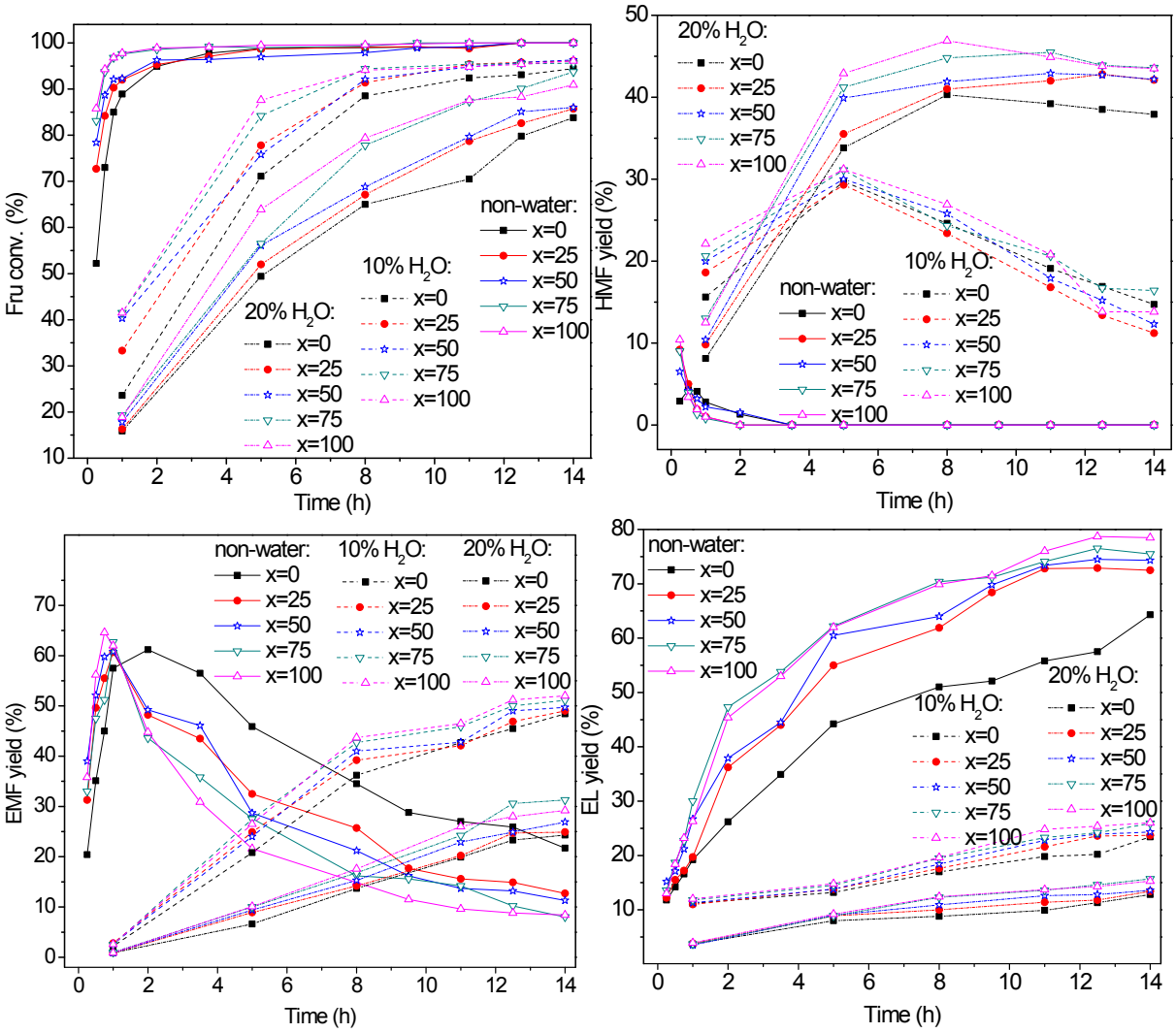

Fig. S 5 Time course of fructose conversion and HMF/EMF/EL yileds using SSFBI-MSMA$_{15}$/Me$_x$-SiO$_2$ as catalyst (x=0, 25, 50,75, and 100) in nonaqueous- and 10%/20% aqueous-alcohol systems.

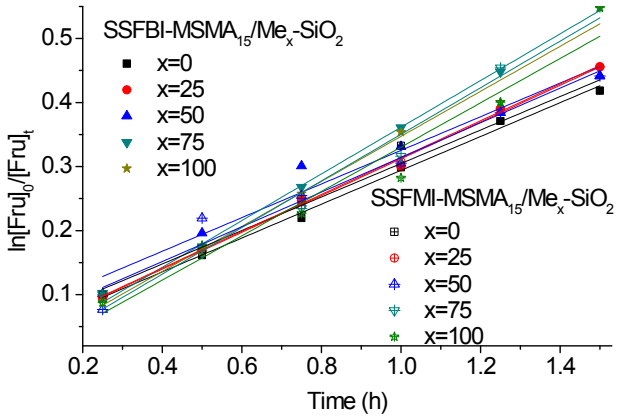

Fig. S 6 Rate constants of fructose dehydration over ten solid acids.

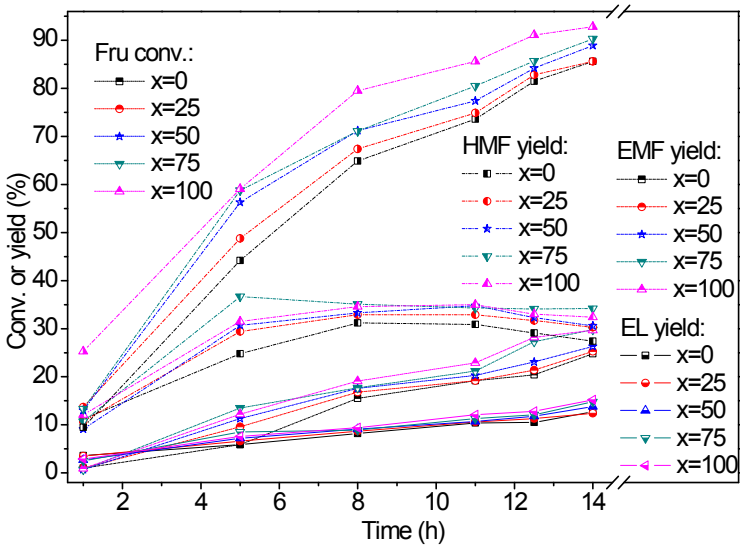

Fig. S 7 Time course of fructose conversion and HMF/EMF/EL yileds using SSFMI-MSMA$_{15}$/Me$_x$-SiO$_2$ as catalyst (x=0, 25, 50,75, and 100) in 20% aqueous-alcohol systems.

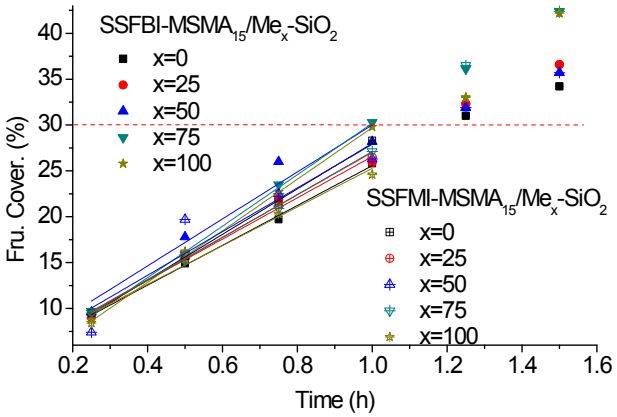

Fig. S 8 Turnover frequency (TOF) of ten solid acids in fructose dehydration.

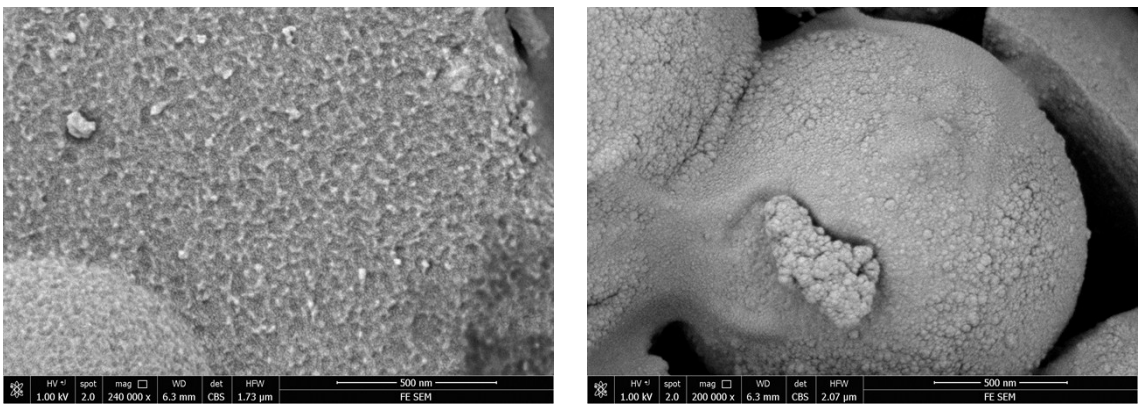

Fig. S 9 SEM images of fresh (left) and recovered (right) **SSFBI-MSMA$_{15}$/Me$_{100}$-SiO$_2$.**

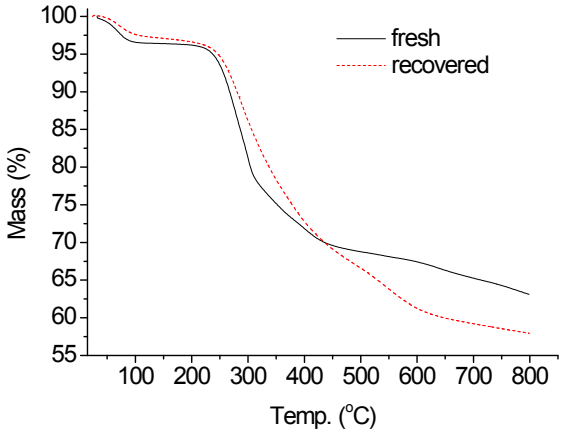

Fig. S 10 TG analysis of fresh and recovered **SSFBI-MSMA$_{15}$/Me$_{100}$-SiO$_2$**.

Table. S 1 **SSFBI-MSMA$_{15}$/Me$_x$-SiO$_2$**-catalysed fructose conversion and mass balance

Cat.	Added Water (%)	Fru conv. (%)			HMF Yield (%)			EMF Yield (%)			EL Yield (%)		
		1 h	8 h	12.5 h	1 h	8 h	12.5 h	1 h	8 h	12.5 h	1 h	8 h	12.5h
x=0	Non-water	89	99	100	3	-	-	58	35	26	19	51	58
	10% H_2O	24	89	93	16	25	25	2	36	46	11	17	20
	20% H_2O	16	65	80	8	40	40	1	14	23	4	9	11
x=25	Non-water	92	99	100	1	-	-	61	26	15	20	62	73
	10% H_2O	33	91	96	19	23	23	2	39	47	11	18	24
	20% H_2O	16	67	83	10	41	41	1	14	25	4	10	12
x=50	Non-water	92	98	100	2.2	-	-	61	21	13	27	64	75
	10% H_2O	40	92	97	20	26	26	3	41	48	11	18	23
	20% H_2O	18	69	85	11	42	42	1	15	25	4	11	13
x=75	Non-water	98	99	100	1	-	-	63	16	10	30	70	77
	10% H_2O	42	94	96	21	24	24	3	43	50	12	20	24
	20% H_2O	19	78	90	13	45	45	1	17	30	4	12	14
x=100	Non-water	98	100	100	1	-	-	62	15	9	26	70	79
	10% H_2O	42	94	95	22	27	25	3	44	51	12	20	23
	20% H_2O	19	79	88	13	47	46	1	18	27	4	12	14