

Supplementary Materials

Mild Dealumination of H-ZSM-5 Zeolite for Enhanced Conversion of Glucose into 5-Hydroxymethylfurfural in a Biphasic Solvent System

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Table S1 Fractions of Al species in the parent and dealuminated H-ZSM-5 catalysts

Catalyst	Al ^{IV} ^a		Al ^V ^b		Al ^{VI} ^c		Distorted EFAL ^d		Total peak area
	Peak area	Fraction (%)	Peak area	Fraction (%)	Peak area	Fraction (%)	Peak area	Fraction (%)	
Parent H-ZSM-5	2823580	62.96	539993	12.04	750786	16.74	370188	8.25	4484547
0.1DeAl.H-ZSM-5	3512800	63.11	793055	14.25	793055	14.25	467586	8.40	5566497

^a Tetrahedral Al species at 54 ppm^b Pentahedral Al species at 37 ppm^c Octahedral Al species at 0 ppm^d Distorted EFAL at -30 ppm**Table S2** Fractions of Si species in the parent and dealuminated H-ZSM-5 catalysts

Catalyst	Si(0Al) ^a		Si(1Al) ^b		Si(2Al) ^c		Si(3Al) ^d		Total peak area
	Peak Area	Fraction (%)	Peak Area	Fraction (%)	Peak Area	Fraction (%)	Peak Area	Fraction (%)	
Parent H-ZSM-5	229551	37.79	250494	41.24	101948	16.79	25380	4.18	607372
0.1DeAl.H-ZSM-5	236797	36.76	256296	39.79	104601	16.24	46446	7.21	644140

^a Si bonded with no Al atom or Si(OSi)₄ species at -111 ppm^b Si bonded to one Al atom or Si(OSi)₃(OH) in the range of -104 to -105 ppm^c Si bonded to two Al atoms or Si(OSi)₂(OH)₂ in the range of -92 to -95 ppm^d Si bonded to three Al atoms or Si(OSi)(OH)₃ in the range of -84 to -85 ppm

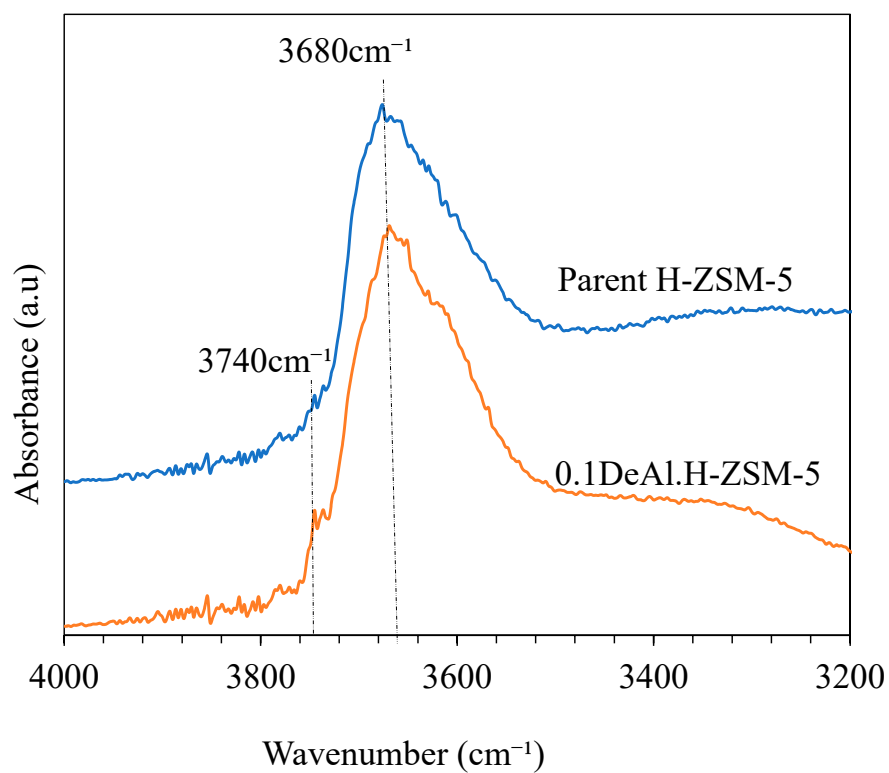


Figure S1 FTIR spectra of the parent H-ZSM-5 and 0.1DeAl.H-ZSM-5
in the O–H stretching region.

Table S3 Glucose conversion and HMF yield obtained over different zeolite-based acid catalysts

Entry	Catalyst	Solvent	Temperature (°C)	Time (h)	Glucose conversion (%)	HMF yield (%)	Reference
1	H-ZSM-5	NaCl-H ₂ O/THF	160	1.5	94.0	61.0	[19]
2	H-ZSM-5	H ₂ O/Dioxane	120	24	59.4	17.0	[50]
3	H-ZSM-5	H ₂ O/MIBK	195	0.5	80.0	42.0	[20]
4	H-ZSM-5	[BMIM]Cl	130	1	n.d. ^a	15.3	[52]
5	Cr-ZSM-5	[BMIM]Cl	130	1	n.d.	11.2	[52]
6	Cu-Cr-ZSM-5	DMSO	140	4	57.5	50.4	[53]
7	H-Beta-Cal750	H ₂ O-DMSO/THF	180	3	78.0	43.0	[43]
8	Sn-β-F, HCl	NaCl-H ₂ O/THF	190	1.1	90.0	53.0	[51]
9	H-USY	[BMIM]Cl	130	1	n.d.	21.5	[52]
10	H-USY	NaCl-H ₂ O/THF	170	1	98.6	48.8	This work
11	0.1DeAl.H-ZSM-5	NaCl-H ₂ O/THF	170	1	99.0	64.7	This work

^a n.d. means no data.