Selective removal of hemicellulose by diluted sulfuric acid as-sisted by aluminum sulfate

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Table S1 Hemicellulose was removed by different pretreatment techniques

Pretreatment method	Raw materials	Condition	Hemicellulose removal	Reference
Mannitol, oxalic acid	Poplar	OA 7.0%, MA 7.0% 150 ℃, 60 min	79.08%	[15]
Mandelic acid	Eucalyptus	6.0 wt%, 150 ℃, 80 min	83.66%	[16]
Vanillic acid	Eucalyptus	8.0%, 170 ℃, 80 min	88.59%	[10]
Tetramethylammonium hydroxide (TMAH)	Poplar	25wt%	66.4%	[41]
Benzoic acid (BZA)	Poplar	2%, 160 ℃, 0.75 h	93.1%	[42]
Saturated steam	Wheat straw	180 ℃, 10 bar, 35 min	63%	[12]
Microwave, choline chloride/p-TsOH	Reed	ChCl/p-TsOH(1:2), 100 ℃, 30 min	89.41%	[43]
Press, Hydrothermal	Kraft pulping.	155 ℃, 3MPa	70.63%	[44]
Aluminum sulfate, H_2SO_4	Straw stover	160 ℃, 1.5wt%E520, 0.7 wt%DA, 40 min	98.05%	This study

Table S2 Effect of dilute acid sulfuric acid pretreatment on chemical composition change

Pretreatment conditions			Solid recovery （%）	Component content （%）		
Temperature (℃)	Time (min)	Concentration %		Glucan	Xylan	Lignin
Corn stover			—	36.95	23.61	18.04
100	30	0.5	84.68	42.95	21.86	20.14
110			73.76	46.79	15.73	21.36
120			66.71	49.37	11.81	22.24
130			62.96	55.21	7.94	23.91
140			57.60	58.39	4.63	24.77
140	20	0.5	61.86	55.46	6.77	23.85
	30		59.14	56.90	6.44	23.17
	40		59.53	57.31	5.36	24.34
	50		58.34	57.79	4.56	25.08
140	40	0.5	56.85	60.39	4.46	26.85
		0.7	55.97	59.62	3.67	27.02
		0.9	54.40	56.54	2.37	27.42
		1.0	53.83	48.87	1.31	28.40
		1.2	52.23	41.19	0.77	28.47

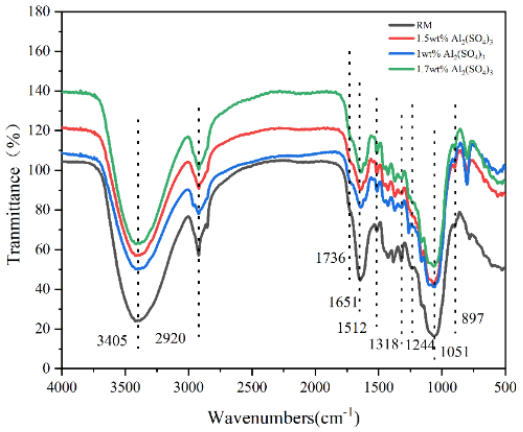


Fig. S1 FTIR of RM and different pretreatment samples

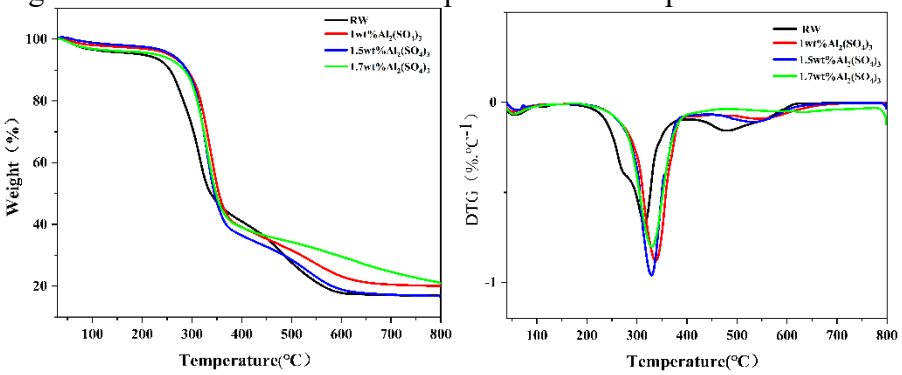


Fig.S2 TG of RM and different pretreatment samples

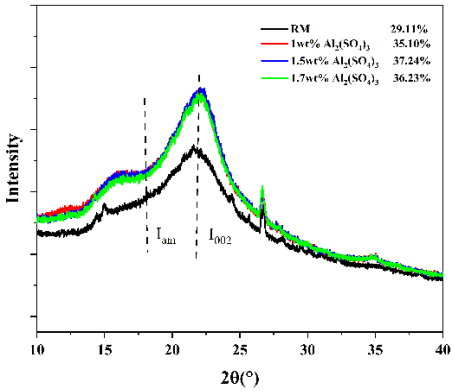


Fig.S3 XRD of RM and different pretreatment samples

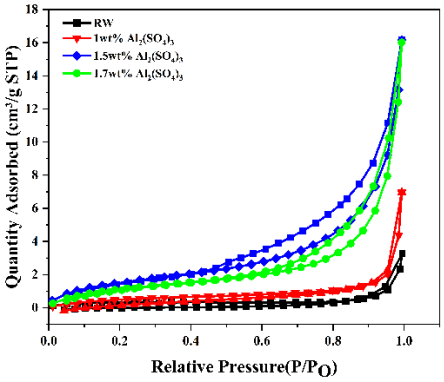


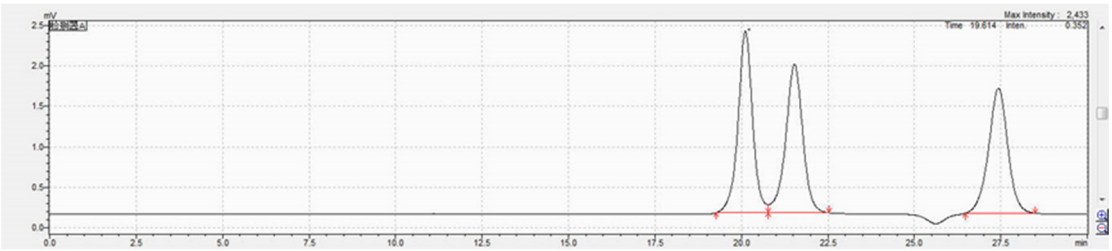
Fig.S4 BET of RM and different pretreatment samples

Table S3 The result of BET data

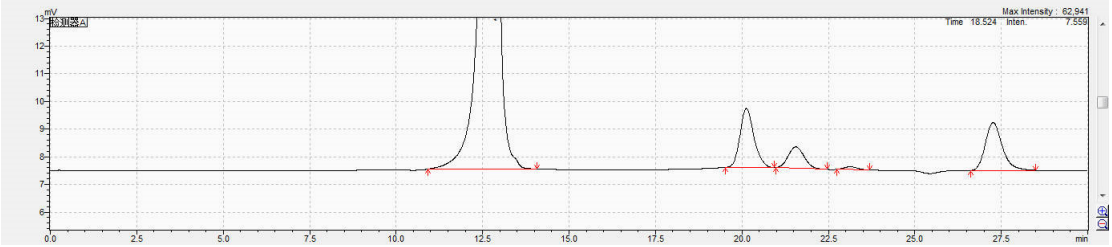
	BET Surface Area (m^2/g)	Pore Volume (dm^3/g)	Pore Size(nm)
RM	1.1979	5.082	26.6296
1wt%	2.1820	10.768	24.3572
1.5wt%	5.9851	25.019	12.7201
1.7wt%	4.6489	24.776	18.0721

Six chromatograms of glucose and xylose standard samples, 1 chromatogram of raw material components of corn stalk and 2 chromatographs of pretreated samples were presented. The peak retention times of glucose and xylose were 20.1 and 21.5, respectively.

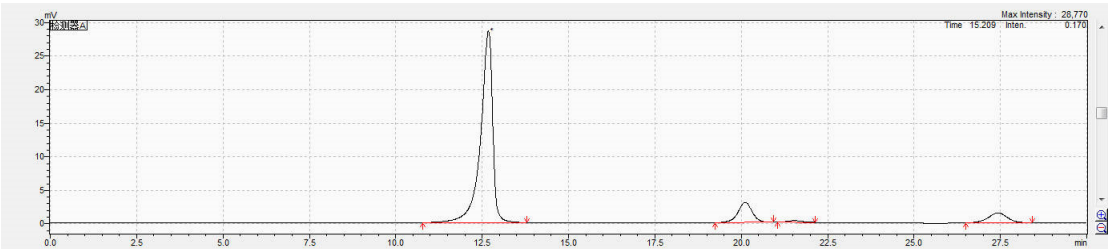
0.3 g/L glucose and xylose(standards mixture)



The raw material before pretreatment (Corn stalk)

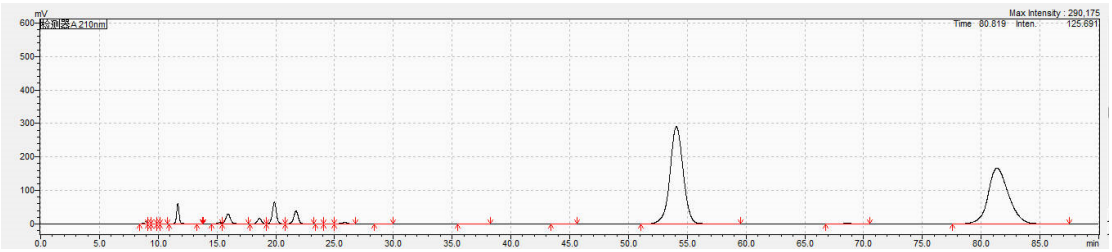


The sample 1 after pretreatment

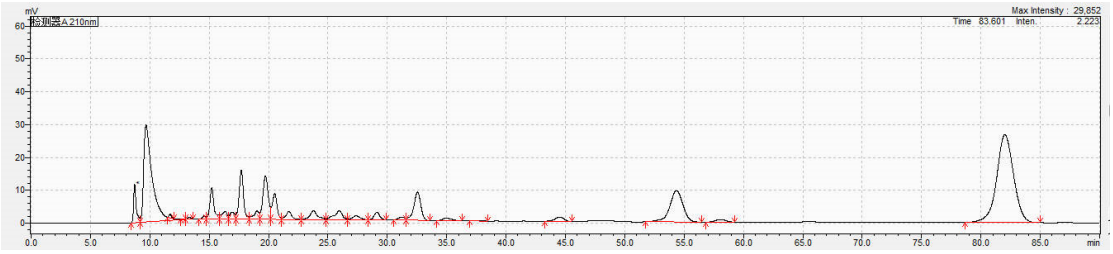


Standard curve chromatograms of inhibitors and sample chromatograms were presented. The peak retention times of formic acid, acetic acid, HMF and furfural were 19.85, 21.69, 53.14 and 80.01, respectively.

0.3 g/L formic acid, acetic acid, HMF and furfural (standards mixture)



Sample1 after pretreatment



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