Supplementary materials

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1. Tables for pretreatment optimization

Table S1. Variables and matrix of Plackett-Burman design (PBD) for pretreatment optimization

Trials	A	B	C	D	E	Y_1	Y_2
1	1 (30)	-1 (100)	1 (50)	-1 (20)	-1	128.55 ± 1.81	33.63 ± 0.59
2	1	1 (200)	-1 (40)	1 (30)	-1 (2.0)	123.12 ± 1.99	32.37 ± 0.58
3	-1 (20)	1	1	-1	1 (3.0)	110.76 ± 1.89	27.91 ± 0.45
4	1	-1	1	1	-1	143.16 ± 1.98	41.93 ± 0.65
5	1	1	-1	1	1	122.86 ± 2.02	32.14 ± 0.48
6	1	1	1	-1	1	131.54 ± 2.11	34.81 ± 0.41
7	-1	1	1	1	-1	127.66 ± 2.07	33.17 ± 0.57
8	-1	-1	1	1	1	129.40 ± 2.06	33.71 ± 0.51
9	-1	-1	-1	1	1	106.38 ± 1.96	26.03 ± 0.41
10	1	-1	-1	-1	1	108.74 ± 1.79	25.49 ± 0.44
11	-1	1	-1	-1	-1	93.19 ± 1.66	19.33 ± 0.28
12	-1	-1	-1	-1	-1	91.85 ± 1.84	18.93 ± 0.33
13	0	0	0	0	0	112.29 ± 1.77	28.93 ± 0.46
14	0	0	0	0	0	111.21 ± 2.03	29.16 ± 0.39
15	0	0	0	0	0	111.25 ± 1.95	29.50 ± 0.37

A: Potassium hydroxide concentration ($g \cdot L^{-1}$); B: Solid dose ($g \cdot L^{-1}$); C: Pretreatment temperature (°C); D: Pretreatment time (min); E: Tween 80 ($g \cdot L^{-1}$); Y_1: Glucose yield ($mg \cdot g_{ds}^{-1}$); Y_2: Xylose yield ($mg \cdot g_{ds}^{-1}$)

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1. Tables for pretreatment optimization

Table S2. Design of the method of steepest ascent for pretreatment optimization

Steps	Potassium hydroxide concentration ($g \cdot L^{-1}$)	Pretreatment temperature (°C)	Pretreatment time (min)	Glucose yield ($mg \cdot g_{ds}^{-1}$)	Xylose yield ($mg \cdot g_{ds}^{-1}$)
1	30	60	30	147.29 ± 2.04	46.57 ± 0.68
2	39	70	40	185.66 ± 2.49	71.63 ± 0.97
3	48	80	50	228.91 ± 3.27	122.62 ± 1.62
4	57	90	60	172.15 ± 2.44	55.84 ± 0.86
5	66	100	70	139.27 ± 2.01	38.78 ± 0.61

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1. Tables for pretreatment optimization

Table S3. Variables and matrix of Box-Behnken design (BBD) for pretreatment optimization

Runs	x_1 (Potassium hydroxide concentration, g·L^{-1})	x_2 (Pretreatment temperature, °C)	x_3 (Pretreatment time, min)	Y_1 (Glucose yield, mg·g$_{ds}^{-1}$)	Y_2 (Xylose yield, mg·g$_{ds}^{-1}$)
1	-1 (36)	-1 (70.0)	0 (50)	199.53 ± 2.48	106.94 ± 1.36
2	1 (60)	-1	0	185.39 ± 2.36	88.05 ± 1.11
3	-1	1 (90.0)	0	184.36 ± 2.32	85.96 ± 1.14
4	1	1	0	170.93 ± 2.19	74.07 ± 0.97
5	-1	0 (80.0)	-1 (42)	188.85 ± 2.39	103.27 ± 1.34
6	1	0	-1	176.01 ± 2.28	93.95 ± 1.23
7	-1	0	1 (58)	201.05 ± 2.47	95.61 ± 1.21
8	1	0	1	187.47 ± 2.31	70.40 ± 0.94
9	0 (48)	-1	-1	196.75 ± 2.46	109.23 ± 1.36
10	0	1	-1	186.09 ± 2.32	97.34 ± 1.24
11	0	-1	1	204.50 ± 2.53	96.55 ± 1.18
12	0	1	1	191.11 ± 2.32	83.02 ± 1.09
13	0	0	0	229.64 ± 3.19	122.25 ± 1.68
14	0	0	0	228.53 ± 3.21	123.30 ± 1.63
15	0	0	0	230.33 ± 3.28	123.88 ± 1.68

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2. Tables for enzymatic hydrolysis optimization

Table S4. Variables and matrix of Plackett-Burman design (PBD) for hydrolysis optimization

Trials	A	B	C	D	E	F	Y_3	Y_4
1	1 (140)	-1 (1.5)	1 (50)	-1 (4.4)	-1 (13.0)	-1 (1.0)	197.14 ± 2.38	114.26 ± 1.25
2	1	1 (3.5)	-1 (45)	1 (4.8)	-1	-1	231.89 ± 2.73	135.94 ± 1.63
3	-1 (120)	1	1	-1	1 (20.0)	-1	235.39 ± 2.82	139.81 ± 1.90
4	1	-1	1	1	-1	1 (3.0)	199.82 ± 2.47	117.75 ± 1.78
5	1	1	-1	1	1	-1	267.95 ± 3.20	156.47 ± 2.38
6	1	1	1	-1	1	1	271.99 ± 3.11	157.93 ± 2.11
7	-1	1	1	1	-1	1	206.28 ± 2.50	122.67 ± 2.18
8	-1	-1	1	1	1	-1	213.06 ± 2.64	122.51 ± 2.23
9	-1	-1	-1	1	1	1	208.27 ± 2.59	116.90 ± 1.79
10	1	-1	-1	-1	1	1	239.96 ± 2.88	136.87 ± 1.89
11	-1	1	-1	-1	-1	1	200.86 ± 2.67	120.78 ± 1.77
12	-1	-1	-1	-1	-1	-1	170.14 ± 2.37	98.44 ± 1.31
13	0	0	0	0	0	0	231.85 ± 2.81	126.48 ± 1.84
14	0	0	0	0	0	0	230.21 ± 2.73	127.70 ± 1.87
15	0	0	0	0	0	0	229.66 ± 2.77	126.64 ± 1.82

A: Biomass loading ($g \cdot L^{-1}$); B: Enzyme loading ($FPU \cdot g_{ds}^{-1}$); C: Reaction temperature (°C); D: Reaction pH; E: Reaction time (h); F: Tween 80 concentration ($g \cdot L^{-1}$); Y_3: Glucose ($mg \cdot g_{ds}^{-1}$); Y_4: Xylose ($mg \cdot g_{ds}^{-1}$)

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2. Tables for enzymatic hydrolysis optimization

Table S5. Design of the method of steepest ascent for hydrolysis optimization

Steps	Biomass loading ($g \cdot L^{-1}$)	Enzyme loading ($FPU \cdot g_{ds}^{-1}$)	Reaction time (h)	Y_3 (Glucose yield, $mg \cdot g_{ds}^{-1}$)	Y_4 (Xylose yield, $mg \cdot g_{ds}^{-1}$)
1	160	4.5	20	305.06 ± 4.01	204.57 ± 2.84
2	180	6.5	25	449.85 ± 5.47	309.44 ± 3.63
3	200	8.5	30	513.97 ± 5.87	341.91 ± 3.91
4	220	10.5	35	469.96 ± 5.48	246.21 ± 3.13
5	240	12.5	40	330.39 ± 4.23	169.95 ± 2.67

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2. Tables for enzymatic hydrolysis optimization

Table S6. Variables and matrix of central composite design (CCD) for hydrolysis optimization

Runs	X_1 (Biomass loading, $g \cdot L^{-1}$)	X_2 (Enzyme loading, FPU·g_{ds}^{-1})	X_3 (Reaction time, h)	Y_3 (Glucose yield, mg·g_{ds}^{-1})	Y_4 (Xylose yield, mg·g_{ds}^{-1})
1	-1 (180)	-1 (5.5)	-1 (24)	438.10 ± 5.25	265.81 ± 3.28
2	1 (220)	-1	-1	423.11 ± 5.12	245.06 ± 3.18
3	-1	1 (11.5)	-1	457.74 ± 5.60	280.93 ± 3.46
4	1	1	-1	439.37 ± 5.28	265.75 ± 3.32
5	-1	-1	1 (36)	454.58 ± 5.31	261.41 ± 3.26
6	1	-1	1	441.64 ± 5.24	208.11 ± 2.52
7	-1	1	1	482.98 ± 5.62	268.22 ± 3.45
8	1	1	1	453.67 ± 5.18	225.38 ± 3.95
9	-1.682 (166)	0 (8.5)	0 (30)	476.01 ± 6.17	278.07 ± 3.58
10	1.682 (234)	0	0	450.72 ± 5.29	229.60 ± 3.27
11	0 (200)	-1.682 (3.45)	0	421.20 ± 4.74	229.36 ± 3.36
12	0	1.682 (13.55)	0	439.73 ± 5.25	271.29 ± 3.44
13	0	0	-1.682 (19.9)	453.93 ± 5.53	276.09 ± 3.56
14	0	0	1.682 (40.1)	484.57 ± 5.59	242.13 ± 3.18
15	0	0	0	518.62 ± 5.92	350.10 ± 4.07
16	0	0	0	516.95 ± 5.87	350.94 ± 4.11
17	0	0	0	512.52 ± 5.80	344.87 ± 4.02
18	0	0	0	516.83 ± 5.79	345.59 ± 3.94
19	0	0	0	516.57 ± 5.89	345.18 ± 3.96
20	0	0	0	513.12 ± 5.90	351.06 ± 4.08