Electronic Supplementary Information:

Synergistic delignification of corncob with a phenoxyethanol/alkaline hydrogen peroxide biphasic system under mild conditions and mechanistic insights

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E-factor calculation

The E-factor of corncob fractionation by EPH/AHP pretreatment was calculated according to the following equation:

$$E\text{-}factor = \frac{Weight\ of\ total\ inputs - Weight\ of\ products}{Weight\ of\ products} \times 100\%\#$$

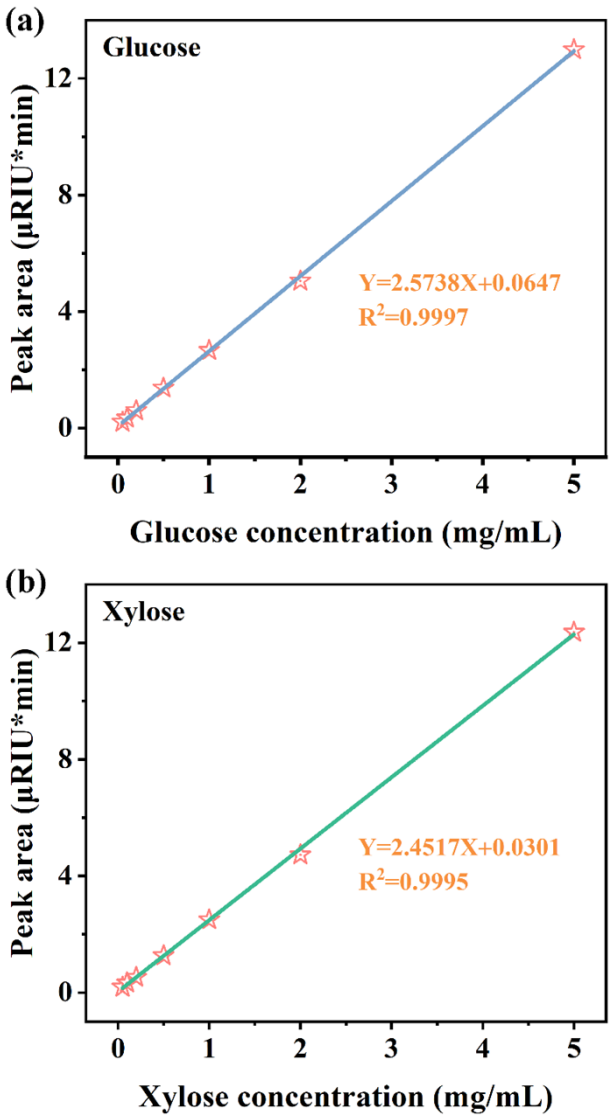

Fig. S1. Calibration curves of (a) glucose and (b) xylose.

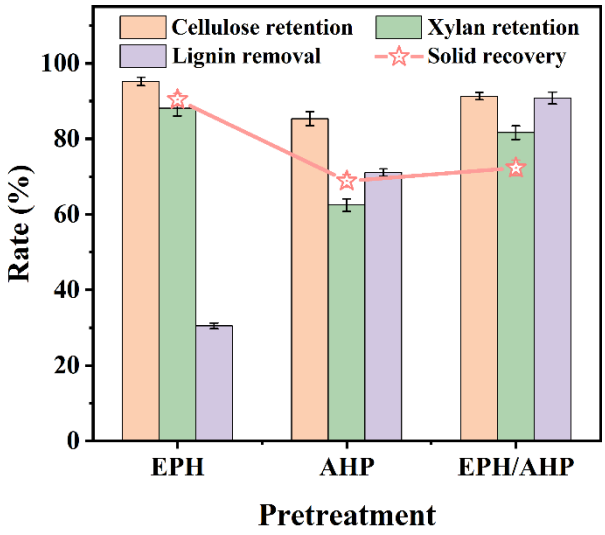

Fig. S2. (a) Fractionation efficiency of poplar components using different solvent systems.

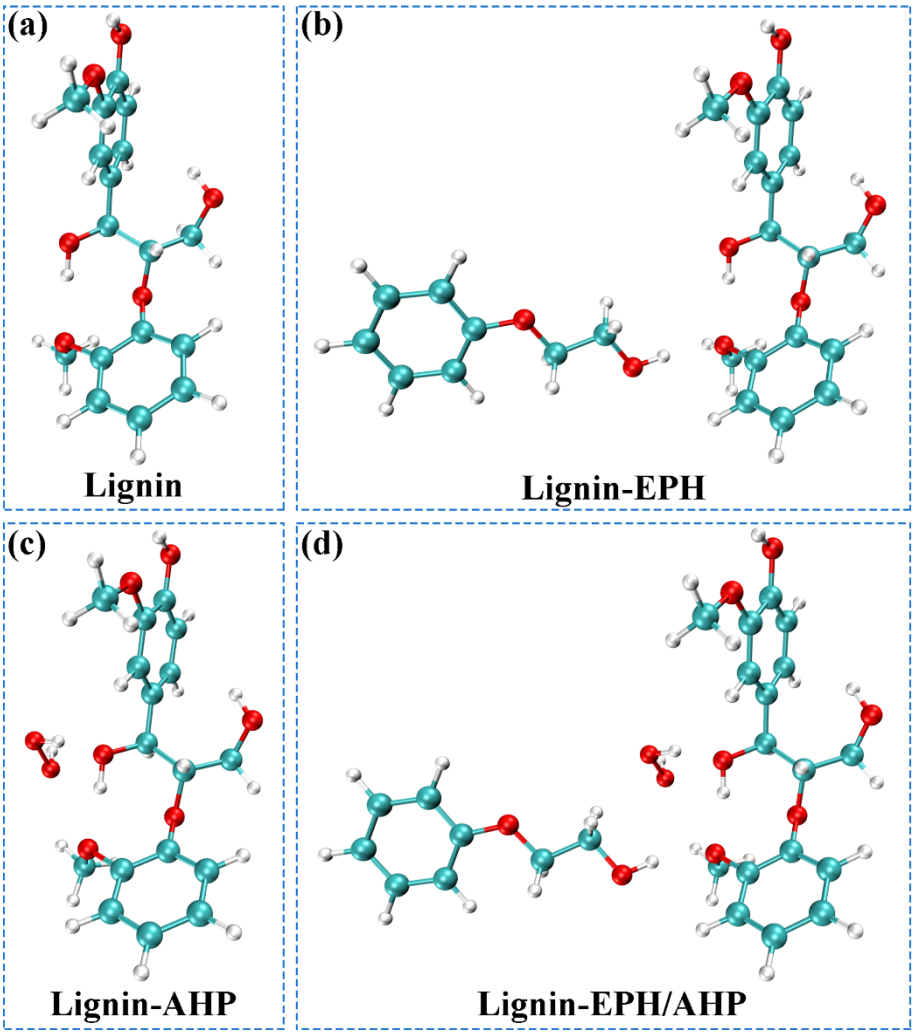

Fig. S3. Structures of Lignin, Lignin-EPH, Lignin-AHP and Lignin-EPH/AHP.

Table S1 Chemical compositions of corncob.

	Chemical compositions (%)						
Samples	Cellulose	Xylan	Lignin	Solvent extractives	Ash	Arabinan	Acetyl
Corncob	37.31±0.27	28.60±0.294	16.63±0.14	3.22±0.21	2.07±0.05	5.21±0.17	4.42±0.20

Table S2 Peak-differentiation of C 1s in high resolution XPS spectra of raw and EPH/AHP pretreated corncob.

	C 1s				
Samples	C1	C2	C3	C3	O/C
Raw	60.29	25.08	10.63	4.00	0.40
EPH/AHP	31.26	46.61	15.98	4.15	0.68

Table S3 Comparison of pretreatment performance between the EPH/AHP system and different pretreatment systems.

Samples	Solvents	Tem. (K)	Time (min)	Cellulose Retention (%)	Lignin removal (%)	Glucose yield (%)	Reference
Corncob	EPH/AHP	343	90	91.86	85.21	98.61	This work
Corn stover	EPH/STA	403	90	85.60	88.54	94.27	[1]
Rice straw	EPH/H_2SO_4	393	120	86.48	63.16	80.94	[2]
Rice straw	EPH/H_2SO_4	393	180	87.34	53.17	88.06	[3]
Moso bamboo	GVL/TsOH	403	60	91.5	98.4	77.32	[4]
Masson pine	GVL/H_2SO_4	423	60	83.66	87.2	76.8	[5]
Sugarcane leaf	GVL/$FeCl_3$	393	180	81.0	74.0	85.5	[6]
Wheat straw	2-MeTHF/TsOH	413	180	95.69	57.18	98.82	[7]
Poplar chip	TsOH/pentanol-MT	393	40	93.37	92.79	96.50	[8]
Masson pine	BDO/H_2SO_4-NS	443	60	91.17	81.83	88.23	[9]

EPH: 2-phenoxyethanol; STA: Silicotungstic acid; GVL: γ-valerolactone; TsOH: p-toluenesulfonic acid; H_2SO_4: sulfuric acid; MT: mannitol; BDO: 1,4-butanediol; NS: 2-naphthol-7-sulphonate.

Table S4 Comparison of lignin removal between the EPH/AHP system and different pretreatment systems.

Samples	Conditions	Lignin removal (%)	E_a ($kJ \cdot mol^{-1}$)	Reference
Corncob	EPH/AHP, 343 K, 90 min	85.21	23.36	This work
Rice straw	THFA/HCl, 413 K, 300 min	95	32.2	[10]
Rice straw	NH_4OH–KOH, 428 K, 45 min	91.8	35.6	[11]
Rice husk	Soda-ethanol, 433 K, 100 min	91.7	38.59	[12]
Sugarcane bagasse	AcH/H_2SO_4, 363 K, 120 min	79.7	64.41	[13]
Bamboo	EPH/H_2SO_4, 393 K, 60 min	84.1	68.0	[14]
Eucalyptus	BTEAC/FA, 403 K, 180 min	94.25	75.22	[15]
Wheat straw	Ethanol/H_2SO_4, 413 K, 52 min	96	89.3	[16]
Eucalyptus	Acid sulphite, 413 K, 196 min	98	138.4	[17]

EPH: 2-phenoxyethanol; AHP: alkaline hydrogen peroxide; BTEAC: benzyltriethylammonium chloride; FA: formic acid; THFA: tetrahydrofurfuryl alcohol; AcH: aqueous acetic acid.

Table S5 Hydrogen bonding interaction between lignin and solvents.

	Hydrogen bond energy (kcal·mol^{-1})		
Samples	Lignin-EPH	Lignin-AHP	EPH-AHP
EPH	−5.21	–	–
AHP	–	−7.50	–
EPH/AHP	−4.68	−7.34	−0.44

Reference

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