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Electronic Supplementary Information

Lignocellulosic full-components hydrogelation using steam-exploded corn stover

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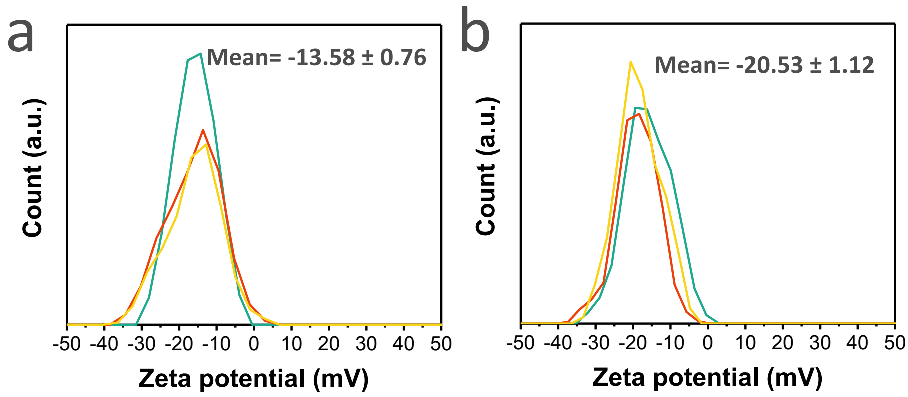

Fig. S1. Zeta potential of CS (a) and SECS (b).

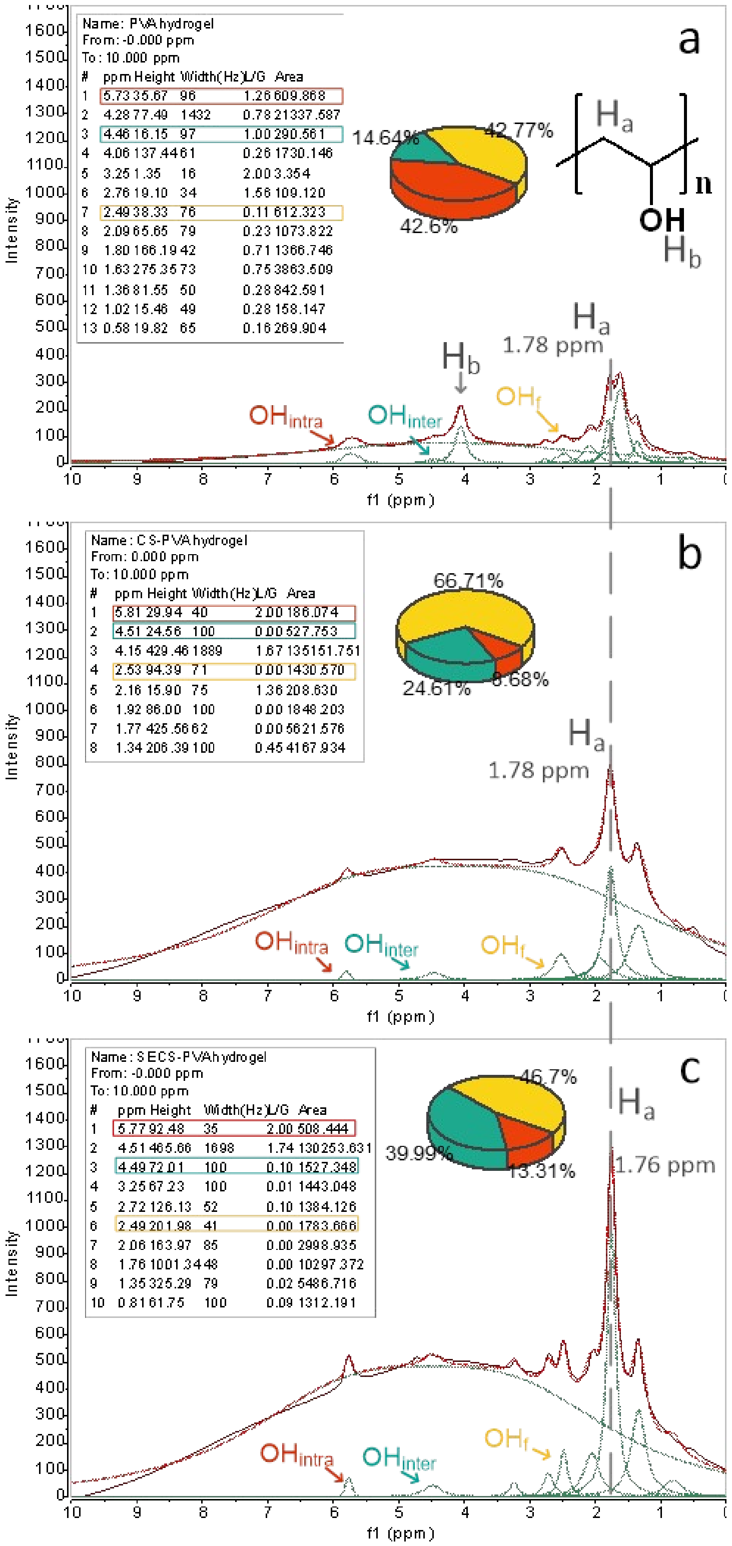

Fig. S2. ^{1}H solid-state NMR spectroscopy of PVA hydrogel (a), CS-PVA hydrogel (b) and SECS-PVA hydrogel (c).

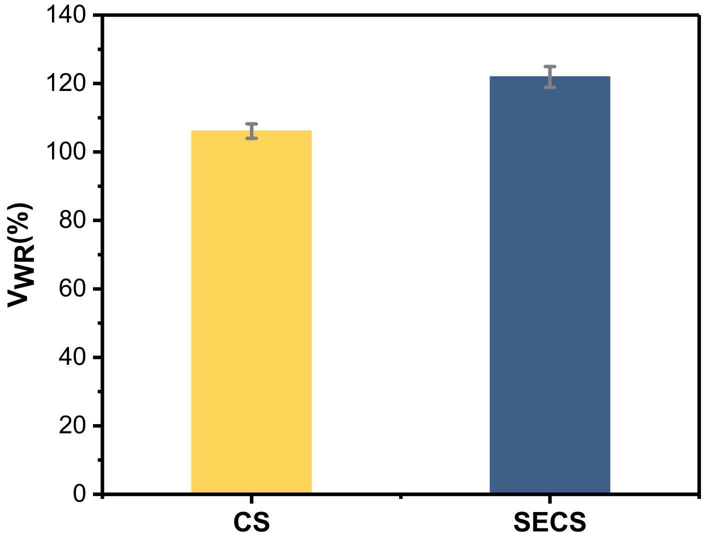

Fig. S3. Water retention property of CS and SECS.

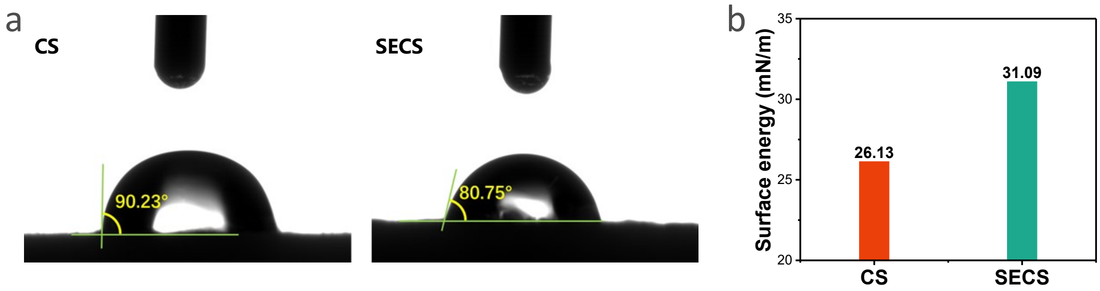

Fig. S4. Contact angle (a) and surface energy results (b) of CS and SECS.

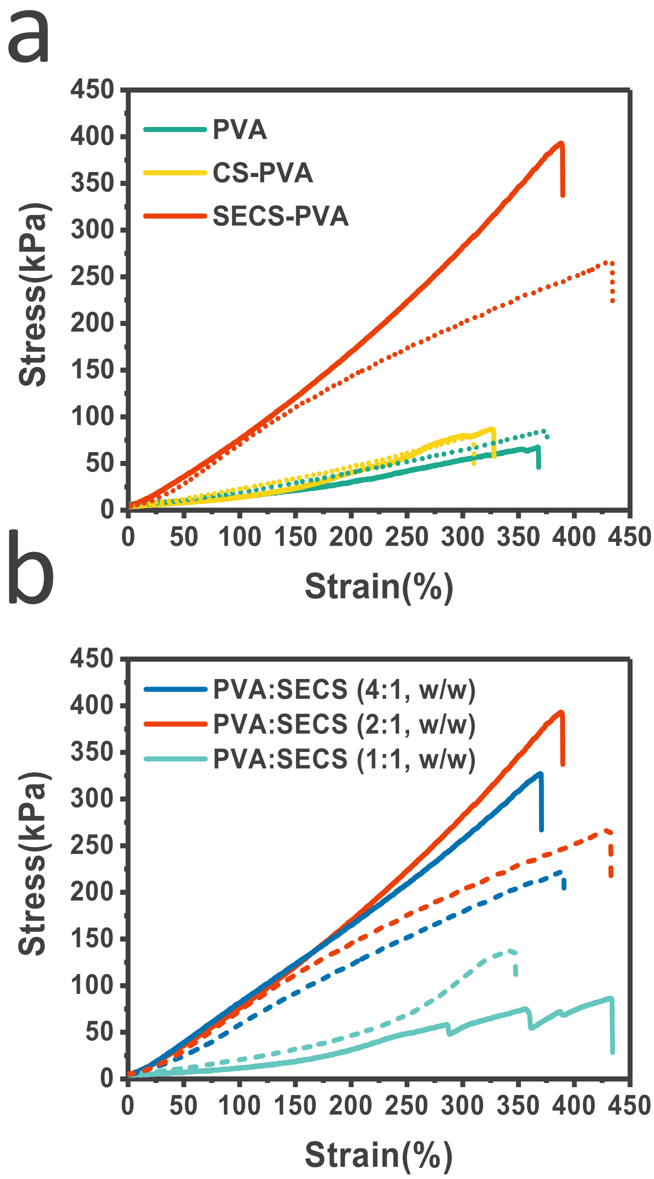

Fig. S5. Stress-strain curves of PVA, CS-PVA, and SECS-PVA hydrogels (a) as well as SECS-PVA hydrogels with different SECS addition (b).

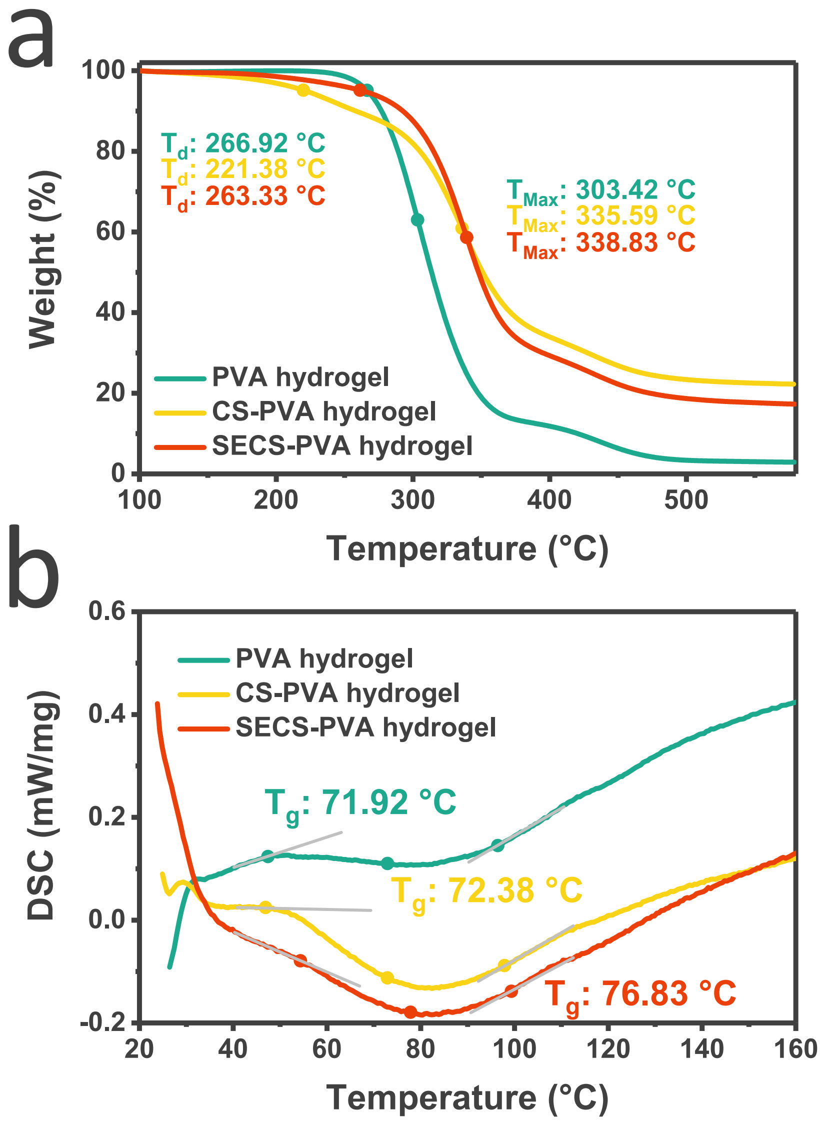

Fig. S6. Thermogravimetric analysis (a) and differential scanning calorimetry (b) results of PVA hydrogels, CS-PVA hydrogels and SECS-PVA hydrogels.

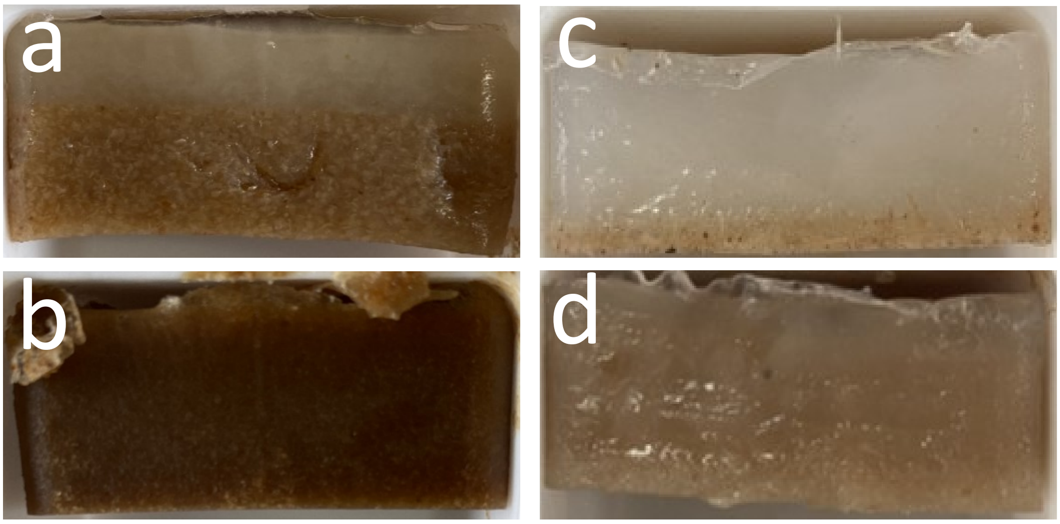

Fig. S7. Photos of wheat bran-PVA hydrogel (a), steam-exploded wheat bran-PVA hydrogel (b), poplar-PVA hydrogel (c), and steam-exploded poplar-PVA hydrogel (d).

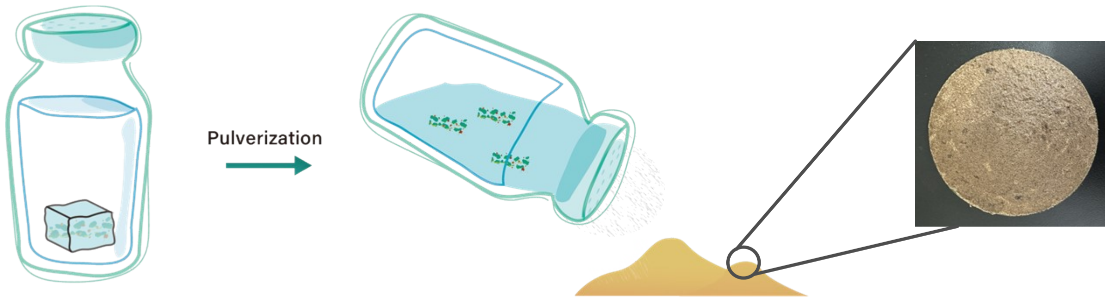

Fig. S8. Schematic diagram of sand fixing agent preparation.

Table S1 Percentage of component in CS and SECS.

Sample	Cellulose (%)	Hemicellulose (%)	Lignin (%)	Ash (%)
CS	42.23±0.92	18.81±0.09	34.50±3.65	4.45±0.44
SECS	45.27±0.59	15.25±0.54	36.92±3.32	2.56±0.85

Table S2 Processing methods and characteristics of lignocellulose-based hydrogels in similar work.

Materials			Processing Information			Characteristics		
Lignocellulose	Polymers	Lignocellulose content	Lignocellulose treatment	Hydrogel fabrication	Reagents	Max tensile strength	Characteristics provided by lignocellulose	Ref.
Cellulose	PVA	50%	Cooking, pulping, separation, and purification	Blended with $BzMe_3NOH$ aqueous solution and frozen-thawed	$BzMe_3NOH$ and epichlorohydrin	37.30 kPa	Not mentioned	[1]
Cellulose nanocrystals	PVA	about 10%	Separation, purification, and nanolization	Blended with borax	Polyaniline, tannic acid, silver nitrate, and H_2SO_4	246.10 kPa	Not mentioned	[2]
Cellulose nanocrystals	PVA	5.0%	Separation, purification, and nanolization	Blended with borax under ultrasonic	Citric, HCl, borax, and aniline	171.52 kPa	Not mentioned	[3]
Cellulose nanofibril	PVA	3.1% to 7.9%	Separation, purification, and nanolization	Blended with the sodium borate solution	TEMPO, $CaCl_2$, and $Na_2B_4O_7$	about 3.30 kPa	Not mentioned	[4]
Lignin nanoparticles and cellulose	PVA	Not explicitly mentioned	Separation, purification, and	Blended with glutaraldehyde, ultrasound	Glutaraldehyde, ethylene glycol, and HCl	Not mentioned	Tune pore structure, anti-oxidative and	[5]

nanocrystals			nanolization	treatment, and dialysis			antibacterial activities	
Alkali lignin	PAM	0.14%	Hydrothermal pretreatment, post-cooking, separation, and purification	One-pot free radical polymerization ultrasound treatment and activation	NaOH, ethylene glycol and ammonium persulfate	136.10 kPa	Self-catalytic system (AL-Cu^{2+})	[6]
3-allyloxy-2-hydroxypropyl-lignin	PAA	5.6% to 15.2%	Separation and purification, and etherification	Blended with $K_2S_2O_8$ and N,N′-methylene bisacrylamide	NaOH, acetone, $K_2S_2O_8$ and N,N′-methylene bisacrylamide	Not mentioned	UV-shielding and antioxidant activity	[7]
Lignin nanoparticles	PAM	4.5% to 22.0%	Separation, purification, and nanolization	Blended with ascorbic acid and hydrogen peroxide	Ascorbic acid and H_2O_2	128.50 kPa	Not mentioned	[8]
Seam-exploded corn stover	PVA	10.0% to 50.0%	Steam explosion activation	Blended and frozen-thawed	Water	329.75 kPa	Porosity, antioxidant activity, UV-shielding, etc.	This work

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