

Supporting Information

High-performance supercapacitor energy storage using carbon material derived from lignin by bacterial activation before carbonization

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Table

Table S1 Chemical compositions of different lignin precursors and lignin-derived carbons

Chemical composition (at%)	AL	BAL-9	ALC	BALC-9
C	61.18	57.85	68.88	90.15
O	38.82	42.15	31.12	9.85

Table S2 Assignment of lignin and polysaccharide correlation signals in the HSQC spectra shown in Figure 3

Labels	δ_C/δ_H (ppm)	Assignments
Lignin cross-signals:		
OCH ₃	56.2/3.73	C–H in methoxyls
A _γ	59.8/3.37	C _γ -H _γ in β-O-4' substructures (A)
C _γ	63.6/3.89	C _γ -H _γ in phenylcoumaran (C)
I _γ	60.2/4.03	C _γ -H _γ in cinnamyl alcohol end-groups (I)
A _α	72.2/4.87	C _α -H _α in β-O-4' substructures (A)
A _β (G)	86.5/4.11	C _β -H _β in β-O-4' linked to G (A)
B _α	85.4/4.49	C _α -H _α in β-β'(resinol) (B)
A _β (S)	86.8/3.98	C _β -H _β in β-O-4' linked to S (A)
S _{2,6}	104.2/6.70	C ₂ -H ₂ and C ₆ -H ₆ in syringyl units (S)
S' _{2,6}	104.7/7.32	C ₂ -H ₂ and C ₆ -H ₆ in oxidized S units (S')
G ₂	111.3/6.99	C ₂ -H ₂ in guaiacyl units (G)
G ₅	115.9/6.79	C ₅ -H ₅ in guaiacyl units (G)
PCE _{3,5}	115.3/6.70	C _{3,5} -H _{3,5} in <i>p</i> -coumarate
G ₆	119.4/6.80	C ₆ -H ₆ in guaiacyl units (G)
FA ₆	122.5/7.12	C ₆ -H ₆ in ferulate
H _{2,6}	128.6/7.23	C _{2,6} -H _{2,6} in H units (H)
PCE _{2,6}	130.4/7.52	C _{2,6} -H _{2,6} in <i>p</i> -coumarate

Figure

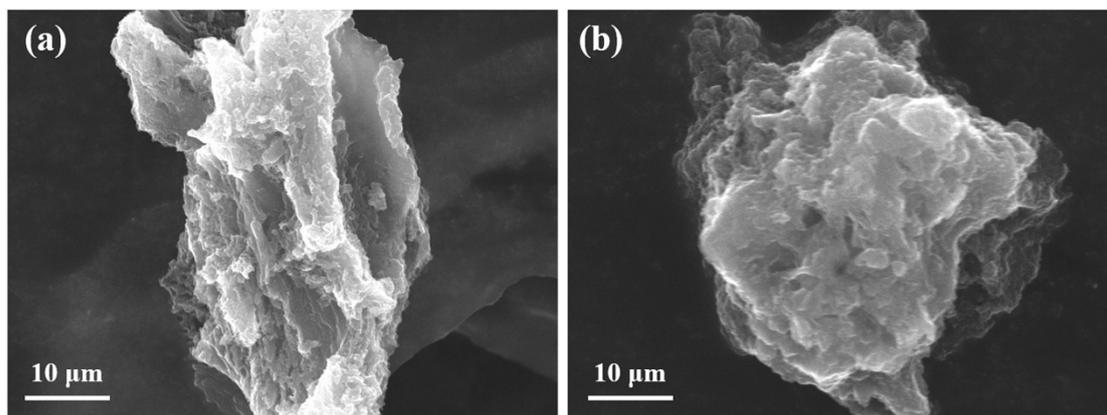


Figure S1. SEM images of (a) the BALC-7 and (b) BALC-8

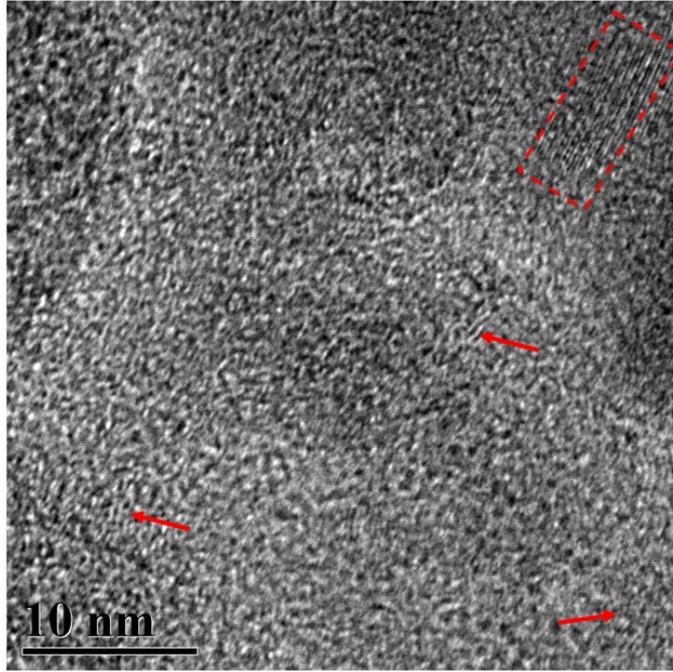


Figure S2. HRTEM image of the BALC-9

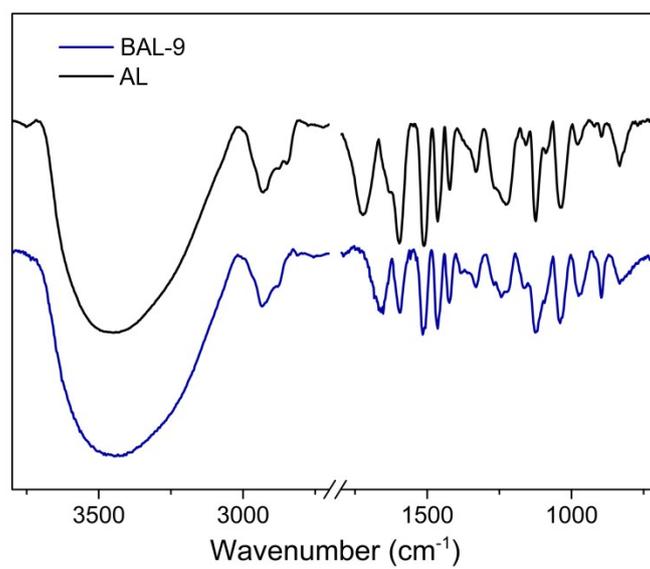


Figure S3. FT-IR spectra of the lignin precursors

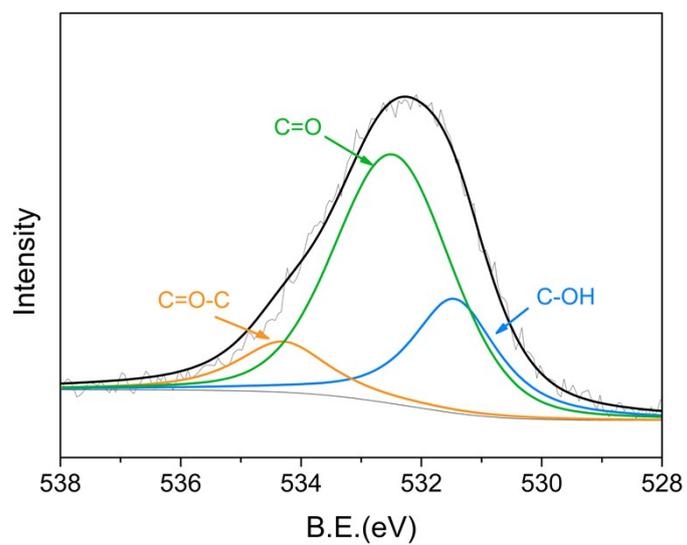


Figure S4. High-resolution O 1s XPS spectra of BALC-9

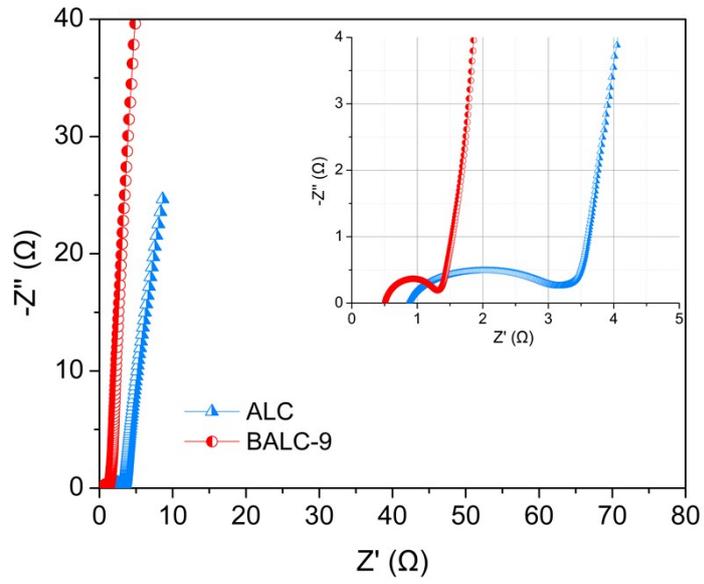


Figure S5. Nyquist plots (inset: magnification of the Nyquist plot).

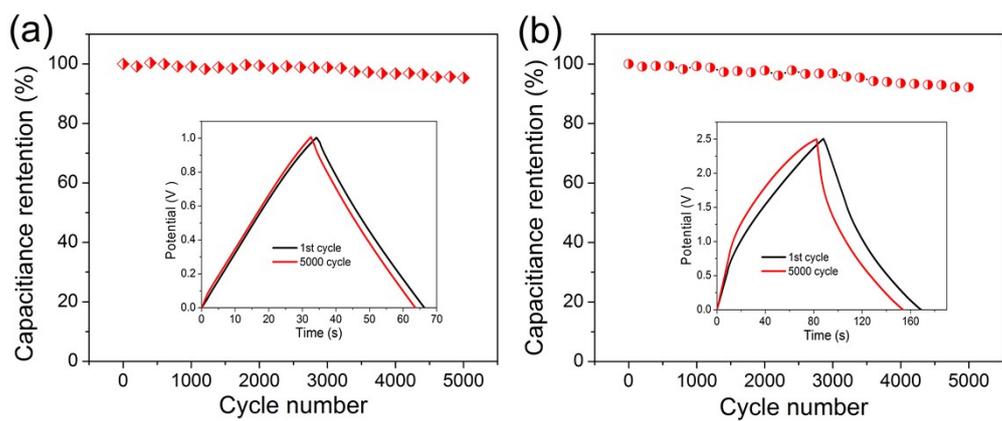


Figure S6. The long-term durability of the BALC-9 based electrode in a two-electrode system: (a) in 6M KOH, (b) in EMIM TFSI.

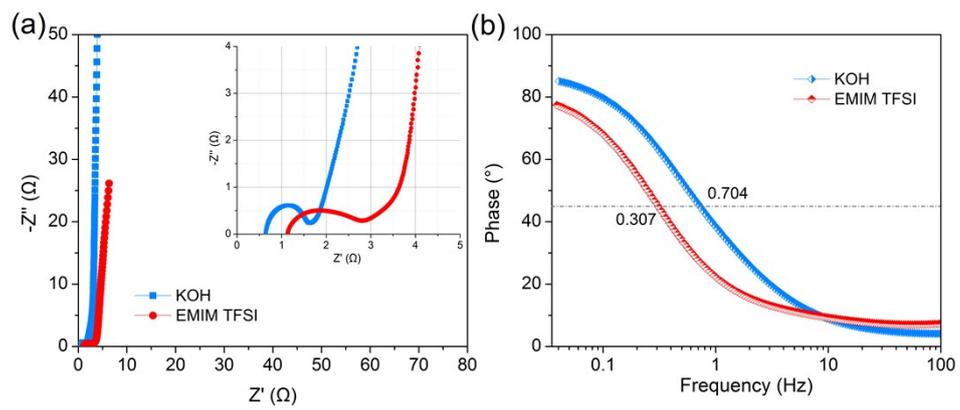


Figure S7. (a) Nyquist plot; (b) Bode plots of the BALC-9 based symmetrical supercapacitor.