Electronic Supplementary Material (ESI) for RSC Advances.

Lignin-derived 3D porous graphene on carbon cloth for flexible supercapacitors

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Supplementals

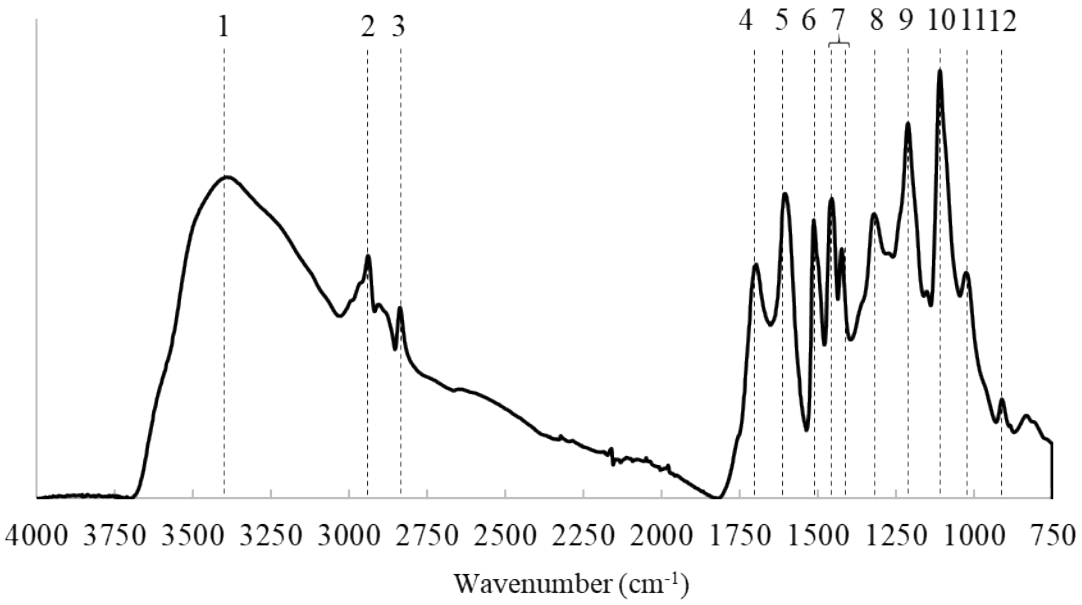

Figure S1. FTIR spectrum of lignin used in this study (Assignments 1: OH, 2/3: C-H in methylene and methyl group, 4: C=O, 5: G-condensed, 6: Aromatic skelton vibrations, 7: C-H deformations, 8: Condensed S and G ring, 9: C-C+C-O+C=O,10: C=O, 11: primary alcohols, 12: CH_2 wagging).

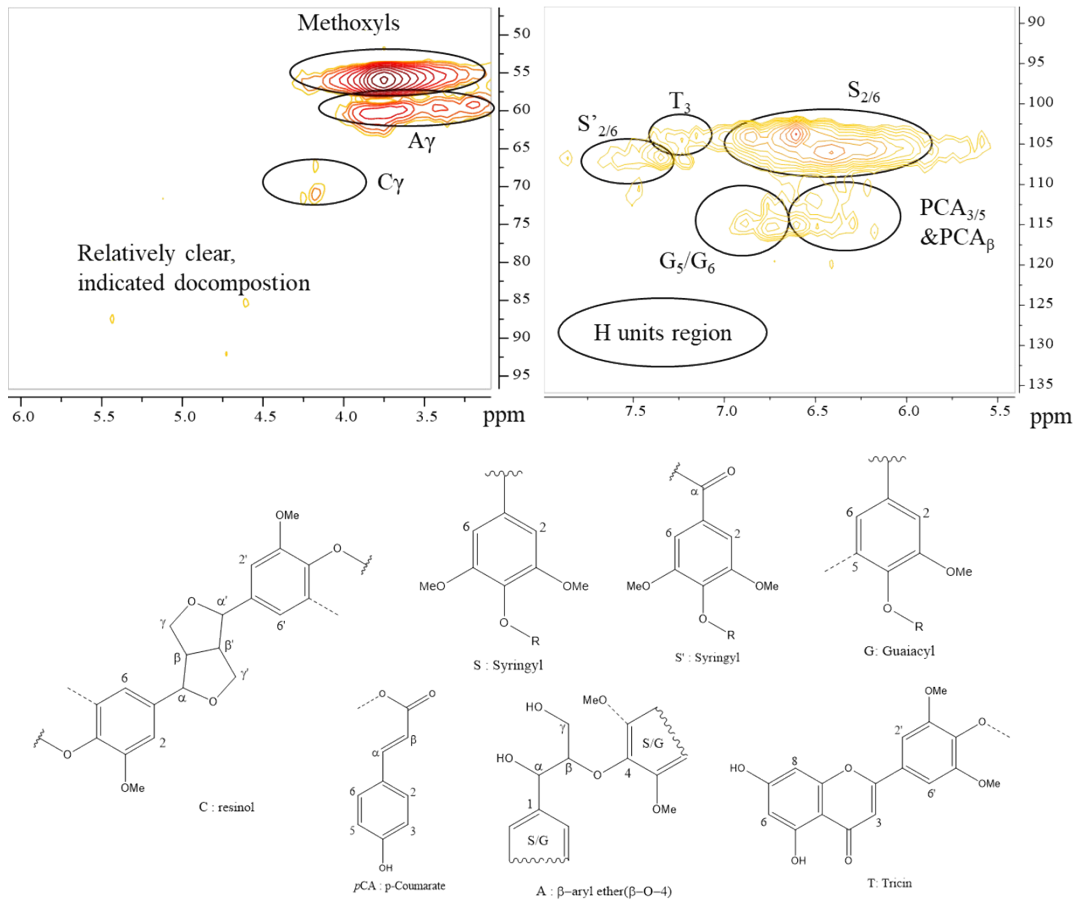

Figure S2. ^{1}H-^{13}C HSQC NMR spectra of the lignin.

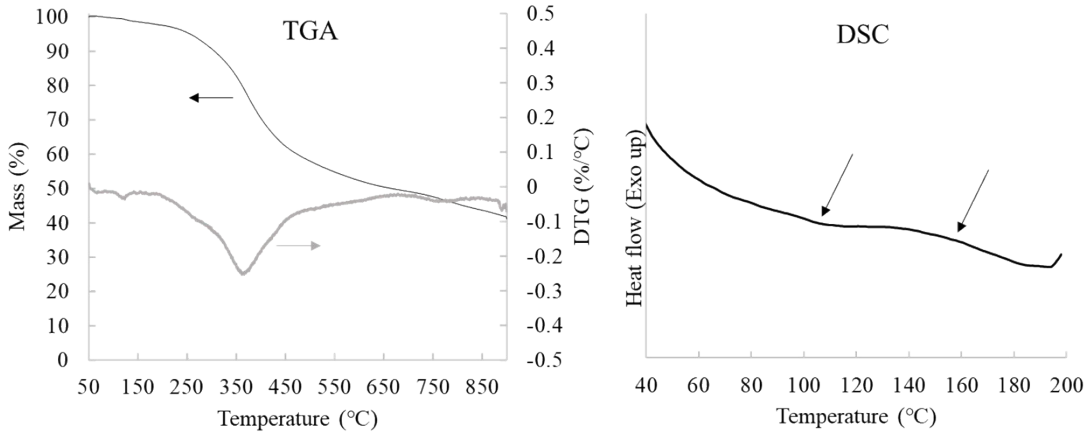

Figure S3. TGA and DSC curves of the lignin.

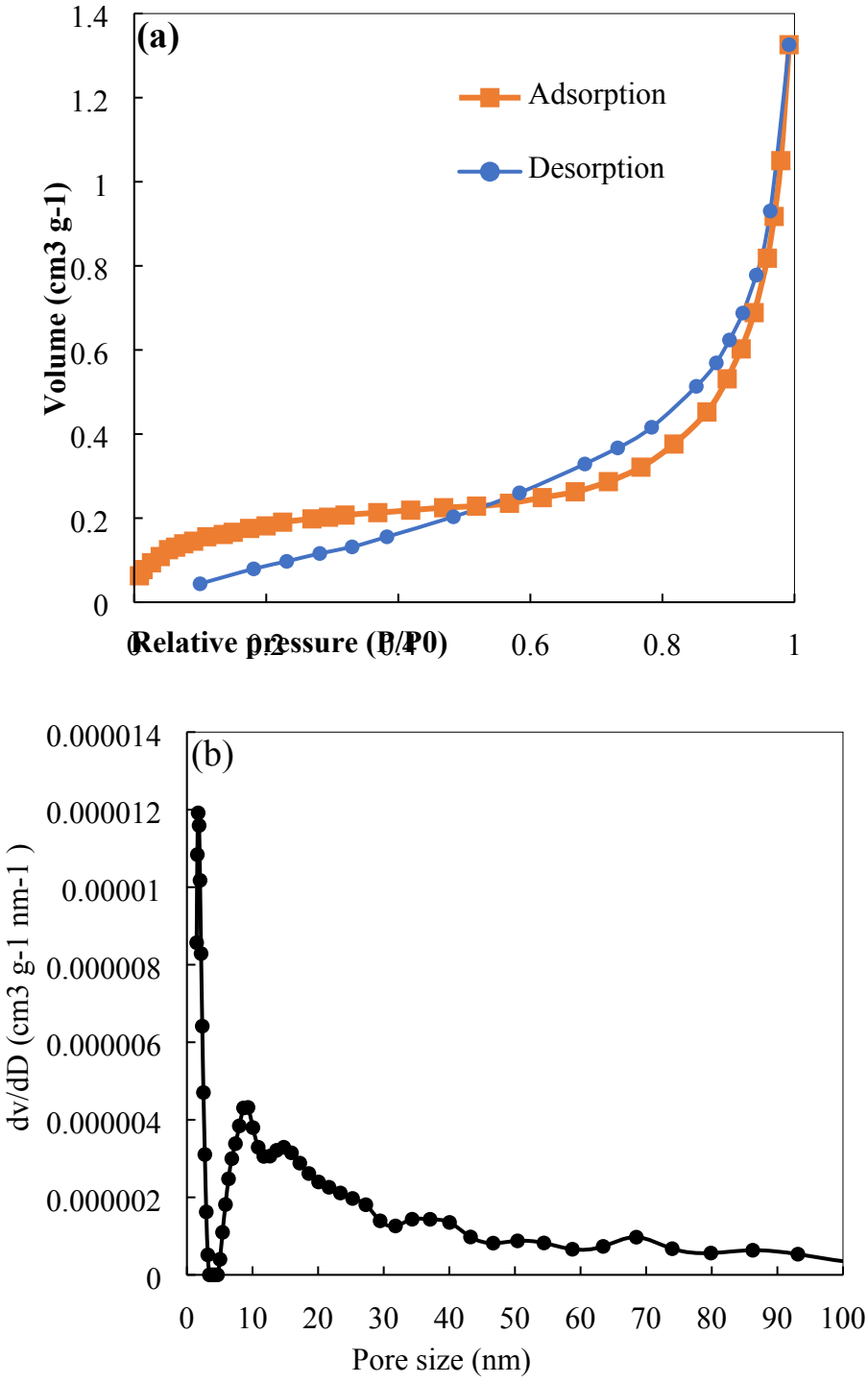

Figure S4. (a) N2 adsorption/desorption isotherms (77 K) of LLC electrodes (b) pore size distribution for N2 adsorption (NLDFT model).

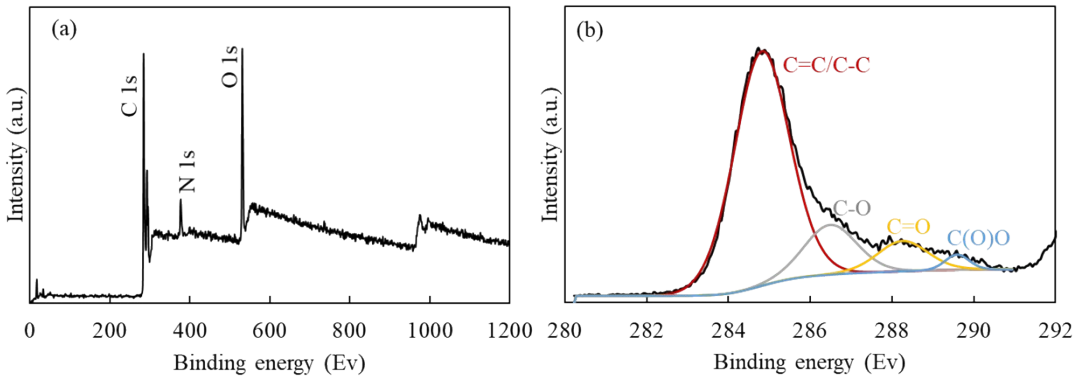

Figure S5. XPS spectrum of LLC.

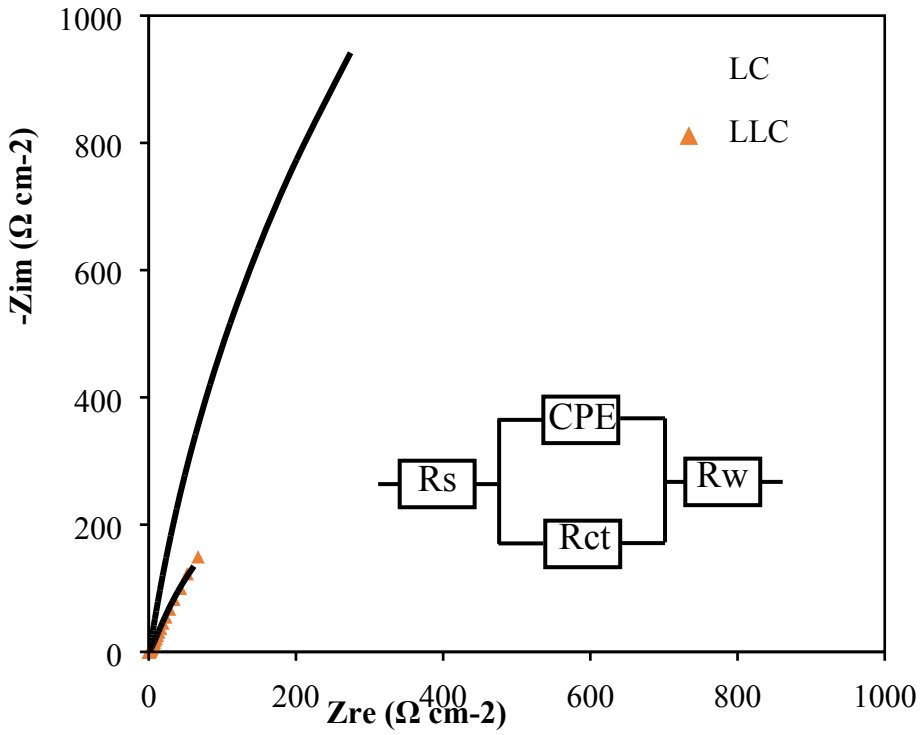

Figure S6. Nyquist plots for LC and LLC in three-electrode system.

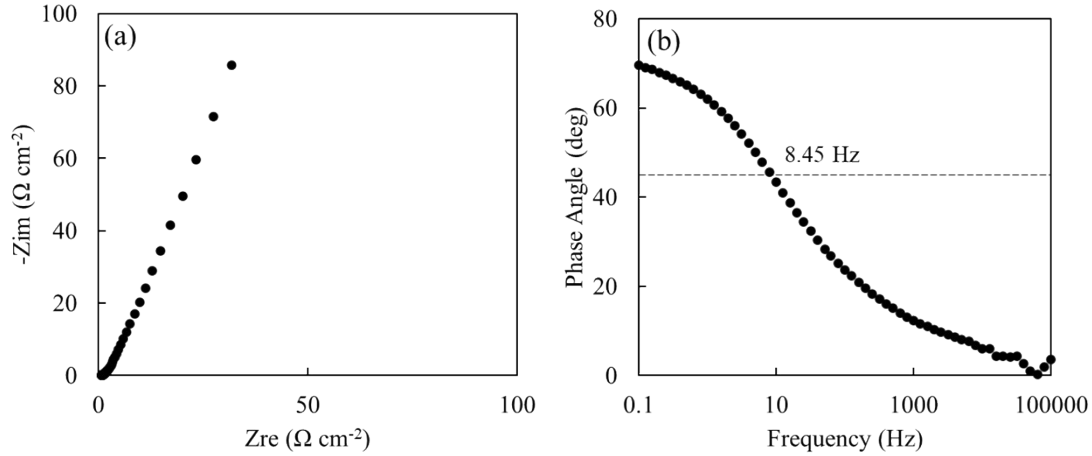

Figure S7. (a) Nyquist plot and (b) Bode phase angle plot for LLC symmetric supercapacitors.

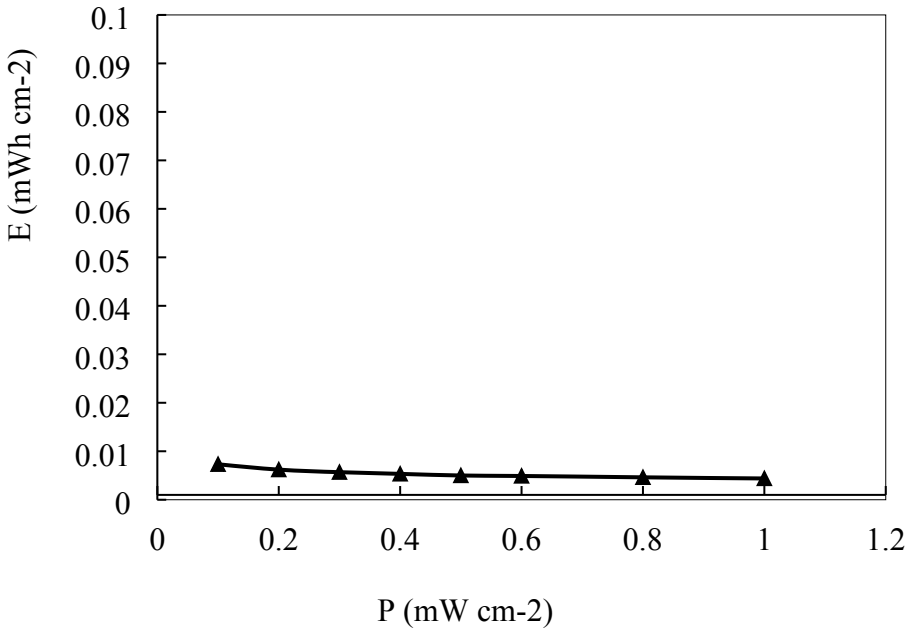

Figure S8. Ragone plot of LLC symmetric supercapacitors.

Table S1. Comparison of the areal capacitances for LLC device with other lignin-based DLW-derived carbons reported in the literature.

Carbon source	Current Density (mA cm^{-2})	C_A (mF cm^{-2})	Electrolyte	Reference
Lignin/PVA	0.05	25.1	1M H_2SO4 gel	[1]
Lignin/PEO	0.1	25.44	1M H_2SO4 gel	[2]
Lignin/PEO	0.01	2.51	1M H_2SO4 gel	[3]
Lignin/PAN/MOS_2	0.1	16.2	1M H_2SO4 gel	[4]
Lignin only	0.1	52.8 41.3	6M KOH 1M H_2SO4 gel	This work

Reference

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