

Supporting Information

Nanostructured Thin Lignin-Derived Carbon Sheet as Excellent Reinforcement Filler in Polypropylene

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Totally 6 pages with 1 table and 4 figures.

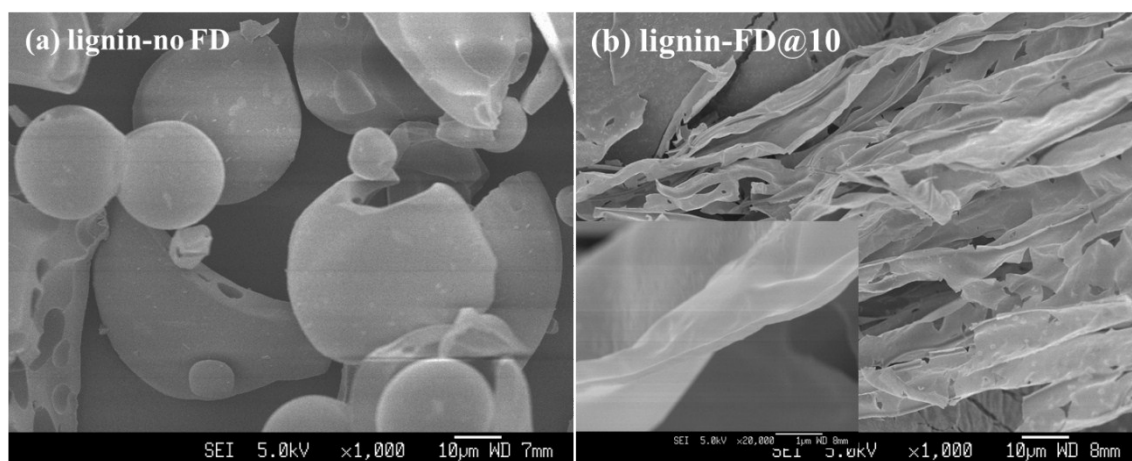


Fig. S1 SEM images of (a) as-received lignin, (b) freeze-dried lignin at lignin concentration of 10 mg/mL. (inset scale bar: 1µm) .

Table S1. Properties of lignin and lignin-derived carbon prepared by FD of 10 mg/mL lignin aqueous solutions, frozen at -196 °C, and subsequent carbonization at varying temperatures.

Sample	Carbonization temp. (°C)	Specific surface area (m ² /g)	Pore polume (cm ³ /g)
Lignin	- ^a	0	0
AR-LC--600	- ^a	0.8	0.01
Freeze-dried lignin @10mg/mL	300	4	0.01
FD-LC@10--600	600	143	0.04
FD-LC@10--900	900	202	0.13

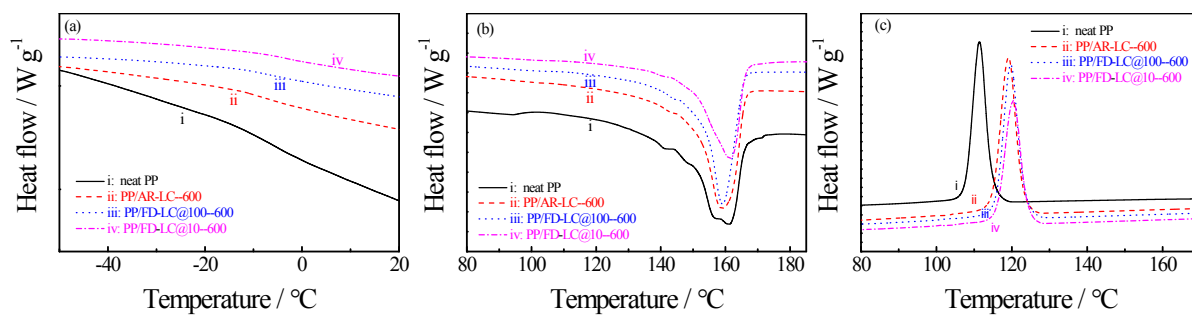


Fig. S2 DSC curves of neat PP (i), and PP based composites containing 2 wt% AR-LC(ii), FD-LCs at lignin conc. of 100 mg/mL (iii), FD-LCs at conc. of 10 mg/mL (iv), which all are carbonized at 600 °C. DSC was conducted at heating rate of 10 °C/min in N₂ atmosphere.

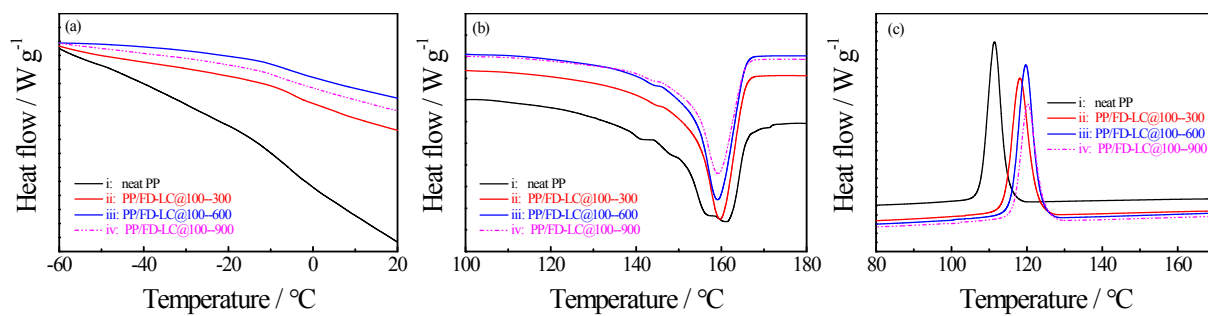


Fig. S3 DSC curves of neat PP (i), and PP/LC composites containing 2 wt% LC at lignin conc. of 100 mg/mL. LCs are respectively carbonized at 300 °C (ii), 600 °C (iii), 900 °C (iv). DSC was conducted at heating rate of 10°C/min in N₂ atmosphere.

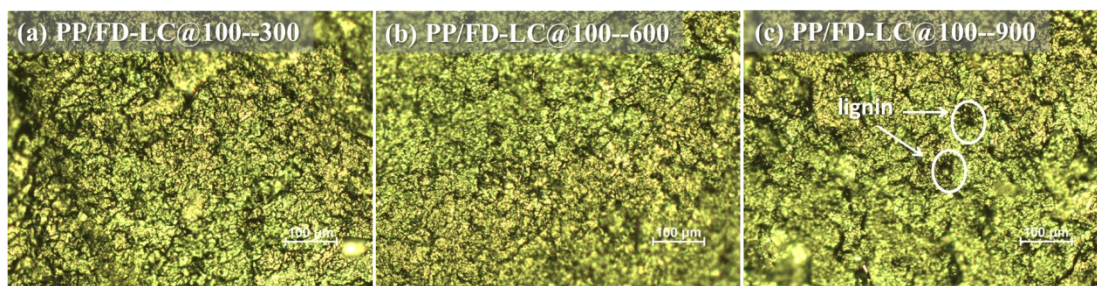


Fig. S4 POM ($\times 100$) images of the PP composites containing 2 wt% FD-LC at lignin concentration of 100 mg/mL, which are respectively carbonized at 300°C (a), 600°C (b) and 900°C (c).