Supporting Information

Direct and mild non-hydroxide activation of biomass to carbons with enhanced CO_2 storage capacity

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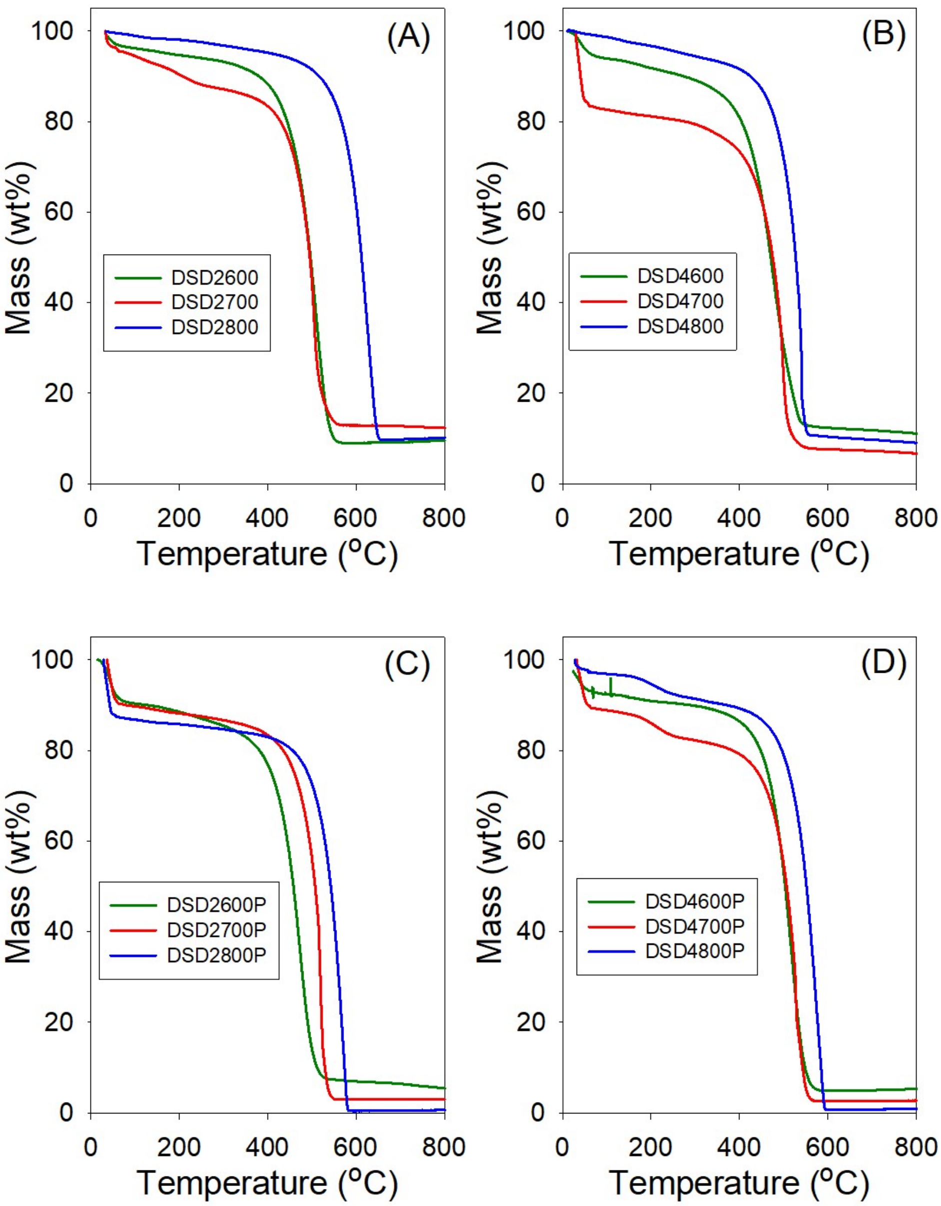

Figure S1. Thermogravimetric analysis (TGA) curves of carbons directly activated (A and B) or compactivated (C and D) from sawdust (SD) at 600, 700 or 800 °C, and PO/SD ratio of 2 (A and C) or 4 (B and D).

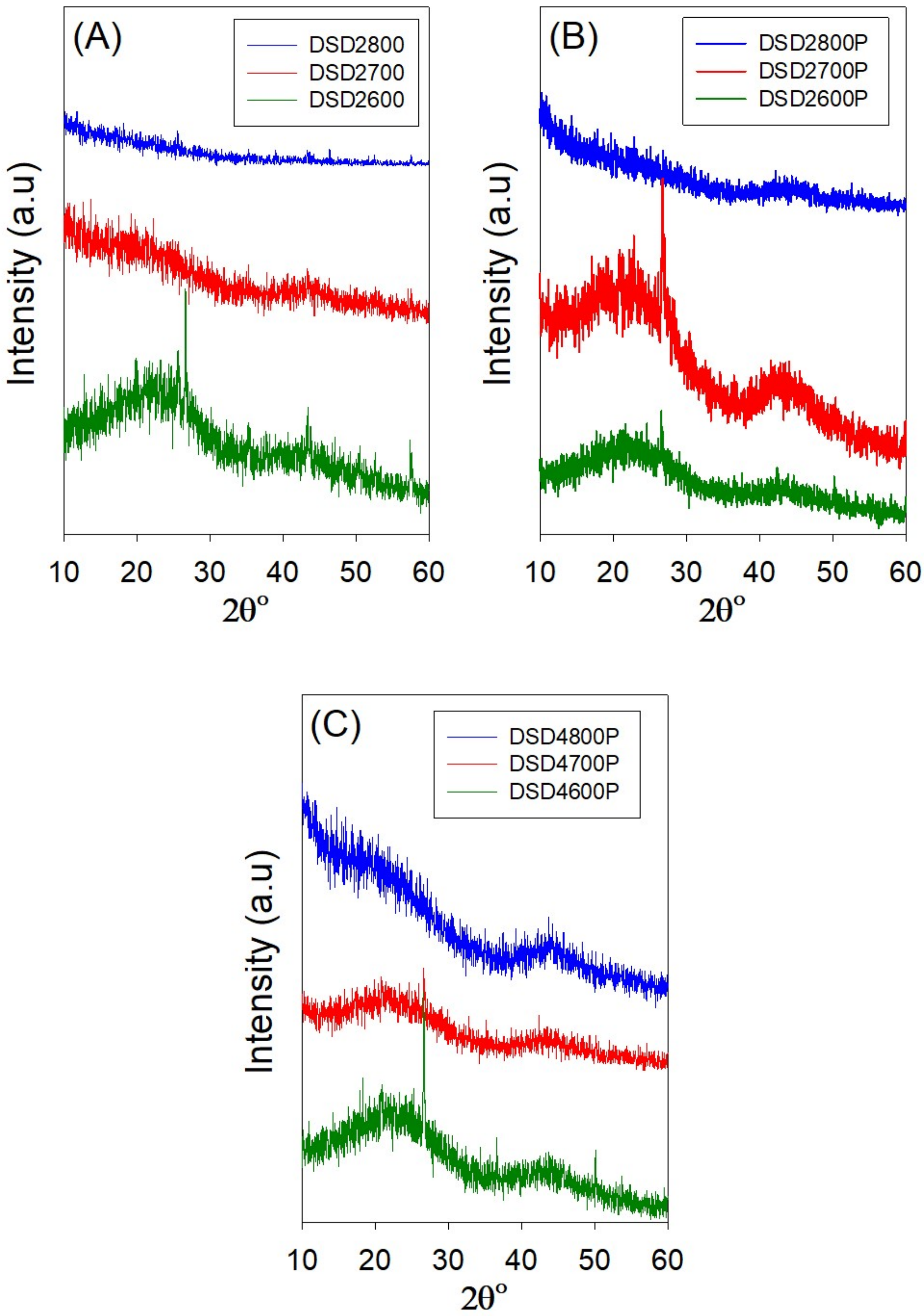

Figure S2. Powder XRD patterns of carbons directly activated (A) or compactivated (B and C) from sawdust (SD) at 600, 700 or 800 °C, and PO/SD ratio of 2 (A and B) or 4 (C).

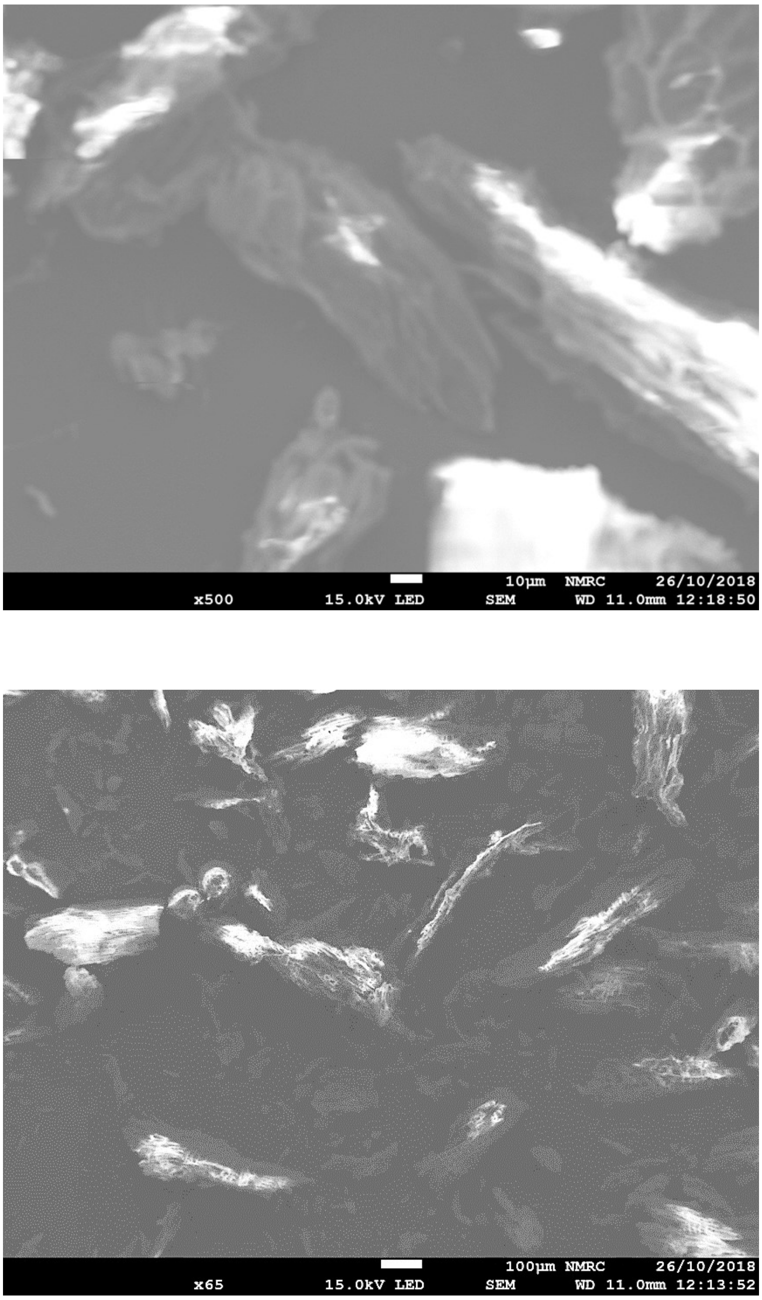

Figure S3. SEM images of raw sawdust showing woody fibrous morphology

Table S1. Textural properties and CO_2 uptake at 25 °C of carbons directly activated (DSDxT) or conventionally activated via hydrothermal carbonisation (SDxT) from sawdust at 600, 700 or 800 °C, and PO/sawdust or PO/hydrochar ratio of 2 or 4.

Sample	Surface area (m^2 g^{-1})	Micropore surface area[a] (m^2 g^{-1})	Pore volume (cm^3 g^{-1})	Micropore volume[b] (cm^3 g^{-1})	CO_2 uptake ($mmol$ g^{-1})		
					0.15 bar	1 bar	20 bar
DSD2600	682	574 (84)	0.36	0.23 (64)	1.0	2.7	4.9
DSD2700	945	813 (86)	0.48	0.33 (69)	1.2	4.0	8.5
DSD2800	1238	1053 (85)	0.59	0.42 (71)	0.9	3.4	12.3
SD2600	506	411 (81)	0.27	0.16 (59)	1.2	2.6	4.6
SD2700	893	813 (91)	0.41	0.33 (80)	1.4	3.8	7.6
SD2800	1463	1311 (89)	0.67	0.53 (79)	1.2	4.3	11.9
DSD4600	556	465 (84)	0.30	0.18 (60)	1.0	2.5	4.8
DSD4700	1131	906 (80)	0.63	0.37 (59)	0.9	3.0	6.8
DSD4800	1859	1497 (81)	0.96	0.60 (63)	0.8	3.2	11.5
SD4600	575	499 (87)	0.30	0.20 (67)	1.2	2.9	5.1
SD4700	972	875 (90)	0.46	0.35 (76)	1.2	3.7	7.6
SD4800	1441	1257 (87)	0.68	0.51 (75)	1.0	3.8	11.2

The values in the parenthesis refer to: [a]% micropore surface area, and [b]% micropore volume.

Table S2. CO_2 uptake of various porous carbons at 25 °C and 0.15 bar or 1 bar (Table adapted from reference 38).

	CO_2 uptake (mmol/g)		Reference
	1 bar	0.15 bar	
Sawdust-derived activated carbon	4.8	1.2	1
KOH-activated templated carbons	3.4	~1.0	2
Hierarchical porous carbon (HPC)	3.0	~0.9	3
Petroleum pitch-derived activated carbon	4.55	~1.0	4
Activated carbon spheres	4.55	~1.1	5
Phenolic resin activated carbon spheres	4.5	~1.2	6
Poly(benzoxazine-co-resol)-derived carbon	3.3	1.0	7
Fungi-derived activated carbon	3.5	~1.0	8
Chitosan-derived activated carbon	3.86	~1.1	9
Polypyrrole derived activated carbon	3.9	~1.0	10
Soya bean derived N-doped activated carbon	4.24	1.2	11
N-doped ZTCs	4.4	~1.0	12
Activated templated N-doped carbon	4.5	1.4	13
Polyaniline derived activated carbon	4.3	1.38	14
N-doped activated carbon monoliths	5.14	1.25	15
Activated N-doped carbon	3.2	1.5	16
Activated hierarchical N-doped carbon	4.8	1.4	17
Activated N-doped carbon from algae	4.5	~1.1	18

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