Supporting Information

Effect of precursor morphology of cellulose-based biomass in the structural & interfacial properties of hard carbon electrodes for sodium-ion batteries

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Sample	Fiber width	Interlayer spacing (d_{002}) (Å)	I_D/I_G	C/O ratios (XPS)	BET specific surface area ($m^2\ g^{-1}$)
MFC-C	-	3.61 (±0.02)	1.02 (±0.01)	8.3 (±0.1)	22
CS-C	6.0 ± 0.35 μm	3.71 (±0.02)	1.10 (±0.02)	9.9 (±0.2)	70

Table S1. Physical parameters of the carbonized cellulose samples.

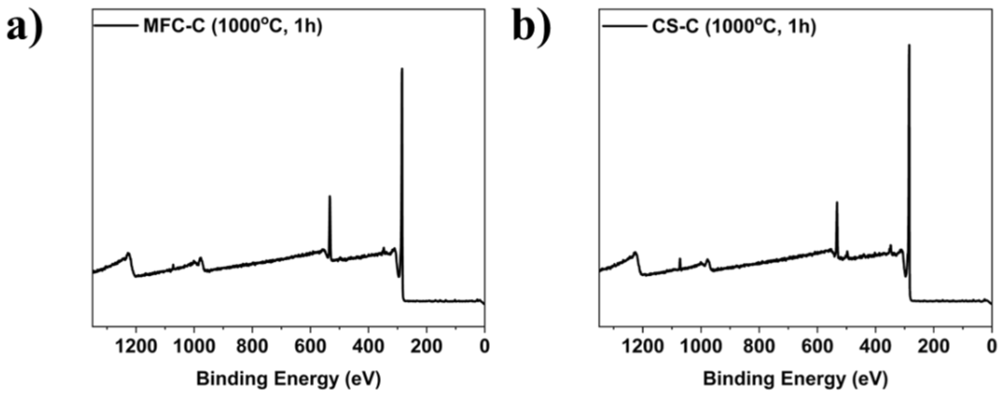

Figure S1. XPS survey scans for a) MFC-C, and b) CS-C.

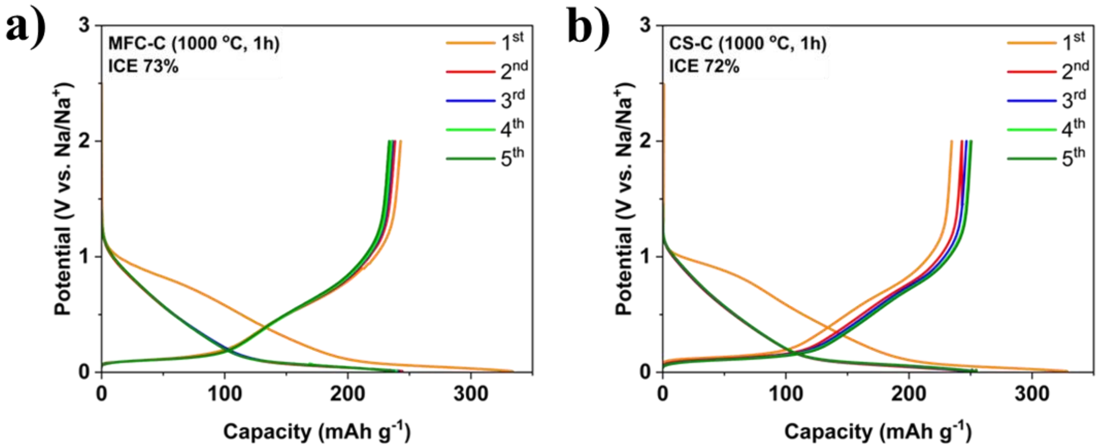

Figure S2. First five charge-discharge curves for a) MFC-C, and b) CS-C.

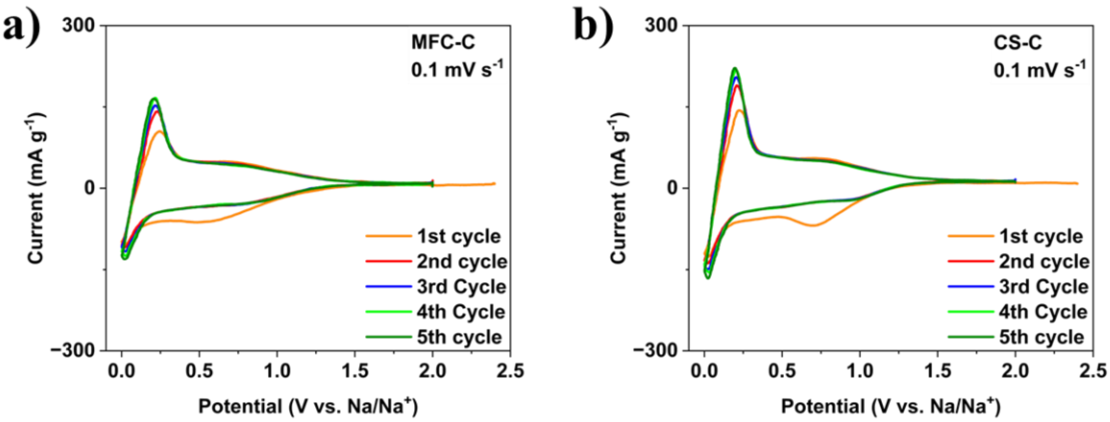

Figure S3. CV of the 1st 5 formation cycles for a) MFC-C, and b) CS-C.

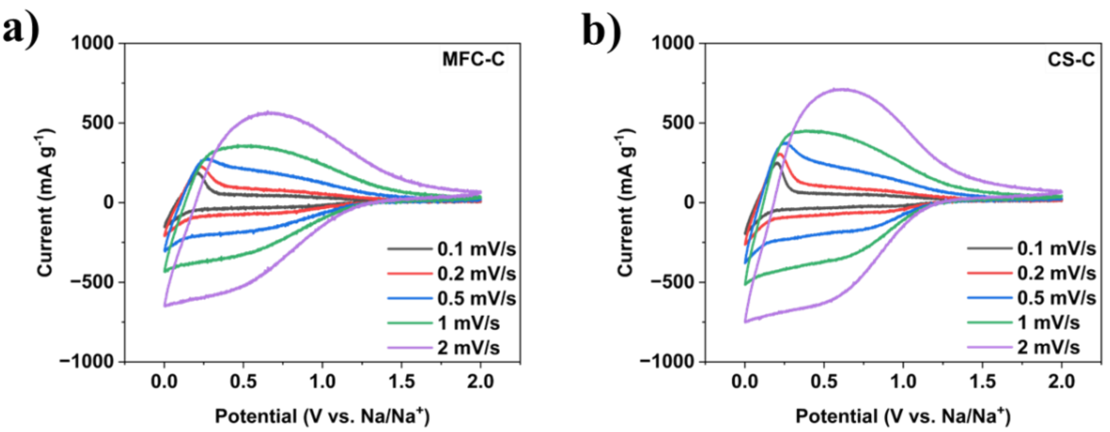

Figure S4. CV at different scan rates for a) MFC-C, and b) CS-C.

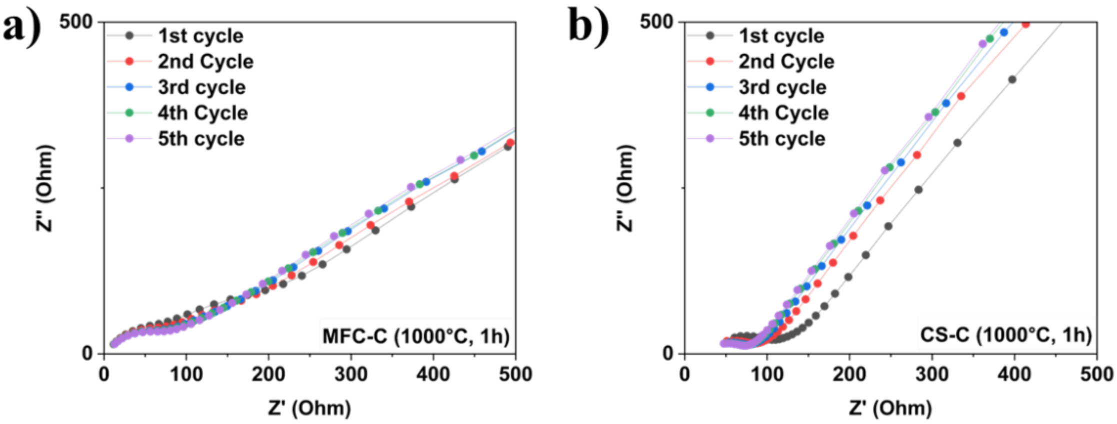

Figure S5. EIS spectra of the 1st 5 formation cycles for a) MFC-C, and b) CS-C.

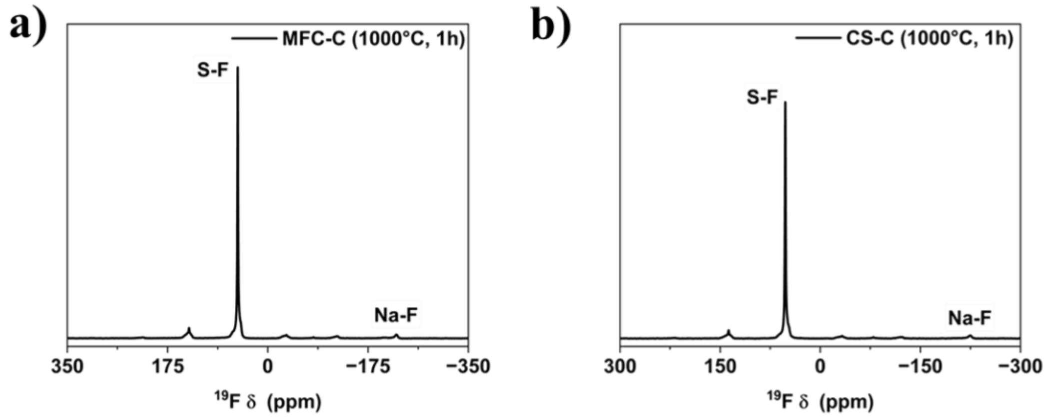

Figure S6. Ex-situ ^{19}F MAS NMR spectra of a) MFC-C, and b) CS-C.

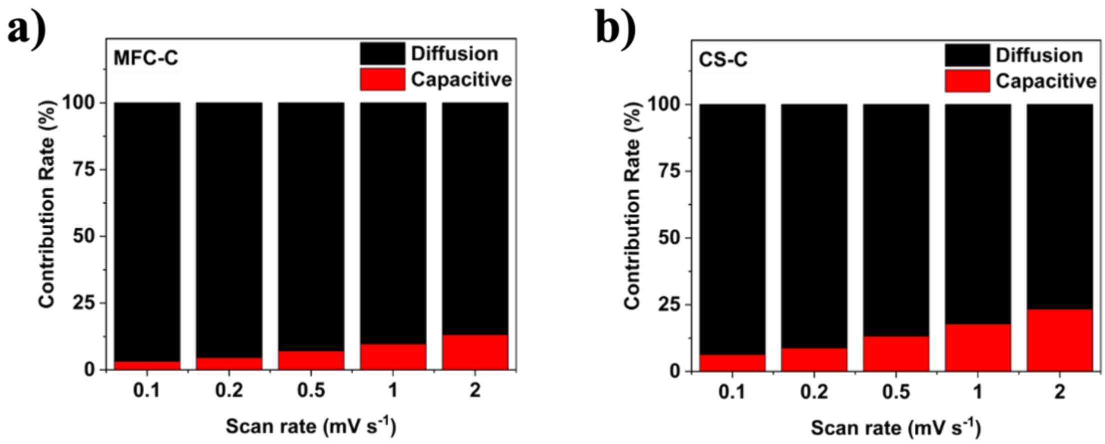

Figure S7. Percentage pseudocapacitive contribution of a) MFC-C and b) CS-C.

Table S2. Comparison of sodium storage performance of biomass-derived hard carbons.

Biomass Source	ICE (%)	Cycling performance (mAh g^{-1})	Rate	Mass Loading (mg cm^{-2})	Electrolyte	Year (Ref.)
MFC-C (microfibrillated cellulose)	73	199	50 mA g^{-1}	2-2.5	1:1 C_3mpyrFSI/NaFSI	This work
CS-C (cotton snippets)	72	240	50 mA g^{-1}	2-2.5	1:1 C_3mpyrFSI/NaFSI	This work
Cotton fabric	75	272	50 mA g^{-1}	2.7	1:1 C_3mpyrFSI/NaFSI	2023 (Sarma et al., 2023)
Silk fabric	75.6	191	50 mA g^{-1}	3-4	1:1 C_3mpyrFSI/NaFSI	2022 (Sun et al., 2022)
Rice Husk	50	276	30 mA g^{-1}	-	0.6 M $NaPF_6$ in EC/DMC	2019 (Rybarczyk et al., 2019)
Peanut shell	68	298	0.1 C	1.5	1 M $NaClO_4$ in EC/PC	2017 (Dou et al., 2017)
Sugar	61	300	0.1 C	-	1 M $NaClO_4$ in EC/PC	2013 (Ponrouch et al., 2013)
Cherry petals	67.3	310	20 mA g^{-1}	-	1 M $NaClO_4$ in PC/FEC	2018 (Zhu et al., 2018)
Banana peels	67.8	200	50 mA g^{-1}	1	1 M $NaClO_4$ in EC/DEC	2014 (Lotfabad et al., 2014)
Oak leaves	75	360 (10 cycles)	10 mA g^{-1}	-	1 M $NaClO_4$ in EC/DEC	2016 (Li et al., 2016a)
Sucrose powder	80	335	40 mA g^{-1}	1.5 – 1.8	1 M $NaClO_4$ in EC/PC	2014 (Bommier et al., 2014)
Sucrose powder (in graphene oxide)	-	300	20 mA g^{-1}	1.5 – 2	1 M $NaPF_6$ in EC/DEC	2017 (Li et al., 2017)
Glucose	82	280/300	35 µA cm^{-2}	-	1 M $NaClO_4$ in EC/DEC	2000 (Stevens and Dahn, 2000)
P-doped sucrose (in GO)	73	275	40 mA g^{-1}	1.5 – 2	-	2016 (Li et al., 2016b)
Corn	86	300	0.2 C	2-3	0.6 M $NaPF_6$ in EC/DMC	2016 (Liu et al., 2016)

Argan shell	86	300	25 mA g^{-1}	1.2 - 2	1 mol dm^{-3} $NaPF_6$ in EC/DEC	2017 (Dahbi et al., 2017)
MFC from bleached pulp	59	255	40 mA g^{-1}	1.2	1 M $NaClO_4$ in EC/PC	2013 (Luo et al., 2013)
Oxidised Cellulose (TEMPO)	72	196	100 mA g^{-1}	2.5	1 M $NaClO_4$ in EC/DEC	2015 (Shen et al., 2015)
Microcrystalline Cellulose Powder (MCC)	84	300	37.2 mA g^{-1}	-	1 M $NaPF_6$ in EC/DMC	2016 (Simone et al., 2016)

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