

Exploiting the Properties of Non-Wood Feedstocks to Produce Tailorable Lignin-containing Cellulose Nanofibers

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Supporting Information

Table S1. XPS peaks from the C 1s and O 1s regions for the various feedstocks.

Material	Peak	Binding energy (eV)	Atomic %
Bleached softwood Kraft pulp (BSKP)	C1s C-C	284.6	5.0
	C1s C-O	286.5	27.0
	C1s C=O	287.8	21.3
	C1s carboxyl	289.3	4.7
	O1s O-C	533.0	27.8
	O1s O=C	534.1	14.1
Wheat straw pulp	C1s C-C	284.3	21.3
	C1s C-O	286.0	32.1
	C1s O-C-O	287.4	10.3
	C1s carboxyl	288.8	1.7
	O1s O-C	532.4	33.1
	O1s O=C	-	-
Flax	C1s C-C	284.3	55.7
	C1s C-O	285.9	17.6
	C1s O-C-O	287.3	6.1
	C1s carboxyl	288.5	2.4
	O1s O-C	532.3	13.5
	O1s O=C	531.4	2.5
Hemp	C1s C-C	284.5	53.6
	C1s C-O	285.6	15.9
	C1s O-C-O	287.0	7.1
	C1s carboxyl	288.6	4.5
	O1s O-C	532.9	8.0
	O1s O=C	531.8	8.1

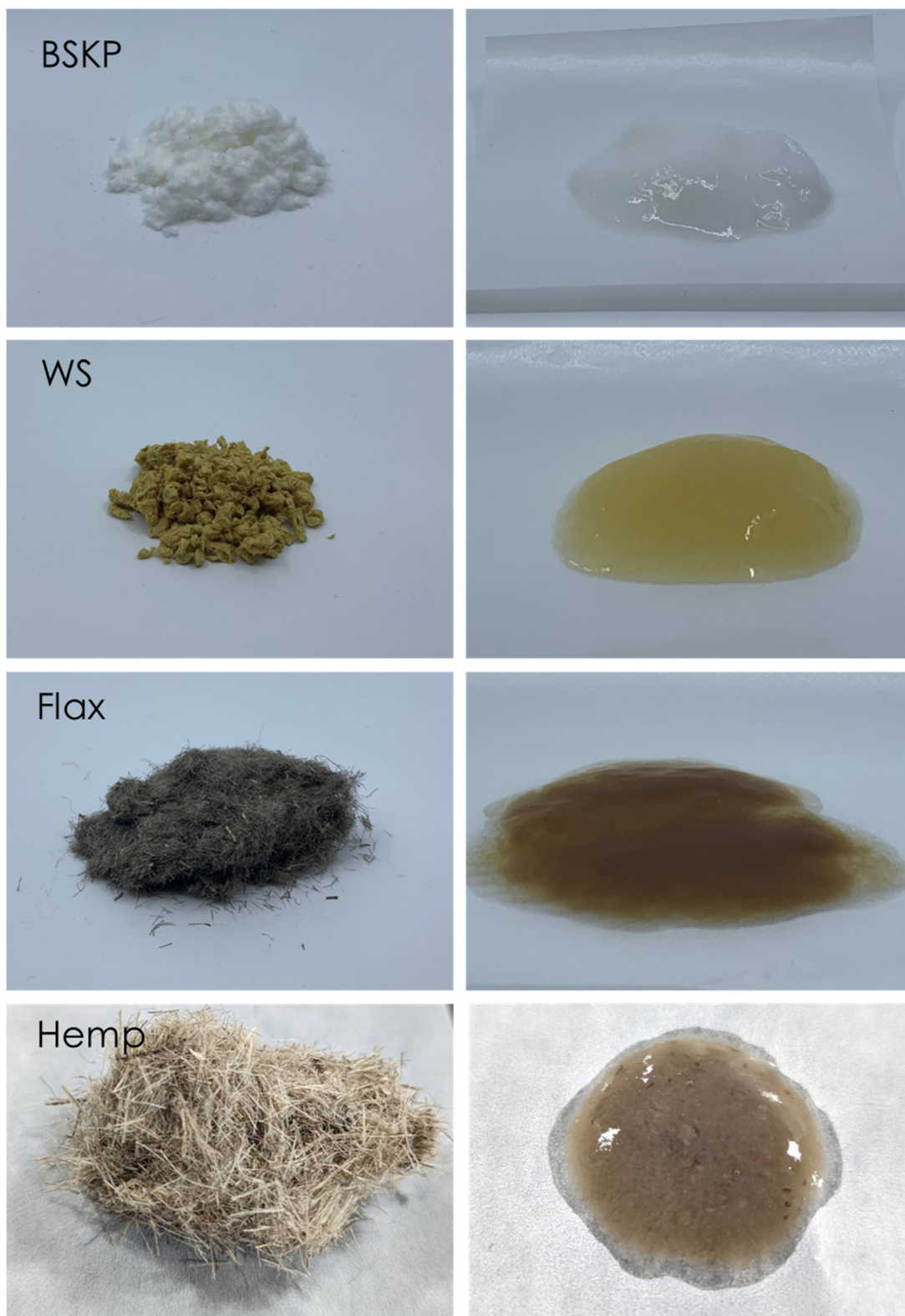


Figure S1. Photographs of the CNF/LCNF and feedstocks used to produce them. The pictures on the right side are CNF/LCNF suspensions in water containing about 3 wt.% solids.

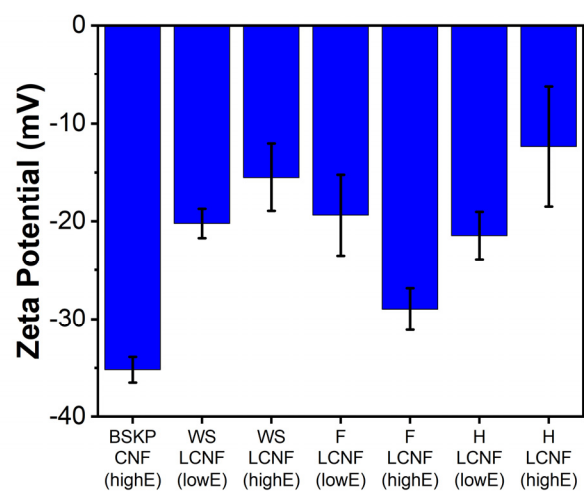


Figure S2. Zeta potential of the LCNF produced from various feedstocks. Values less than -30 mV indicate greater stability in the medium, water.

Table S2. XPS peaks from the C 1s and O 1s regions for the various CNF and LCNF.

Material	Peak	Binding energy (eV)	Atomic %
BKSP CNF	C1s C-C	284.6	14.8
	C1s C-O	286.3	35.8
	C1s O-C-O	287.9	9.3
	C1s carboxyl	289.1	1.2
	O1s O-C	532.7	38.7
	O1s O=C	-	-
WS LCNF Low E	C1s C-C	284.6	38.5
	C1s C-O	286.2	24.2
	C1s O-C-O	287.7	7.1
	C1s carboxyl	288.8	1.6
	O1s O-C	532.6	23.8
	O1s O=C	531.0	2.1
WS LCNF High E	C1s C-C	284.6	31.8
	C1s C-O	286.2	27.0
	C1s O-C-O	287.8	8.0
	C1s carboxyl	289.0	1.3
	O1s O-C	532.6	27.3
	O1s O=C	530.9	1.5
Flax LCNF low E	C1s C-C	284.6	29.7
	C1s C-O	286.3	27.9
	C1s O-C-O	287.8	8.7
	C1s carboxyl	289.0	1.5
	O1s O-C	532.6	27.4
	O1s O=C	531.0	2.2
Flax LCNF high E	C1s C-C	284.6	36.9
	C1s C-O	286.3	25.1
	C1s O-C-O	287.7	7.8
	C1s carboxyl	288.8	2.0
	O1s O-C	532.6	25.9
	O1s O=C	530.7	1.0
Hemp LCNF low E	C1s C-C	284.6	37.1
	C1s C-O	286.2	23.8
	C1s O-C-O	287.7	8.0
	C1s carboxyl	289.0	2.0
	O1s O-C	532.6	24.2
	O1s O=C	531.0	2.2
Hemp LCNF high E	C1s C-C	284.6	21.6
	C1s C-O	286.2	30.8
	C1s O-C-O	287.6	10.0
	C1s carboxyl	288.9	2.5
	O1s O-C	532.6	33.3
	O1s O=C	530.8	0.6

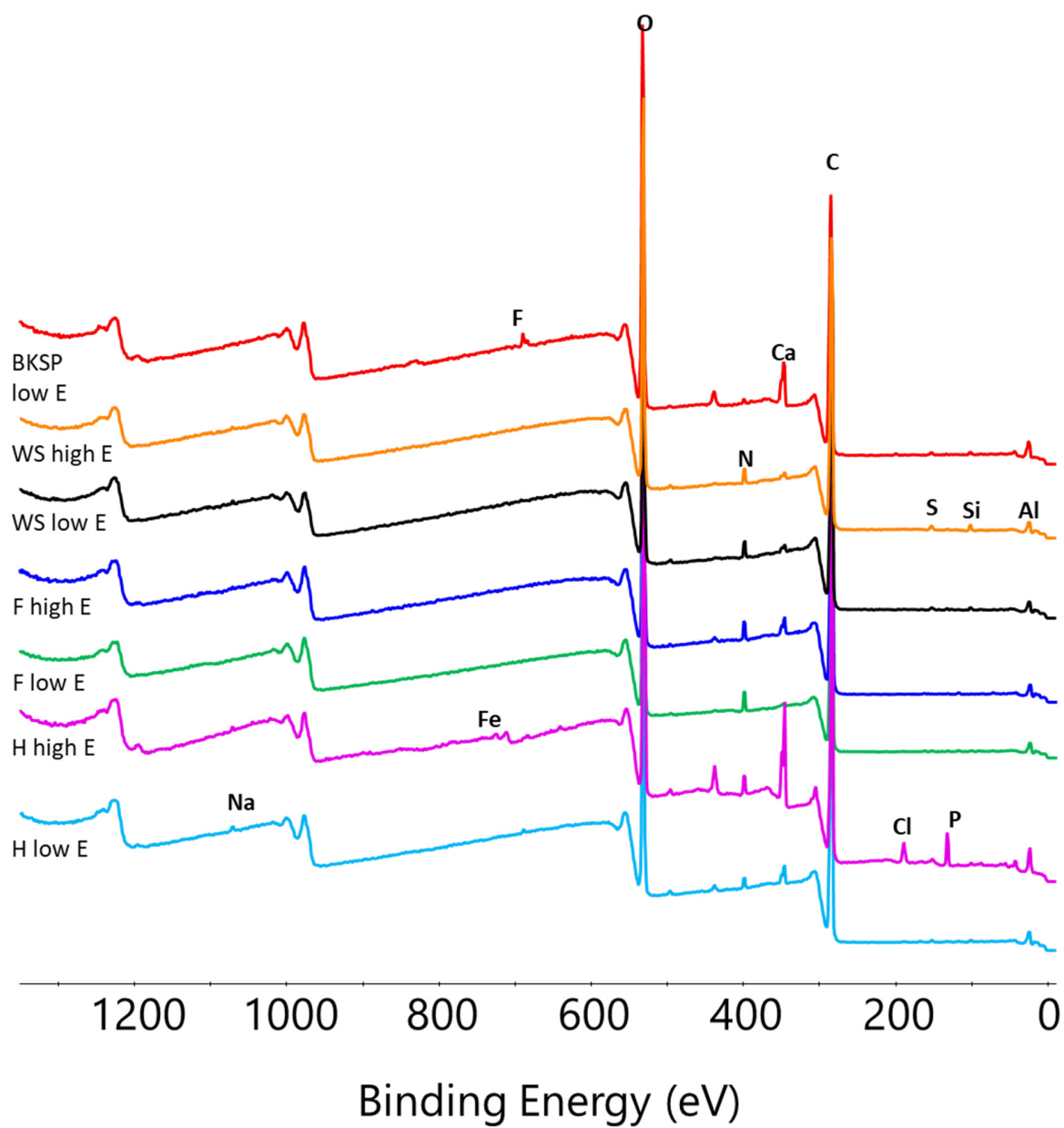


Figure S3 Entire XPS spectra of the various CNF and LCNF produced in this study. Note, only BKSP low energy is shown as both the low and high energy samples appeared the same on XPS.

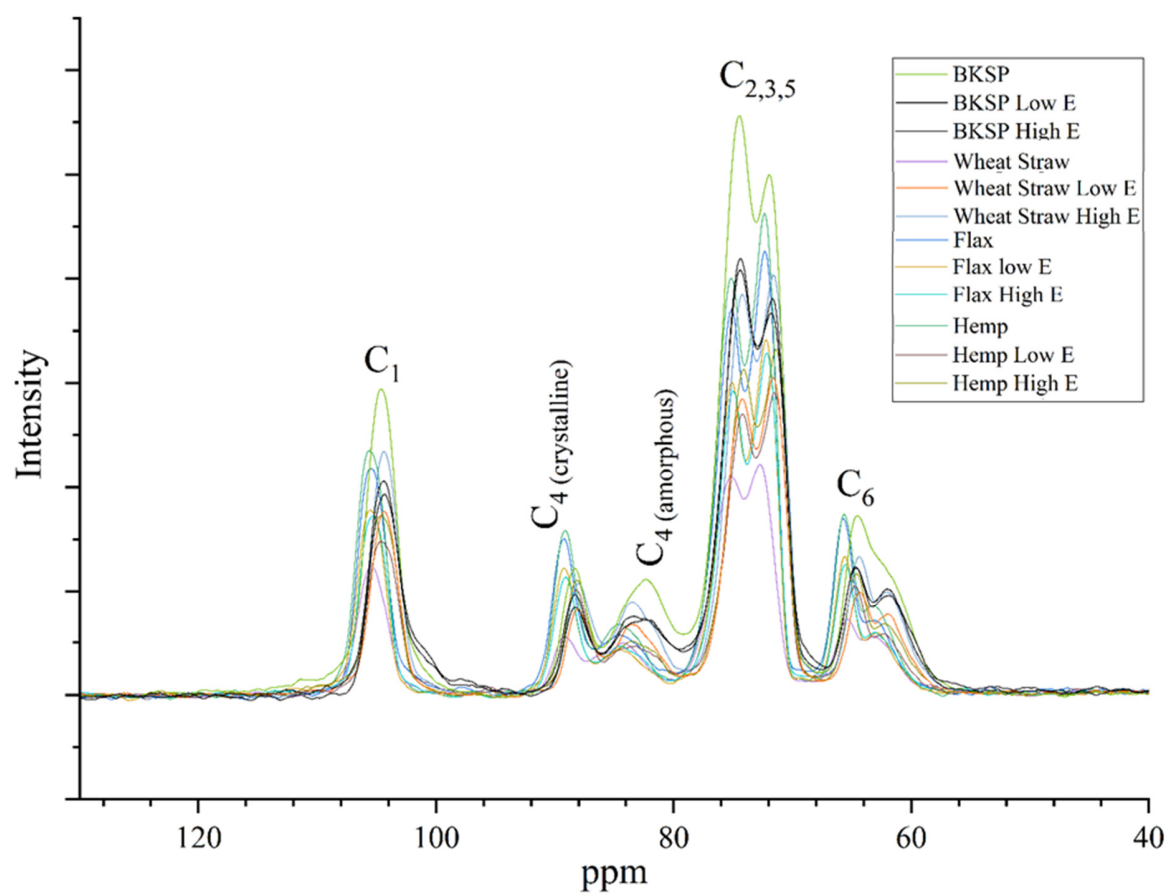
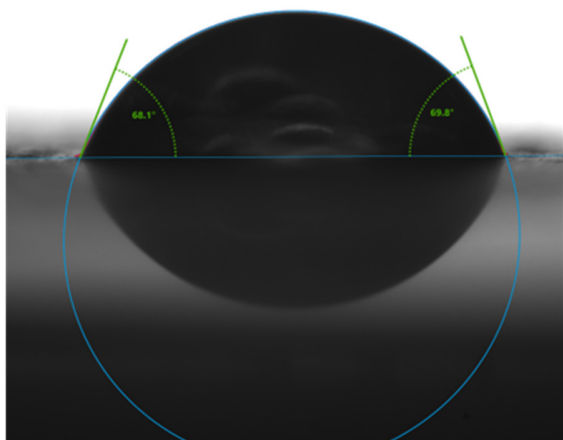
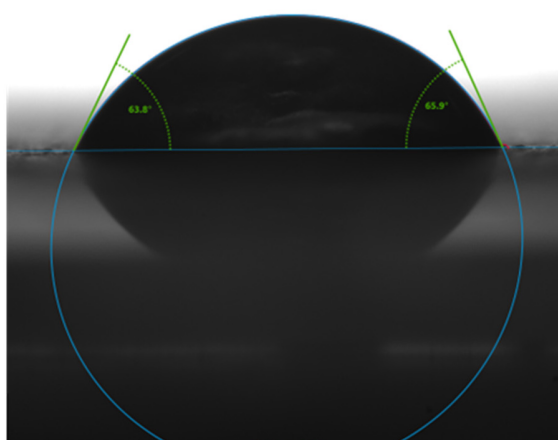


Figure S4. ^{13}C ss-NMR CP/MAS spectra of cellulose extracted from various biomass samples.

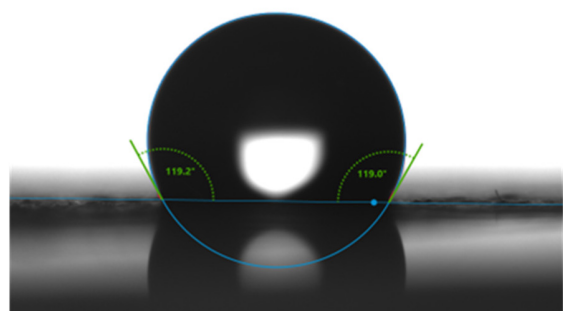
BKSP CNF



WS LCNF



Flax
LCNF



Hemp
LCNF

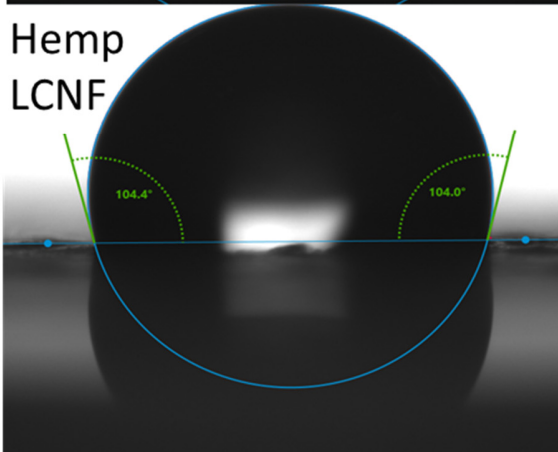


Figure S5. Water contact angle for the various CNF and LCNF produced in this work.