

SUPPORTING INFORMATION

Morphological and thermo-chemical changes upon autohydrolysis and microemulsion treatments of coir and Empty Fruit Bunch (EFB) residual biomass to isolate lignin-rich micro and nano fibrillar cellulose (MNFC)

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Pages: 5
Figures: 3
Tables: 1



Figure S1. The synthesis procedure for the micro-nano fibrillar cellulose from coir fiber (MNFC-coir) and the sample nomenclature is shown. The as received coir fiber (P-coir) was subjected to autohydrolysis and fiber refining (H-coir) followed by microemulsion pretreatment (M-coir) and microfluidization to produce MNFC-coir. The same procedure was carried on EFB fibers.

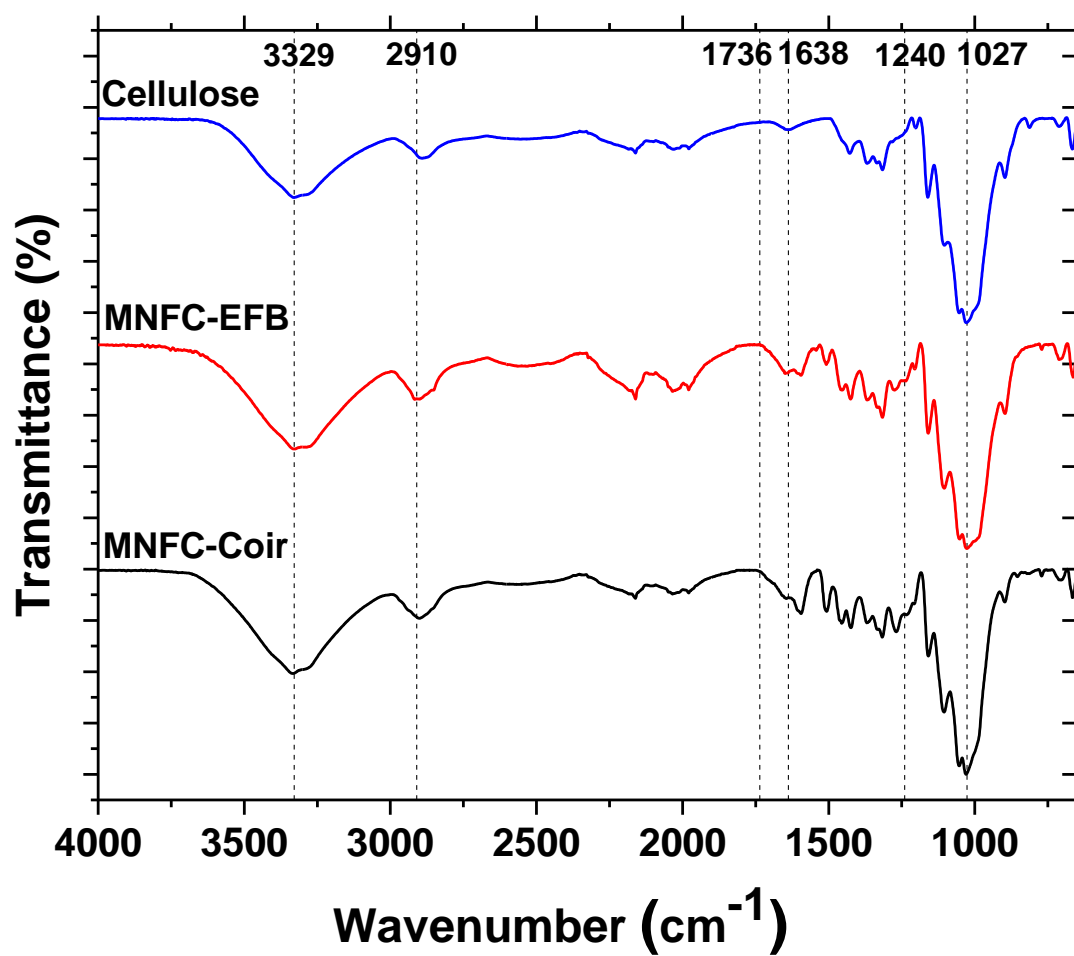


Figure S2: FTIR spectra of pure cellulose with MNFC-Coir and MNFC-EFB

Table S1: Transmission peaks observed for coir and EFB samples along with the identified functional groups, chemical compounds and fiber component consisting of the identified functional groups. (C = Cellulose, H = Hemicelluloses, L = Lignin).

Wavenumber (cm⁻¹)	Functional groups	Organic Compound(s) containing functional groups	Fiber component
3329	O-H stretch	Acid and alcohol	C, H, L
2910	sp ³ C-H stretch	Alkyl, aliphatic, aromatic	C, H, L
1736-1715	C=O stretch	Ketone, ester and carboxylic	H
1640	O-H bend	Adsorbed water	C
1600-1460	C=C stretch of aromatic	Aromatic rings	L
1470-1430	O-CH ₃	Methoxy (O-CH ₃) on aromatic ring	L
1440-1400	O-H bending	Acid	C, H, L
1400-1300	Sp ³ C-H bend	Saturated alkanes	C, H, L
1240	Acyl C-O (C-O-C stretching)	Aryl-alkyl ether linkage	C, L
1161, 1100	C-O-C stretching vibration	Pyranose ring skeletal	C, H
1027	Alkoxy C-O stretch and C-O deformation	C-OH (ethanol)	C, H, L
898	C-O-C stretching vibration	Glycosidic linkage between glucose units	C, H
700-900	Aromatic sp ² bend	Aromatic hydrogen	L

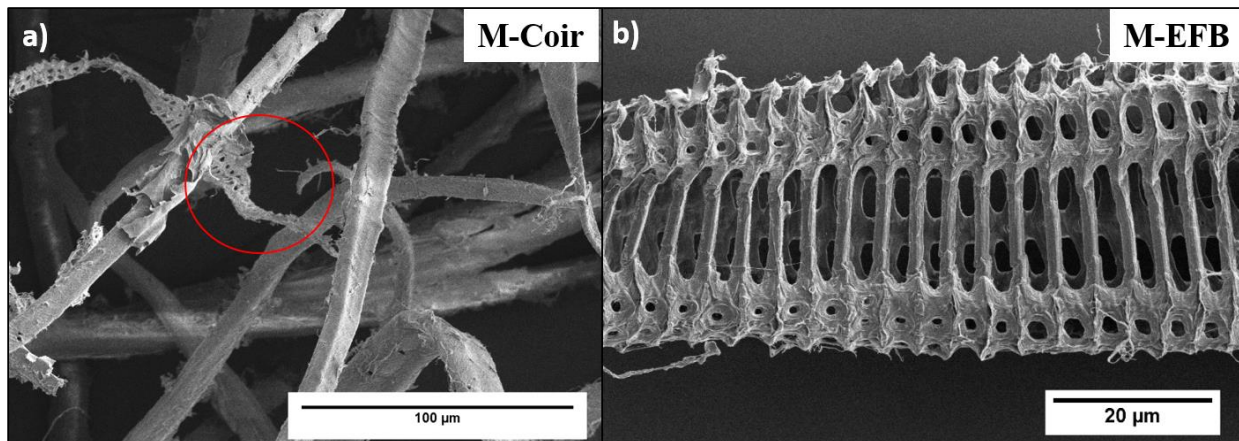


Figure S3: The Coir and EFB fibers showing the vessel element.

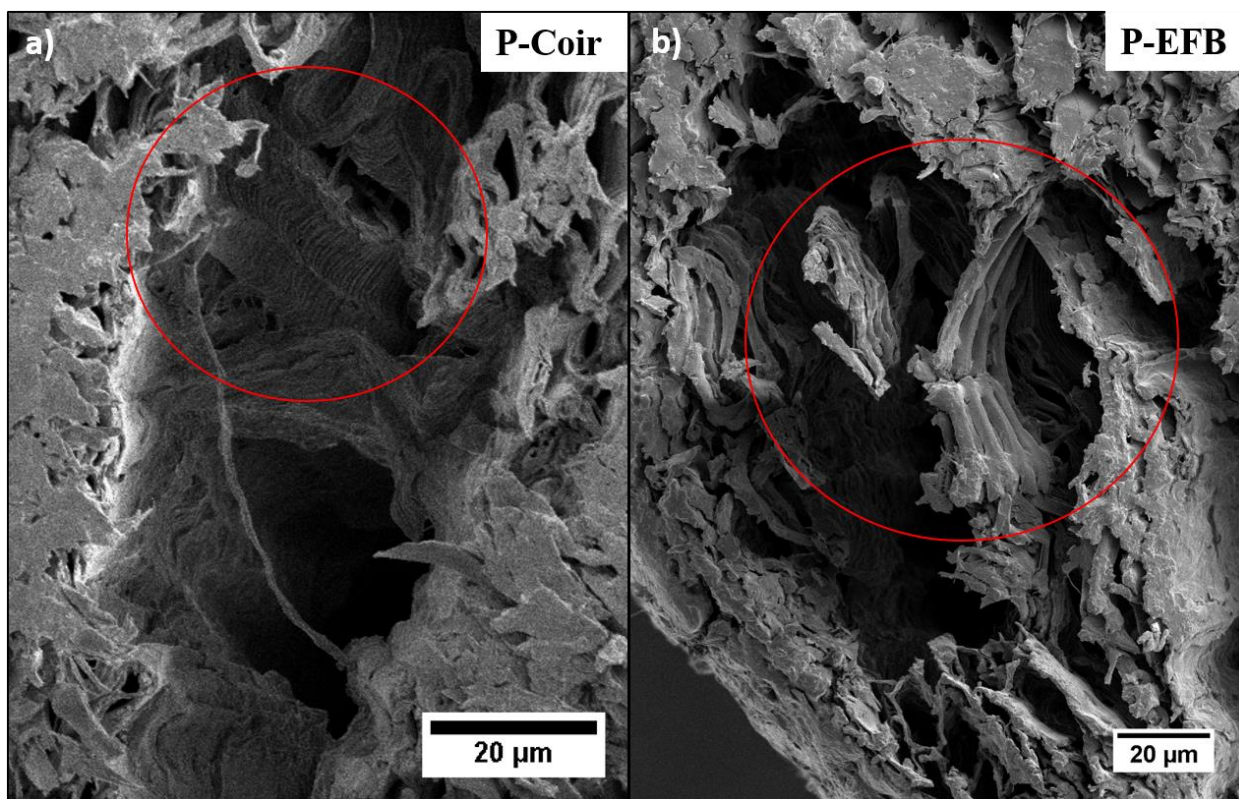


Figure S4: Cross-section of the untreated or pristine coir and EFB fibers showing the vessel element in solid circles