MDPI

Supplementary Materials

Optimization of the Alkali-Silane Treatment of *Agave lechuguilla* Fibers (Ixtle) for Potential Reinforcement in Polymeric Composites

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Figure S1 presents representative images of the fiber diameter measurement method from images acquired with a stereomicroscope microscope. For each fiber, 3 measurements were performed to estimate the average value that was used for the stress calculation during the tensile strength test performed by DMA.
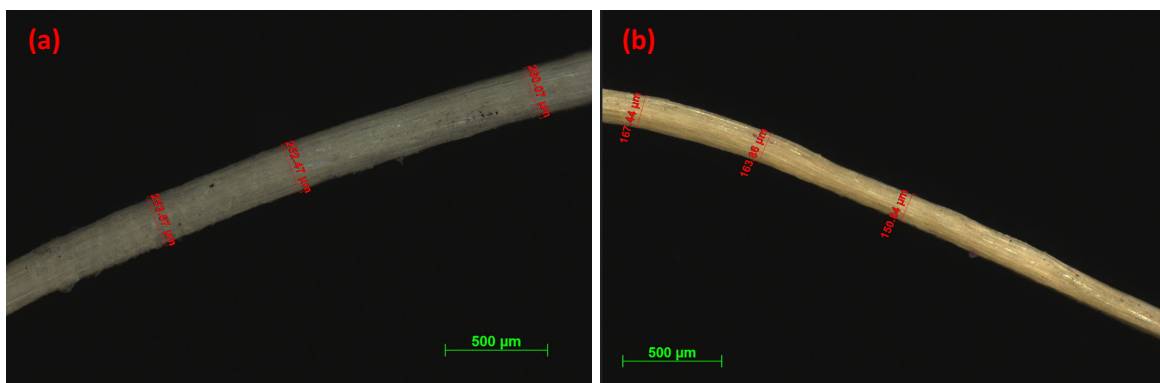

Figure S1. Optical microscope image of ixtle fibers at a magnification of 50x (a) untreated and (b) alkaline treated (FIx-5)

Table S1 presents the FTIR signal assignments for the FIx modified by alkaline treatment. Table S2 presents the FTIR signal assignment for the AcSi functionalized FIx.

Table S1 FTIR signal assignment for alkaline treated FIx

Wavenumber (cm^{-1})	Functional group – vibration mode	Possible Assignments
3600-3100	-OH stretching vibration	Cellulose, hemicellulose, and lignin
2919	C-H symmetric stretch vibration	Cellulose, hemicellulose, and lignin
2884	C-H asymmetric stretching vibration	Cellulose, lignin, and hemicellulose
1736	C=O stretching vibration	Carboxyl group in hemicellulose and lignin
1636	-OH bending mode	Moisture traces
1615 y 1510	C=C stretching vibration	Aromatic ring in lignin
1425 y 1314	C-H bending mode	Alkanes in cellulose, hemicellulose, and lignin
1234	C-O stretching vibration	Acetyl group in lignin
1190-940	C-O-C symmetric and asymmetric stretching	Cellulose

Table S2 FTIR Signal assignment for silane treated FIx

Wavenumber (cm^{-1})	Functional group – vibration mode
1200	Si-O-C $_{cellulose}$ asymmetric stretching
1370 y 965	Si-O-C $_{cellulose}$ symmetric stretching
1140	Si-O-Si asymmetric stretching
700 y 1040	Si-O-Si symmetric stretching
1015	Si-OH
1100-1080	Si-OCH3 unreacted residual monomer