Supporting information

Mechanically Strong, Transparent, and Biodegradable Wood-derived Film

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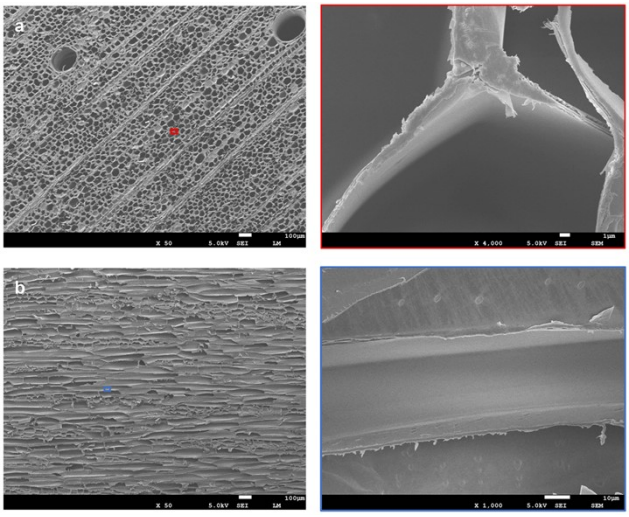

Figure S1. Microstructure characterization of natural balsa.

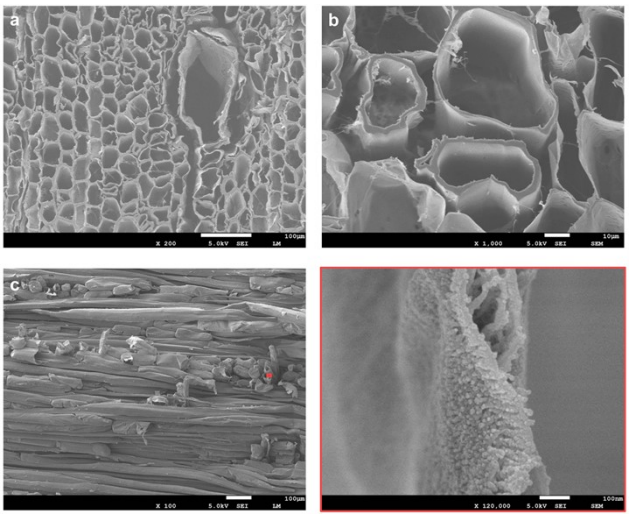

Figure S2. Microstructure characterization of TEMPO-oxidated wood.

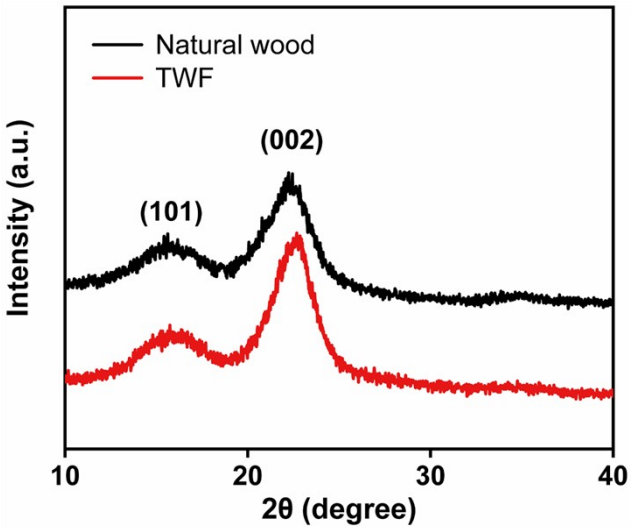

Figure S3. XRD patterns of natural wood and TWF.

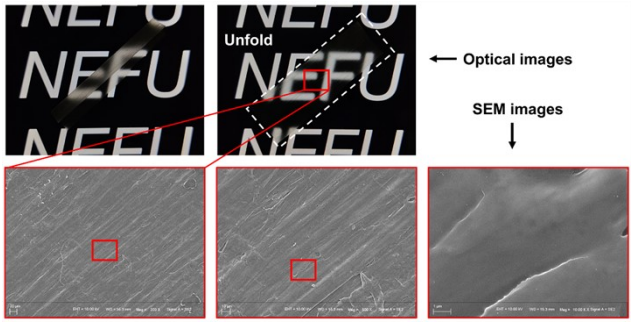

Figure S4. SEM images of TWF (a) before and (b) after bending.

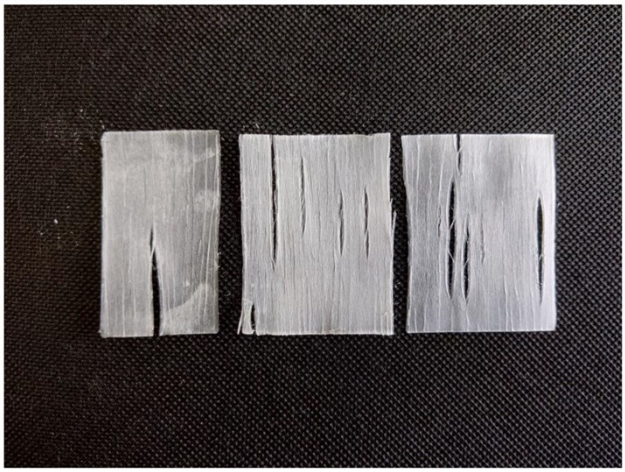

Figure S5. Photograph of TEMPO-oxidated wood dried under air condition.

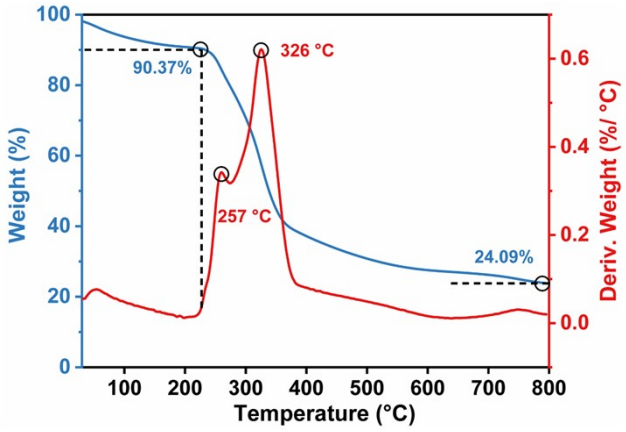

Figure S6. TGA curves of TWF.

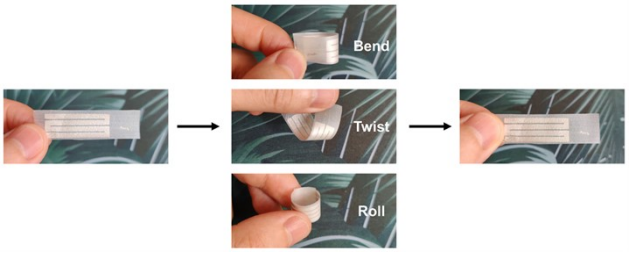

Figure S7. Optical images of TWF-based electronics after bending, twisting, and rolling to demonstrate the flexibility, durability, and dimensional stability.

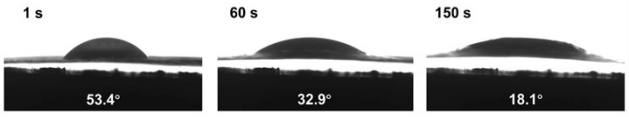

Figure S8. Water contact angle of TWF.

Table S1: Comparison of characteristics between the TWF and similar wood-derived competing materials.

Materials	Preparation method	Tensile strength (MPa)		Transmittance (%)	Haze (%)	Applications	Ref.
		L	T				
TWF	**Delignification, TEMPO-oxidation, Ca^{2+} cross-linking, and pressing**	**426**	**67.1**	**77**	**73.5**	**Substrate materials and humidity monitoring**	**This work**
TWF	Delignification and pressing	350	23	88	74	Substrate materials	34
TWF	Delignification, alkali treatment, and pressing	469.9	128.5	80	85	Substrate materials	15
Wood film	Delignification, alkali treatment, and pressing	394	76	-	-	Substrate materials	32
Cellulose film	Delignification, alkali treatment, and pressing	352	56	-	-	Substrate materials	38
Transparent wood	Delignification and impregnation	42	-	80	45	Substrate materials	48
Transparent wood	Delignification and impregnation	60	22	81	-	Substrate materials	49