

# Fossil-Free Fibreboard: Material Properties of an IonoSolv-Derived All-Wood Biocomposite

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## Supplementary Materials

Supplementary Table 1. Experimental design detailing factor values associated with each condition number.

Condition	Pattern	IL treatment temperature (°C)	IL treatment time (min)	Hot-press temperature (°C)	Hot-press time (h)	Hot-press pressure (tf)
1	00000	160	60	140	3	3
2	--000	150	30	140	3	3
3	--+000	150	90	140	3	3
4	+--000	170	30	140	3	3
5	++000	170	90	140	3	3
6	00--0	160	60	135	2.5	3
7	00--0	160	60	135	3.5	3
8	00+-0	160	60	145	2.5	3
9	00++0	160	60	145	3.5	3
10	0-00-	160	30	140	3	2
11	0-00+	160	30	140	3	4
12	00000	160	60	140	3	3
13	0+00-	160	90	140	3	2
14	0+00+	160	90	140	3	4
15	-0-00	150	60	135	3	3
16	-0+00	150	60	145	3	3
17	+0-00	170	60	135	3	3
18	+0+00	170	60	145	3	3
19	000--	160	60	140	2.5	2
20	000+-	160	60	140	2.5	4
21	000+-	160	60	140	3.5	2
22	000++	160	60	140	3.5	4
24	0--00	160	30	135	3	3
25	0--00	160	30	145	3	3
26	0+-00	160	90	135	3	3
27	0++00	160	90	145	3	3
28	-00-0	150	60	140	2.5	3
29	-00+0	150	60	140	3.5	3
30	+00-0	170	60	140	2.5	3
31	+00+0	170	60	140	3.5	3
32	00-0-	160	60	135	3	2
33	00-0+	160	60	135	3	4
34	00000	160	60	140	3	3
35	00+0-	160	60	145	3	2
36	00+0+	160	60	145	3	4
37	-000-	150	60	140	3	2
38	-000+	150	60	140	3	4
39	+000-	170	60	140	3	2
40	+000+	170	60	140	3	4
41	0-0-0	160	30	140	2.5	3
42	0-0+0	160	30	140	3.5	3
43	0+0-0	160	90	140	2.5	3
44	0+0+0	160	90	140	3.5	3

Supplementary Table 2. Goodness-of-fit metrics for regression models, calculated from predicted-versus-observed response values.  $R^2$  and RMSE are reported for each response. No regression models were fitted for backlit colour values because too many opaque samples had to be excluded due to artefactual blue reflection from the lightbox.

Response variable	Units	$R^2$	RMSE
Powder yield	fraction (0–1)	0.96	0.0188
Fused fraction	fraction (0–1)	0.79	0.149
Overall yield	fraction (0–1)	0.76	0.104
Ultimate tensile strength (UTS)	MPa	0.38	4.54
Young's modulus	GPa	0.54	1.28
Envelope density	$\text{g/cm}^3$	0.20	0.0318
Specific strength	$\text{MPa}/(\text{g/cm}^3)$	0.44	3.27
Specific stiffness	$\text{GPa}/(\text{g/cm}^3)$	0.47	0.956
Contact angle	°	0.40	4.21
UVA blocking	percentage points	0.05	0.0092
UVB blocking	percentage points	0.03	0.0536
UVC blocking	percentage points	0.03	0.0318
Visible light transmittance	percentage points	0.24	0.0837
Frontlit $L^*$	CIE $L^*$ (0–100)	0.18	3.53
Frontlit $a^*$	CIE $a^*$ (dimensionless; no fixed bounds)	0.86	1.68
Frontlit $b^*$	CIE $b^*$ (dimensionless; no fixed bounds)	0.78	1.38

Supplementary Figures 1-100. Stress-strain curves for each sample tested by condition number, plotted until the break point as detected by the maximum decrease in measured force applied and increase in measured strain between timepoints.





































































































