

Supplementary material

Effect of curing conditions on the water vapor sorption behavior of melamine formaldehyde resin and resin-modified wood

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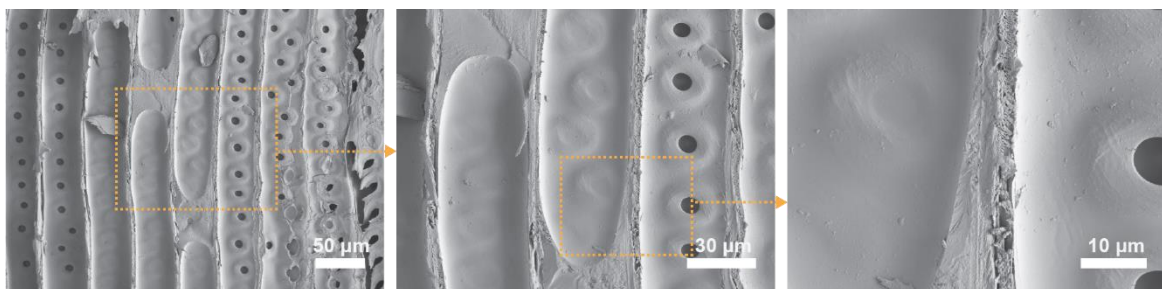


Fig. S. 1: SEM images of the radial surface in dry cured wood that was treated using an impregnation solution with 25 % solid content. The images show that the MF resin has formed a smooth layer on the cell wall surface, which also covered the pits.

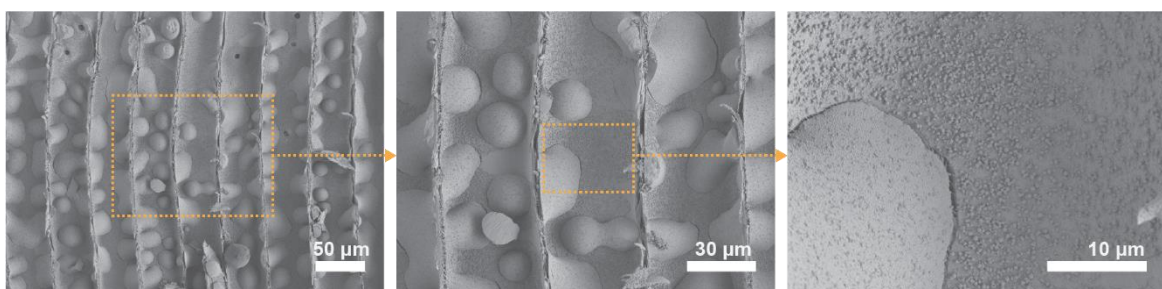


Fig. S. 2: SEM images of the radial surface in wet cured wood that was treated using an impregnation solution. The images show that the MF resins have formed droplets on the cell wall surface. Besides droplets with sizes in the micrometer range, small droplets with diameters in the nanometer range are visible.

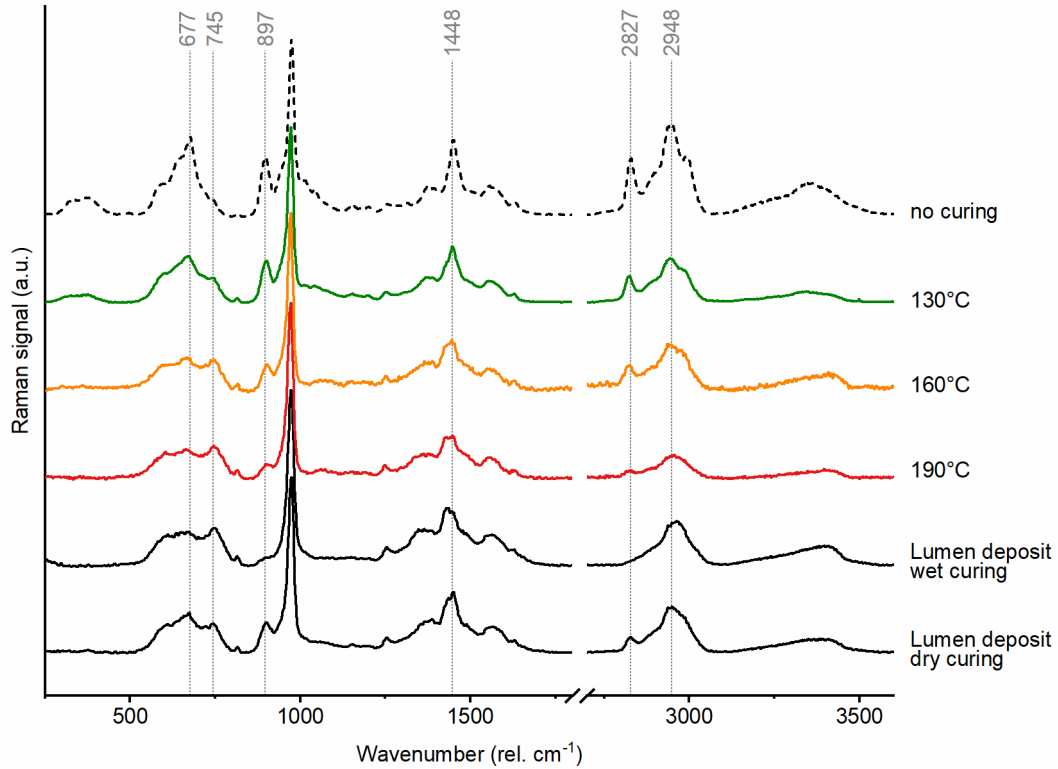


Fig. S. 3: Raman spectra of MF resin cured at different conditions. The Raman spectra of uncured MF resin and resin cured at 130-190 °C for 1 h were collected in the present study. The Raman spectra of MF resin in the cell lumen of wet and dry cured wood are derived from a previous study [1]. All spectra were baseline corrected and normalized to the intensity at ca. 974 cm^{-1} .

Table S. 1: MC_R (%) measured at different climatic conditions over different aqueous salt solutions or calculated from the DVS data.

Solid content	Curing	MC_R at 33 % RH (%)			MC_R at 79% RH (%)			MC_R at 95 % RH (%)		
		MgCl_2	DVS ^a	Δ	NH_4Cl	DVS ^a	Δ	KNO_3	DVS ^b	Δ
0 %	Dry	5.6 (.04)	5.3	0.3	13.3 (.11)	13.2	0.1	20.7 (.12)	22.9	-2.2
	Wet	5.7 (.01)	5.4	0.3	13.4 (.06)	13.2	0.1	21.1 (.12)	22.9	-1.8
10 %	Dry	6.0 (.08)	6.0	0.0	13.5 (.17)	13.2	0.3	19.4 (.37)	20.7	-1.3
	Wet	6.4 (.04)	6.3	0.1	14.4 (.08)	14.4	0.0	21.2 (.07)	22.8	-1.7
25 %	Dry	6.4 (.08)	6.2	0.2	14.0 (.24)	13.1	0.9	19.6 (.43)	19.8	-0.2
	Wet	7.8 (.04)	7.2	0.6	16.7 (.11)	15.6	1.1	23.2 (.21)	24.1	-0.9

^a MC_R obtained by linear interpolation; ^b MC_R at 95% target RH

Reference

- [1] Altgen M, Awais M, Altgen D, Klüppel A, Mäkelä M, Rautkari L (2020) Distribution and curing reactions of melamine formaldehyde resin in cells of impregnation-modified wood. *Sci. Rep.* 10(3366):1–10.