

Integrative Structure Validation Report

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The following software was used in the production of this report:

IHMValidation Version 3.0

Python-IHM Version 2.5

MolProbity Version 4.5.2

PDB ID	9A3U pdb_00009a3u
PDB-Dev ID	PDBDEV_00000215
Structure Title	A representative atomistic model of the Populus Secondary Cell Wall
Structure Authors	Bharadwaj, V.S.; Bu, L.; Crowley, M.F.; Crowley, M.F.; Ciesielski, P.; Brooks, B.R.
Deposited on	2023-10-02

This is a PDB-IHM Structure Validation Report.

We welcome your comments at helpdesk@pdb-ihm.org

A user guide is available at https://pdb-ihm.org/validation_help.html with specific help available everywhere you see the  symbol.

List of references used to build this report is available [here](#).

1. Overview

1.1. Summary

This entry consists of 1 model(s). A total of 2 dataset(s) were used to build this entry.

Name	Type	Count
NMR data	Experimental data	1
De Novo model	Starting model	1

1.2. Overall quality

This validation report contains model quality assessments for all structures, data quality and fit to model assessments for SAS and crosslinking-MS datasets. Data quality and fit to model assessments for other datasets and model uncertainty are under development. Number of plots is limited to 256.

Model Quality: Excluded Volume Analysis ?



2. Model Details ?

2.1. Ensemble information ?

This entry consists of 0 distinct ensemble(s).

2.2. Representation ?

This entry has 1 representation(s).

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
1	1	1	Lignin	A [L10]	20	-	1-20	100.00 / 100.00	Atomic
				B [L21]					
				C [L32]					
				D [L43]					
				E [L54]					
				F [L65]					
				G [L76]					
				H [L87]					
				I [L98]					
				J [L109]					
				K [L11a]					
				L [L12b]					
				M [L13c]					
				N [L14d]					
				O [L15e]					
				P [L16f]					
				Q [L17g]					
R [L18h]									
S [L19i]									
T [L20j]									

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				U [L21k]					
				V [L22l]					
				W [L23m]					
				X [L24n]					
				Y [L25o]					
				Z [L26p]					
				AA [L27q]					
				AB [L53Q]					
				AC [L79k]					
				AD [L105K]					
				BA [L28r]					
				BB [L54R]					
				BC [L80l]					
				BD [L106L]					
				CA [L29s]					
				CB [L55S]					
				CC [L81m]					
				CD [L107M]					
				DA [L30t]					
				DB [L56T]					
				DC [L82n]					
				DD [L108N]					
				EA [L31u]					
				EB [L57U]					
				EC [L83o]					
				ED [L109O]					
				FA [L32v]					
				FB [L58V]					
				FC [L84p]					
				FD [L110P]					
				GA [L33w]					
				GB [L590]					
				GC [L85q]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				GD [L111Q]					
				HA [L34x]					
				HB [L601]					
				HC [L86r]					
				HD [L112R]					
				IA [L35y]					
				IB [L612]					
				IC [L87s]					
				ID [L113S]					
				JA [L36z]					
				JB [L623]					
				JC [L88t]					
				JD [L114T]					
				KA [L37A]					
				KB [L634]					
				KC [L89u]					
				KD [L115U]					
				LA [L38B]					
				LB [L645]					
				LC [L90v]					
				MA [L39C]					
				MB [L656]					
				MC [L91w]					
				NA [L40D]					
				NB [L667]					
				NC [L92x]					
				OA [L41E]					
				OB [L678]					
				OC [L93y]					
				PA [L42F]					
				PB [L689]					
				PC [L94z]					
				QA [L43G]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				QB [L69a]					
				QC [L95A]					
				RA [L44H]					
				RB [L70b]					
				RC [L96B]					
				SA [L45I]					
				SB [L71c]					
				SC [L97C]					
				TA [L46J]					
				TB [L72d]					
				TC [L98D]					
				UA [L47K]					
				UB [L73e]					
				UC [L99E]					
				VA [L48L]					
				VB [L74f]					
				VC [L100F]					
				WA [L49M]					
				WB [L75g]					
				WC [L101G]					
				XA [L50N]					
				XB [L76h]					
				XC [L102H]					
				YA [L51O]					
				YB [L77i]					
				YC [L103I]					
				ZA [L52P]					
				ZB [L78j]					
				ZC [L104J]					
		5	Xylan-m8	AE [X37f]	Non-polymeric	-	-	Not available / Not available	Atomic
			AF [X21F]						
			BE [X38g]						
			CE [X39h]						

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				DE [X40i]					
				EE [X41j]					
				FE [X42k]					
				QF [X58V]					
				RF [X59W]					
				SF [X60X]					
				VE [X16A]					
				WE [X17B]					
				XE [X18C]					
				YE [X19D]					
				ZE [X20E]					
		6	Cellulose	AG [CEL17]	Non-polymeric	-	-	Not available / Not available	Atomic
			AH [CEL2x]						
			AI [CEL4n]						
			AJ [CEL5d]						
			AK [CEL73]						
			AL [CEL8t]						
			BG [CEL18]						
			BH [CEL2y]						
			BI [CEL4o]						
			BJ [CEL5e]						
			BK [CEL74]						
			BL [CEL8u]						
			CG [CEL19]						
			CH [CEL2z]						
			CI [CEL4p]						
			CJ [CEL5f]						
			CK [CEL75]						
			CL [CEL8v]						
			DG [CEL1a]						
			DH [CEL30]						
			DI [CEL4q]						
			DJ [CEL5g]						

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				DK [CEL76]					
				DL [CEL8w]					
				EG [CEL1b]					
				EH [CEL31]					
				EI [CEL4r]					
				EJ [CEL5h]					
				EK [CEL77]					
				EL [CEL8x]					
				FG [CEL1c]					
				FH [CEL32]					
				FI [CEL4s]					
				FJ [CEL6i]					
				FK [CEL78]					
				FL [CEL8y]					
				GG [CEL1d]					
				GH [CEL33]					
				GI [CEL4t]					
				GJ [CEL6j]					
				GK [CEL79]					
				GL [CEL8z]					
				HG [CEL1e]					
				HH [CEL34]					
				HI [CEL4u]					
				HJ [CEL6k]					
				HK [CEL7a]					
				IG [CEL1f]					
				IH [CEL35]					
				II [CEL4v]					
				IJ [CEL6l]					
				IK [CEL7b]					
				JG [CEL1g]					
				JH [CEL36]					
				JI [CEL4w]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				JJ [CEL6m]					
				JK [CEL7c]					
				KG [CEL1h]					
				KH [CEL37]					
				KI [CEL4x]					
				KJ [CEL6n]					
				KK [CEL7d]					
				LG [CEL2i]					
				LH [CEL38]					
				LI [CEL4y]					
				LJ [CEL6o]					
				LK [CEL7e]					
				MG [CEL2j]					
				MH [CEL39]					
				MI [CEL4z]					
				MJ [CEL6p]					
				MK [CEL7f]					
				NG [CEL2k]					
				NH [CEL3a]					
				NI [CEL50]					
				NJ [CEL6q]					
				NK [CEL7g]					
				OG [CEL2l]					
				OH [CEL3b]					
				OI [CEL51]					
				OJ [CEL6r]					
				OK [CEL7h]					
				PG [CEL2m]					
				PH [CEL3c]					
				PI [CEL52]					
				PJ [CEL6s]					
				PK [CEL8i]					
				QG [CEL2n]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				QH [CEL3d]					
				QI [CEL53]					
				QJ [CEL6t]					
				QK [CEL8j]					
				RG [CEL2o]					
				RH [CEL3e]					
				RI [CEL54]					
				RJ [CEL6u]					
				RK [CEL8k]					
				SG [CEL2p]					
				SH [CEL3f]					
				SI [CEL55]					
				SJ [CEL6v]					
				SK [CEL8l]					
				TF [CEL10]					
				TG [CEL2q]					
				TH [CEL3g]					
				TI [CEL56]					
				TJ [CEL6w]					
				TK [CEL8m]					
				UF [CEL11]					
				UG [CEL2r]					
				UH [CEL3h]					
				UI [CEL57]					
				UJ [CEL6x]					
				UK [CEL8n]					
				VF [CEL12]					
				VG [CEL2s]					
				VH [CEL4i]					
				VI [CEL58]					
				VJ [CEL6y]					
				VK [CEL8o]					
				WF [CEL13]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				WG [CEL2t]					
				WH [CEL4j]					
				WI [CEL59]					
				WJ [CEL6z]					
				WK [CEL8p]					
				XF [CEL14]					
				XG [CEL2u]					
				XH [CEL4k]					
				XI [CEL5a]					
				XJ [CEL70]					
				XK [CEL8q]					
				YF [CEL15]					
				YG [CEL2v]					
				YH [CEL4l]					
				YI [CEL5b]					
				YJ [CEL71]					
				YK [CEL8r]					
				ZF [CEL16]					
				ZG [CEL2w]					
				ZH [CEL4m]					
				ZI [CEL5c]					
				ZJ [CEL72]					
				ZK [CEL8s]					
		7	SODIUM ION	AM [L13c]	Non-polymeric	-	-	Not available / Not available	Atomic
			AN [L24n]						
			AO [L30t]						
			AP [L40D]						
			AQ [L47K]						
			AR [L57U]						
			AS [L73e]						
			AT [L77i]						
			AU [L84p]						
			AV [L93y]						

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				AW [L111Q]					
				BM [L13c]					
				BN [L25o]					
				BO [L31u]					
				BP [L40D]					
				BQ [L47K]					
				BR [L57U]					
				BS [L73e]					
				BT [L77i]					
				BU [L84p]					
				BV [L95A]					
				BW [L111Q]					
				CM [L14d]					
				CN [L25o]					
				CO [L33w]					
				CP [L40D]					
				CQ [L47K]					
				CR [L57U]					
				CS [L73e]					
				CT [L77i]					
				CU [L84p]					
				CV [L95A]					
				CW [L111Q]					
				DM [L14d]					
				DN [L25o]					
				DO [L33w]					
				DP [L40D]					
				DQ [L48L]					
				DR [L57U]					
				DS [L73e]					
				DT [L77i]					
				DU [L84p]					
				DV [L95A]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				DW [L111Q]					
				EM [L14d]					
				EN [L25o]					
				EO [L33w]					
				EP [L40D]					
				EQ [L49M]					
				ER [L57U]					
				ES [L73e]					
				ET [L77i]					
				EU [L84p]					
				EV [L95A]					
				EW [L111Q]					
				FM [L14d]					
				FN [L25o]					
				FO [L35y]					
				FP [L40D]					
				FQ [L49M]					
				FR [L57U]					
				FS [L73e]					
				FT [L77i]					
				FU [L84p]					
				FV [L96B]					
				FW [L111Q]					
				GM [L14d]					
				GN [L25o]					
				GO [L35y]					
				GP [L40D]					
				GQ [L49M]					
				GR [L590]					
				GS [L73e]					
				GT [L77i]					
				GU [L84p]					
				GV [L96B]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				GW [L111Q]					
				HL [L54]					
				HM [L15e]					
				HN [L25o]					
				HO [L35y]					
				HP [L40D]					
				HQ [L50N]					
				HR [L601]					
				HS [L73e]					
				HT [L77i]					
				HU [L84p]					
				HV [L96B]					
				HW [L111Q]					
				IL [L76]					
				IM [L16f]					
				IN [L25o]					
				IO [L35y]					
				IP [L40D]					
				IQ [L50N]					
				IR [L601]					
				IS [L73e]					
				IT [L77i]					
				IU [L84p]					
				IV [L96B]					
				IW [L111Q]					
				JL [L76]					
				JM [L16f]					
				JN [L25o]					
				JO [L36z]					
				JP [L40D]					
				JQ [L50N]					
				JR [L601]					
				JS [L73e]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				JT [L77i]					
				JU [L84p]					
				JV [L96B]					
				JW [L111Q]					
				KL [L76]					
				KM [L16f]					
				KN [L25o]					
				KO [L36z]					
				KP [L40D]					
				KQ [L50N]					
				KR [L601]					
				KS [L73e]					
				KT [L77i]					
				KU [L84p]					
				KV [L98D]					
				KW [L111Q]					
				LL [L76]					
				LM [L16f]					
				LN [L25o]					
				LO [L36z]					
				LP [L40D]					
				LQ [L52P]					
				LR [L601]					
				LS [L73e]					
				LT [L77i]					
				LU [L85q]					
				LV [L99E]					
				LW [L111Q]					
				ML [L76]					
				MM [L16f]					
				MN [L27q]					
				MO [L37A]					
				MP [L41E]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				MQ [L55S]					
				MR [L612]					
				MS [L73e]					
				MT [L77i]					
				MU [L85q]					
				MV [L99E]					
				MW [L111Q]					
				NL [L76]					
				NM [L16f]					
				NN [L27q]					
				NO [L37A]					
				NP [L41E]					
				NQ [L55S]					
				NR [L634]					
				NS [L73e]					
				NT [L78j]					
				NU [L86r]					
				NV [L100F]					
				NW [L111Q]					
				OL [L76]					
				OM [L18h]					
				ON [L27q]					
				OO [L37A]					
				OP [L42F]					
				OQ [L55S]					
				OR [L645]					
				OS [L73e]					
				OT [L79k]					
				OU [L91w]					
				OV [L100F]					
				OW [L111Q]					
				PL [L76]					
				PM [L18h]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				PN [L27q]					
				PO [L37A]					
				PP [L43G]					
				PQ [L55S]					
				PR [L645]					
				PS [L73e]					
				PT [L80I]					
				PU [L91w]					
				PV [L100F]					
				PW [L111Q]					
				QL [L87]					
				QM [L18h]					
				QN [L27q]					
				QO [L37A]					
				QP [L45I]					
				QQ [L55S]					
				QR [L645]					
				QS [L73e]					
				QT [L80I]					
				QU [L91w]					
				QV [L100F]					
				QW [L111Q]					
				RL [L87]					
				RM [L18h]					
				RN [L27q]					
				RO [L37A]					
				RP [L46J]					
				RQ [L55S]					
				RR [L645]					
				RS [L73e]					
				RT [L81m]					
				RU [L91w]					
				RV [L100F]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				RW [L111Q]					
				SL [L87]					
				SM [L19i]					
				SN [L27q]					
				SO [L38B]					
				SP [L46J]					
				SQ [L55S]					
				SR [L645]					
				SS [L73e]					
				ST [L82n]					
				SU [L91w]					
				SV [L100F]					
				SW [L111Q]					
				TL [L87]					
				TM [L21k]					
				TN [L27q]					
				TO [L38B]					
				TP [L47K]					
				TQ [L55S]					
				TR [L645]					
				TS [L73e]					
				TT [L83o]					
				TU [L92x]					
				TV [L102H]					
				TW [L114T]					
				UL [L87]					
				UM [L22i]					
				UN [L28r]					
				UO [L38B]					
				UP [L47K]					
				UQ [L55S]					
				UR [L645]					
				US [L74f]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				UT [L84p]					
				UU [L92x]					
				UV [L104J]					
				UW [L114T]					
				VL [L98]					
				VM [L23m]					
				VN [L29s]					
				VO [L38B]					
				VP [L47K]					
				VQ [L56T]					
				VR [L667]					
				VS [L76h]					
				VT [L84p]					
				VU [L92x]					
				VV [L105K]					
				WL [L98]					
				WM [L24n]					
				WN [L29s]					
				WO [L38B]					
				WP [L47K]					
				WQ [L56T]					
				WR [L69a]					
				WS [L76h]					
				WT [L84p]					
				WU [L92x]					
				WV [L105K]					
				XL [L98]					
				XM [L24n]					
				XN [L29s]					
				XO [L38B]					
				XP [L47K]					
				XQ [L56T]					
				XR [L69a]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				XS [L76h]					
				XT [L84p]					
				XU [L92x]					
				XV [L106L]					
				YL [L12b]					
				YM [L24n]					
				YN [L29s]					
				YO [L38B]					
				YP [L47K]					
				YQ [L57U]					
				YR [L69a]					
				YS [L77i]					
				YT [L84p]					
				YU [L92x]					
				YV [L107M]					
				ZL [L12b]					
				ZM [L24n]					
				ZN [L30t]					
				ZO [L38B]					
				ZP [L47K]					
				ZQ [L57U]					
				ZR [L70b]					
				ZS [L77i]					
				ZT [L84p]					
				ZU [L92x]					
				ZV [L111Q]					
		8	water	AX [L87]	Non-polymeric	-	-	Not available / Not available	Atomic
			AY [L37A]						
			AZ [L645]						
			BX [L98]						
			BY [L38B]						
			BZ [L656]						
			CX [L11a]						

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				CY [L39C]					
				CZ [L667]					
				DX [L12b]					
				DY [L40D]					
				DZ [L69a]					
				EX [L13c]					
				EY [L41E]					
				EZ [L70b]					
				FX [L14d]					
				FY [L42F]					
				FZ [L71c]					
				GX [L15e]					
				GY [L43G]					
				GZ [L73e]					
				HX [L16f]					
				HY [L44H]					
				HZ [L74f]					
				IX [L17g]					
				IY [L45I]					
				IZ [L75g]					
				JX [L18h]					
				JY [L46J]					
				JZ [L76h]					
				KX [L19i]					
				KY [L47K]					
				KZ [L77i]					
				LX [L21k]					
				LY [L48L]					
				LZ [L78j]					
				MX [L22l]					
				MY [L49M]					
				MZ [L79k]					
				NX [L23m]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				NY [L50N]					
				NZ [L80I]					
				OX [L24n]					
				OY [L51O]					
				OZ [L81m]					
				PX [L25o]					
				PY [L52P]					
				PZ [L82n]					
				QX [L26p]					
				QY [L54R]					
				QZ [L83o]					
				RX [L27q]					
				RY [L55S]					
				RZ [L84p]					
				SX [L28r]					
				SY [L56T]					
				SZ [L85q]					
				TX [L29s]					
				TY [L57U]					
				TZ [L86r]					
				UX [L30t]					
				UY [L58V]					
				UZ [L87s]					
				VW [L10]					
				VX [L31u]					
				VY [L590]					
				VZ [L88t]					
				WW [L21]					
				WX [L33w]					
				WY [L601]					
				WZ [L89u]					
				XW [L43]					
				XX [L34x]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				XY [L612]					
				XZ [L91w]					
				YW [L54]					
				YX [L35y]					
				YY [L623]					
				YZ [L92x]					
				ZW [L76]					
				ZX [L36z]					
				ZY [L634]					
				ZZ [L93y]					
				AAA [L94z]					
				BAA [L95A]					
				CAA [L96B]					
				DAA [L97C]					
				EAA [L98D]					
				FAA [L99E]					
				GAA [L100F]					
				HAA [L101G]					
				IAA [L102H]					
				JAA [L103I]					
				KAA [L104J]					
				LAA [L105K]					
				MAA [L106L]					
				NAA [L107M]					
				OAA [L108N]					
				PAA [L109O]					
				QAA [L110P]					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				RAA [L111Q]					
				SAA [L112R]					
				TAA [L113S]					
				UAA [L114T]					
		2	Xylan-m2	BF [X43G]	Non-polymeric	-	-	Not available / Not available	Atomic
			CF [X44H]						
			DF [X45I]						
			EF [X46J]						
			FF [X47K]						
			GE [X11]						
			HE [X2m]						
			IE [X3n]						
			JE [X4o]						
			KE [X5p]						
			LD [X220]						
			MD [X231]						
			ND [X242]						
			OD [X253]						
			PD [X264]						
		3	Xylan-m4	GF [X48L]	Non-polymeric	-	-	Not available / Not available	Atomic
			HF [X49M]						
			IF [X50N]						
			JF [X51O]						
			KF [X52P]						
			LE [X6q]						
			ME [X7r]						
			NE [X8s]						
			OE [X9t]						
			PE [X10u]						
			QD [X275]						
			RD [X286]						

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
				SD [X297]					
				TD [X308]					
				UD [X319]					
		4	Xylan-m6	LF [X53Q]	Non-polymeric	-	-	Not available / Not available	Atomic
			MF [X54R]						
			NF [X55S]						
			OF [X56T]						
			PF [X57U]						
			QE [X11v]						
			RE [X12w]						
			SE [X13x]						
			TE [X14y]						
			UE [X15z]						
			VD [X32a]						
			WD [X33b]						
			XD [X34c]						
			YD [X35d]						
			ZD [X36e]						

2.3. Datasets used for modeling ?

There are 2 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	De Novo model	Zenodo	10.5281/zenodo.10179190
2	NMR data	Zenodo	10.5281/zenodo.8377844

2.4. Methodology and software ?

This entry is a result of 1 distinct protocol(s).

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	Initial Polymer Placement	Molecular Placement of Cellulose, Xylan and Lignin	Not available	Not available	False	False

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
2	1	Equilibration with Molecular Dynamics	A series of compression simulations to assemble the matrix polymers (xylan and lignin) onto the xylan coated cellulose microfibril. This is followed by the placement of water molecules and ions for charge neutrality. Experimentally observed density values are used as a validation metric at this stage. For further details see cited manuscript DOI:10.1126/sciadv.adi7965	Not available	Not available	False	False
3	1	Production Simulations in the NVT ensemble	This step involves running molecular dynamics for 100ns (50,000,000 steps with a 2fs timestep) to explore the dynamics of biopolymeric components. Periodic boundary conditions are considered for the simulations. For further details see cited manuscript DOI:10.1126/sciadv.adi7965 . CHARMM compatible files for this system are available for download, visualization and analysis at https://doi.org/10.5281/zenodo.10179190	Not available	Not available	False	False
4	1	Proximity Calculations for Reproduction of ssNMR Observables	This step involves calculating the fraction of 'sink' atom type within 1nm of a 'source' atom type. The source and sink atoms are chosen based on ssNMR experiments. There are two types of sources Xylan-sourced (methyl carbon on the acetate group attached to xylose) or Lignin-Sourced (Ring atoms C3 and C5 on the Syringyl residues and atoms C4 and C3 on the Guaiacol residues of lignin). The sink atoms for Xylan-sources include Cellulose atoms (C4 atom on Glucose) and Lignin atoms (Ring atoms C3 and C5 on the Syringyl residues and atoms C4 and C3 on the Guaiacol residues). The sink atoms for Lignin-sources include Cellulose atoms (C4 atom on Glucose) and Xylan atoms (methyl carbon (CA2) on the acetate group attached to xylose). For a chosen source atom in the system, a count of sink atoms within 1nm of that source atom is calculated. This is repeated for each and every source atom and the total count is used to calculate the fraction of sink atoms within 1nm of the source atom. This metric also measured by ssNMR, is used to validate the spatial arrangement of polymers in the atomistic model. For further details see cited manuscript DOI:10.1126/sciadv.adi7965	Not available	Not available	False	False

There is 1 software package reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	CHARMM	C44a	model building	https://www.charmm.org/

3. Data quality ?

3.4. NMR ?

Validation for this section is under development.

4. Model quality ?

For models with atomic structures, MolProbity analysis is performed. For models with coarse-grained or multi-scale structures, excluded volume analysis is performed.

4.1a. Excluded Volume Analysis ?

Excluded volume satisfaction for the models in the entry are listed below. The Analysed column shows the number of particle-particle or particle-atom pairs for which excluded volume was analysed.

Model ID	Analysed	Number of violations	Excluded Volume Satisfaction (%)
1	32017024725	1219509	100.00

5. Fit to Data Used for Modeling Assessment ?

5.4. NMR ?

Validation for this section is under development.

6. Fit to Data Used for Validation Assessment ?

Validation for this section is under development.

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