

# Supporting Information

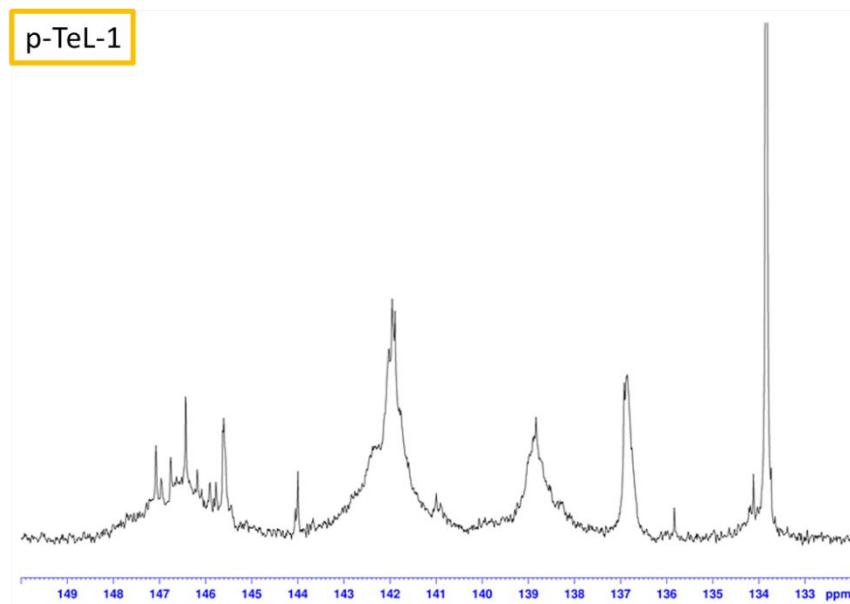
## Successive Organic Solvent Fractionation and Characterization of Heterogeneous Lignin Extracted by *p*-Toluenesulfonic Acid from Hybrid Poplar

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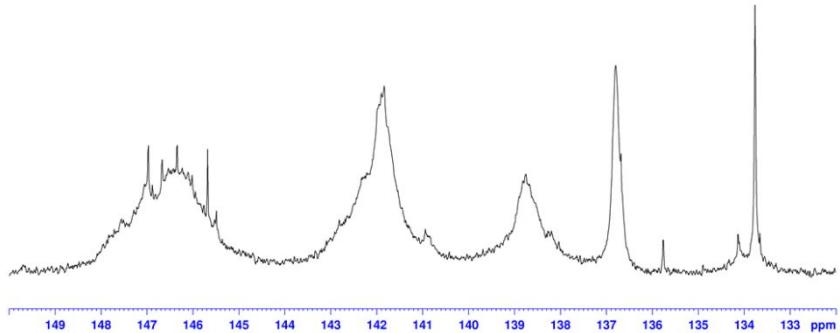
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**Table S1.** Contents of carbohydrates in the parent and fractionated lignins (%).

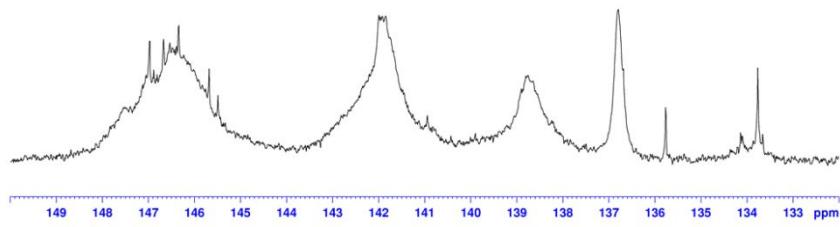
	Glucose	Xylose	Arabinose	Galactose	Total
p-TeL-P	2.21	1.97	1.37	0.07	5.62
p-TeL-1	1.03	0.84	0.46	0.11	2.44
p-TeL-2	1.69	1.01	0.11	0.10	2.91
p-TeL-3	1.52	0.9	0.71	0.10	3.23
p-TeL-4	2.02	1.29	0.48	0.08	3.87



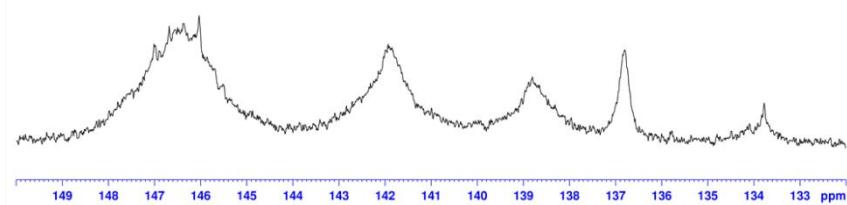
p-TeL-2



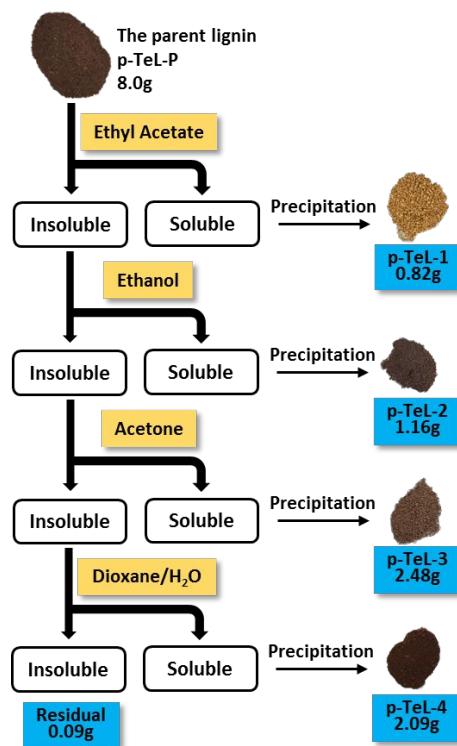
p-TeL-3



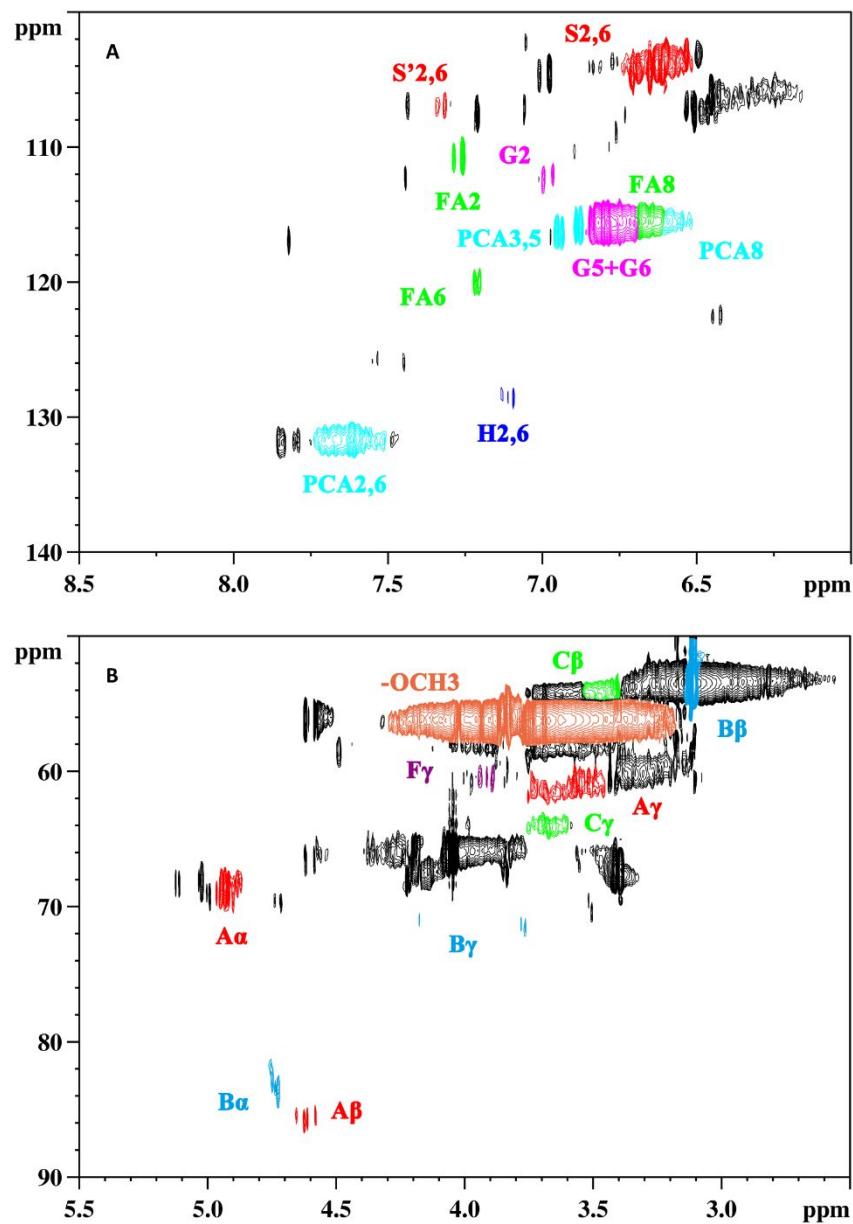
p-Tel-4



**Figure S1.** <sup>31</sup>P-NMR spectra of fractionated lignins.



**Figure S2.** Flowchart and yields of the successive organic solvent fractionation of lignin.



**Figure S3.** 2D-HSQC spectra of the original lignin before fractionation. (A) aromatic region and (B) side-chain region.