

Supplementary Materials for **Rapid and near-complete dissolution of wood lignin at $\leq 80^{\circ}\text{C}$ by a recyclable acid hydrotrope**

Liheng Chen, Jinze Dou, Qianli Ma, Ning Li, Ruchun Wu, Huiyang Bian, Daniel J. Yelle,
Tapani Vuorinen, Shiyu Fu, Xuejun Pan, Junyong (J.Y.) Zhu

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fig. S1. Optical microscopy images of wood fibers produced using *p*-TsOH fractionation under low-severity conditions (fiber lignin content, 16%), followed by mechanical refining to 550-ml Canadian Standard Freeness.

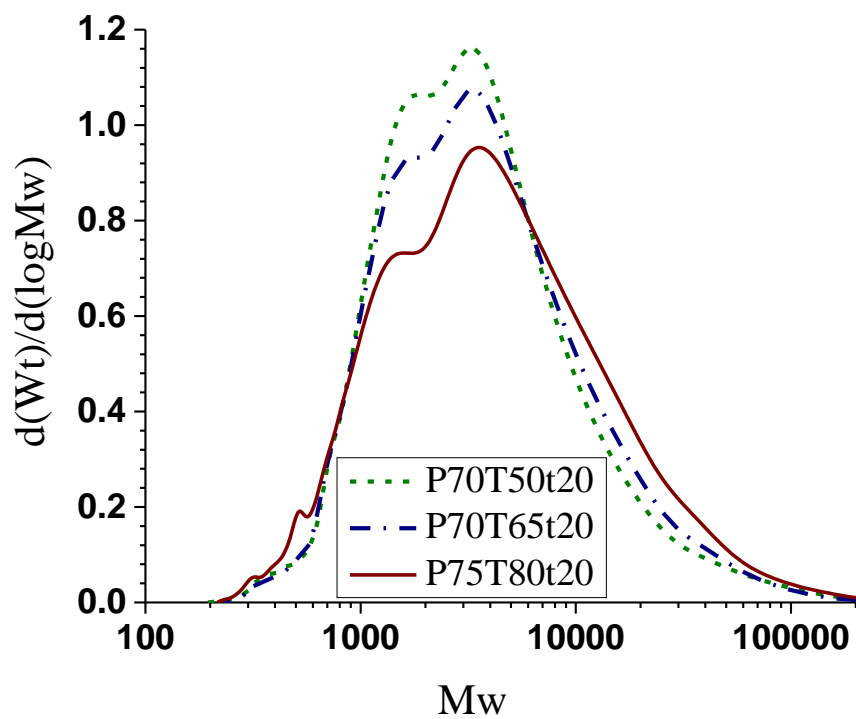


fig. S2. GPC-measured molecular weight distribution of LNPs from fractionation of Wiley-milled poplar NE222 using *p*-TsOH under three different conditions.

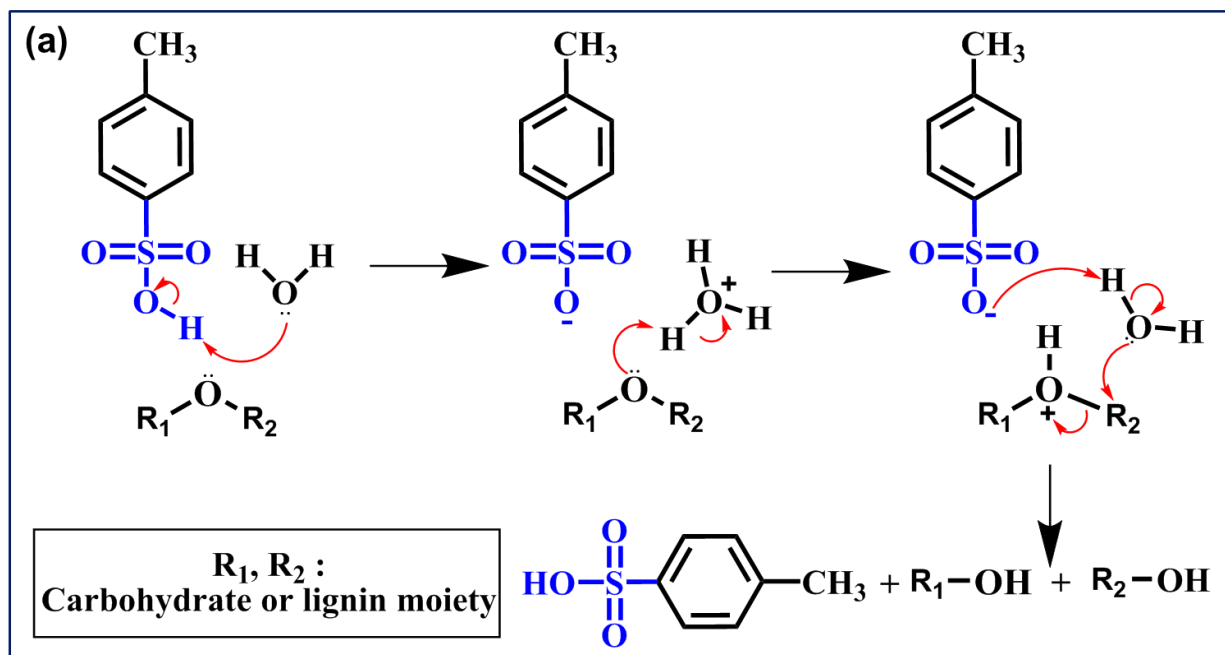


fig. S3. Catalysis of carbohydrate hydrolysis and lignin degradation by *p*-TsOH.

table S1. Duplicate fractionation runs under six sets of conditions to demonstrate the repeatability of *p*-TsOH fractionation experiments. The numbers are chemical compositions in the water-insoluble solids (WIS).

Sample Label	Glucan (%)	Xylan (%)	Mannan (%)	Lignin (%)	WIS yield (%)
P70T50t35-1 st	65.1	7.2	4.8	18.7	73.3
P70T50t35-2 nd	59.3	7.7	3.8	19.8	75.4
P70T65t10-1 st	61.1	6.6	5.0	24.2	70.4
P70T65t10-2 nd	61.8	6.9	4.1	17.6	68.4
P70T80t20-1 st	64.2	6.5	4.3	8.8	58.8
P70T80t20-2 nd	61.9	6.0	4.1	8.8	58.9
P75T50t20-1 st	55.9	7.1	4.5	17.8	69.7
P75T50t20-2 nd	59.0	6.8	4.1	18.5	71.5
P75T65t60-1 st	75.7	5.5	4.8	7.7	57.1
P75T65t60-2 nd	73.8	4.6	3.8	7.0	56.8
P75T80t05-1 st	71.5	6.4	4.0	10.9	60.5
P75T80t05-2 nd	68.3	6.8	3.8	12.6	65.7
P80T80t60-1 st	73.8	4.1	2.8	7.6	57.0
P80T80t60-2 nd	62.7	2.3	2.0	9.0	58.1

table S2. Comparisons of chemical compositions of fractionated poplar NE222 WISs between the first cycle using fresh *p*-TsOH solution and the recycle run using spent *p*-TsOH acid liquor.

Sample Label ¹	Glucan (%)	Xylan (%)	Mannan (%)	Lignin (%)
P55T80t20-1 st	48.2±1.1	10.8±0.0	2.3±0.2	21.4±0.1
P55T80t20-2 nd	47.6±0.4	9.1±0.4	2.3±0.0	22.3±0.4
P80T80t20-1 st	71.1±1.4	5.3±0.0	2.7±0.1	4.4±0.2
P80T80t20-2 nd	74.1±1.4	5.3±0.0	2.7±0.2	4.8±0.0