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Supporting information

Catalytic depolymerization of alkali lignin in ionic liquid on Pt-supported La_2O_3-SO_4^{2-}/ZrO_2 catalysts

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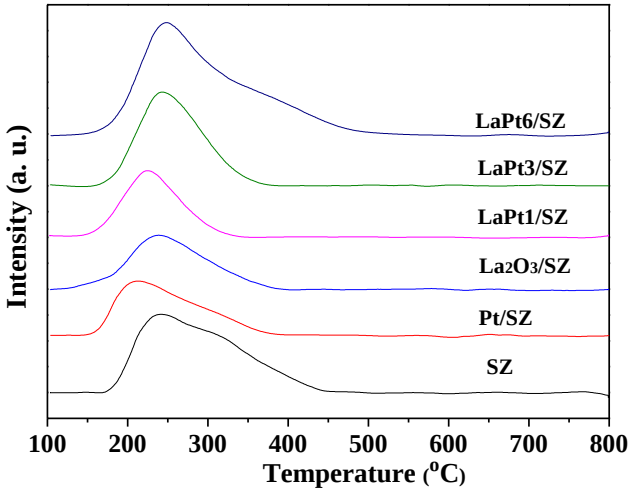


Figure S1. NH_3-TPD profiles of the support and reduced catalysts.

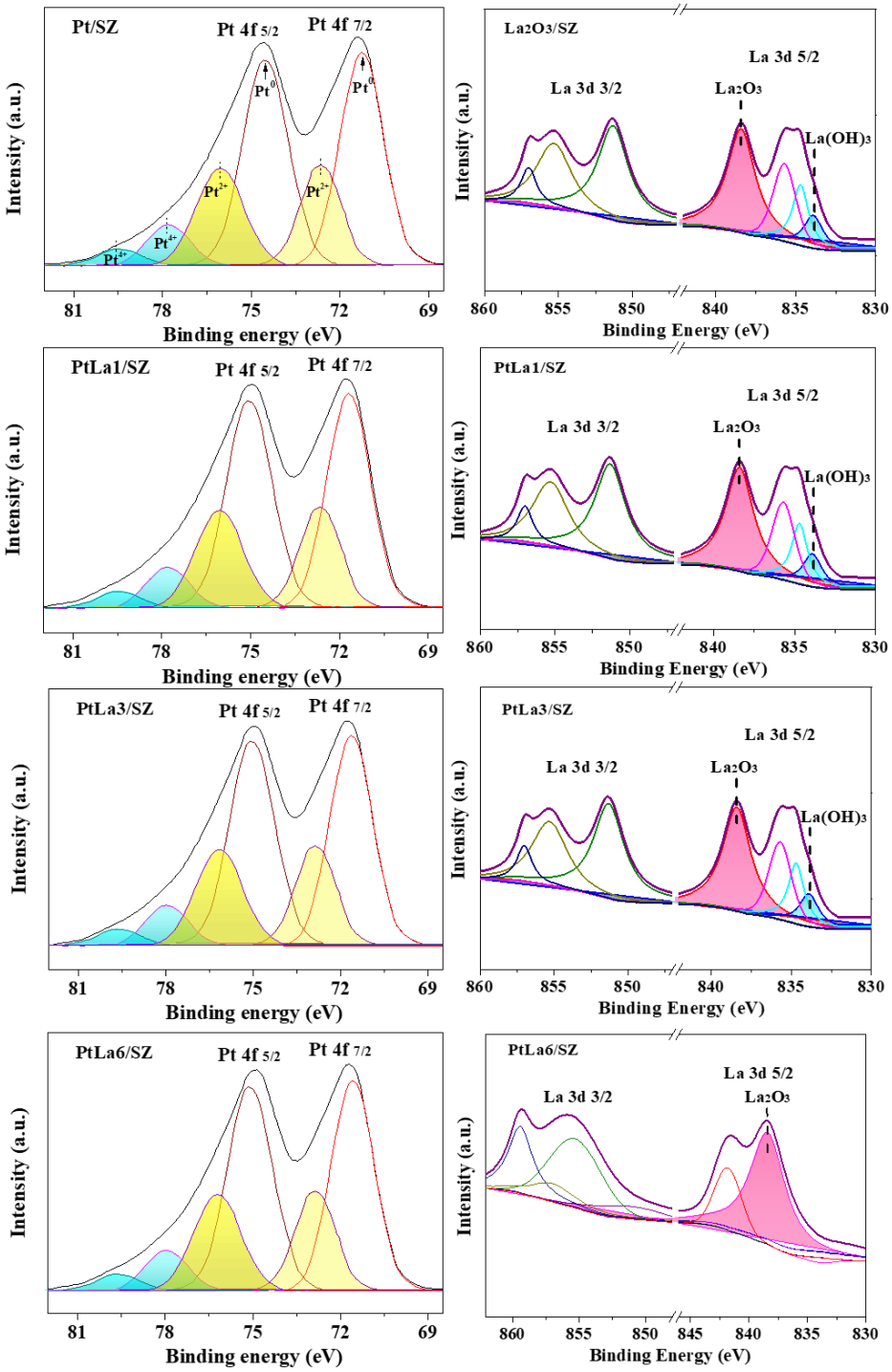


Figure S2. XPS spectra of Pt 4f X and La 3d for the reduced La_2O_3/SZ, Pt/SZ and PtLaχ/SZ catalysts.

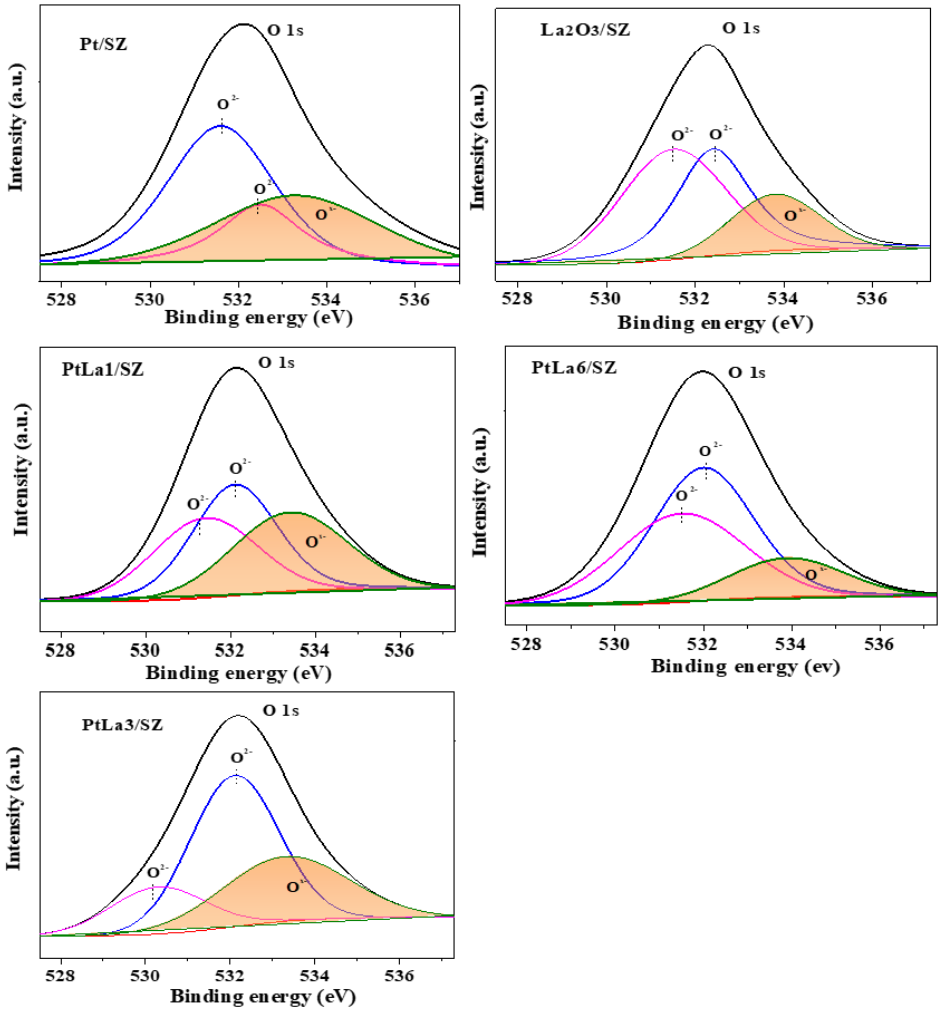


Figure S3. XPS spectra of O 1s for the reduced La_2O_3/SZ, Pt/SZ and PtLaχ/SZ catalysts.

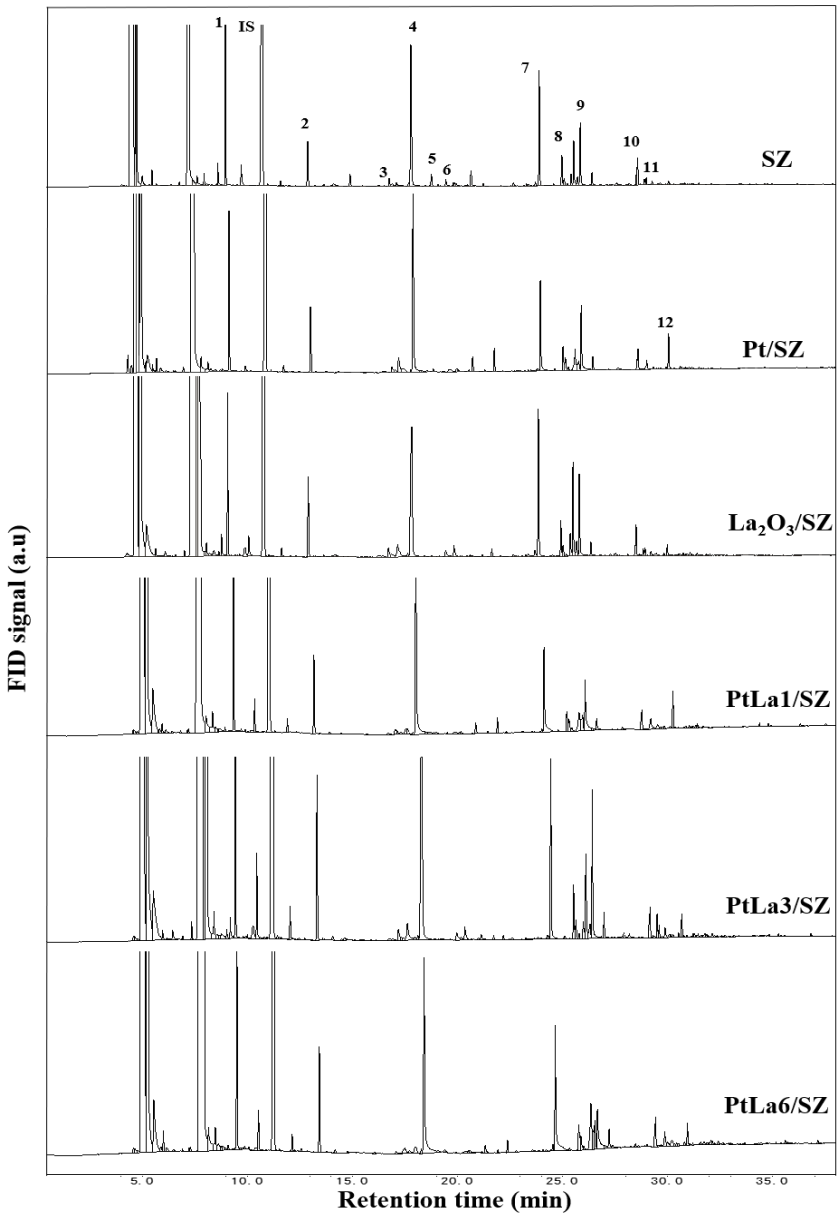


Figure S4. GC-FID chart of liquid products in lignin depolymerization with different catalysts (210 ℃, WHSV of 3.8 h^{-1}).

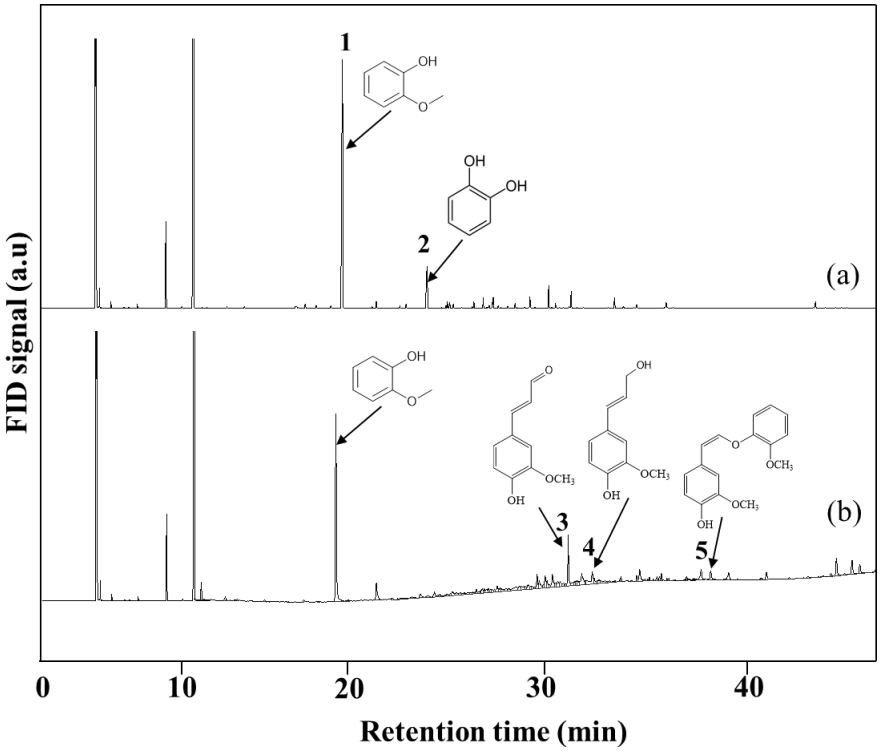


Figure S5. GC-FID chart of liquid products from pretreatment unit (90 ℃, 3h), a: guaiacol; b: guaiacylglycerol-β-guaiacyl ether (GG).

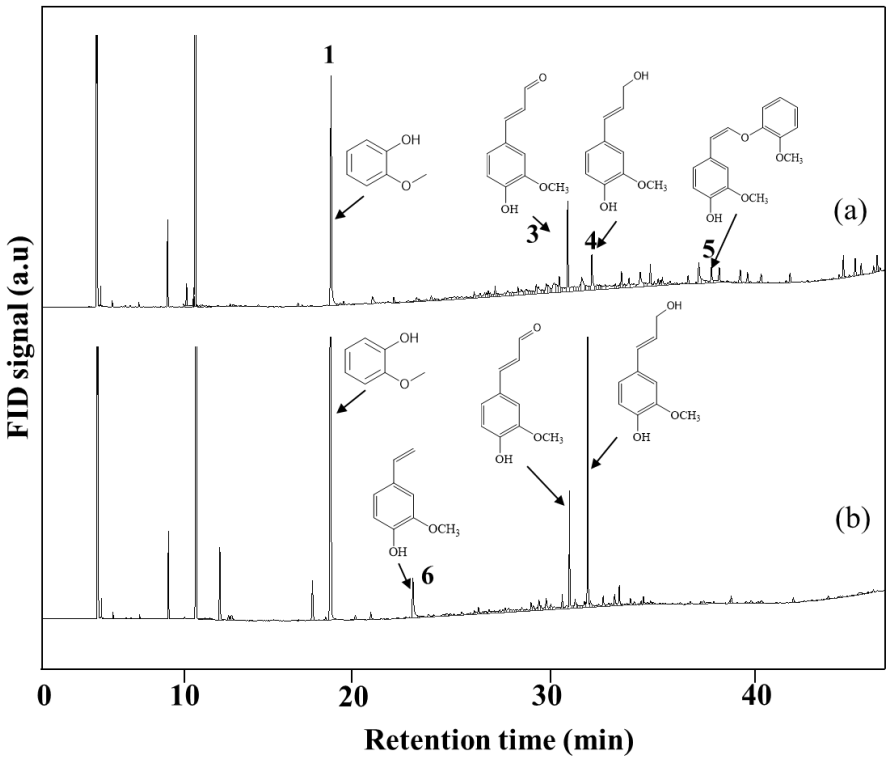


Figure S6. GC-FID chart of liquid products from guaiacylglycerol-β-guaiacyl ether (GG) in reaction unit with different catalysts (210 ℃; 1h; a: SZ catalyst; b: Pt/SZ catalyst).

Table S1. Identification of liquid products by means of GC-MS.

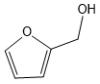
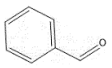
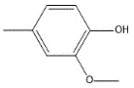
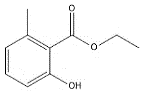
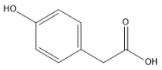
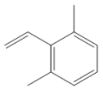
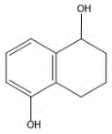
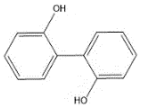
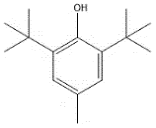
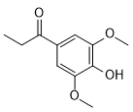
No.	Compounds	Structure
1	Furfuryl alcohol	
2	Benzaldehyde	
3	2,6-Xylenol	
4	4-Vinylphenol	
5	Iso-creosol	
6	6-Methylsalicylic acid ethyl ester	
7	4-Hydroxyphenylacetic acid	
8	2,6-Dimethylstyrene	
9	1,5-Dihydroxy-1,2,3,4-tetrahydro naphthalene	
10	2,2'-Biphenol	
11	Butylated hydroxytoluene	
12	1-(4-Hydroxy-3,5-dimethoxyphenyl) propan-1-one	

Table S2. Yields of various identified liquid products (C-based, mol %).

NO.	Compounds	SZ	Pt/SZ	La_2O_3/SZ	PtLa1/SZ	PtLa3/SZ	PtLa6/SZ
1	Furfuryl alcohol	3.44	4.50	4.07	7.50	6.46	5.96
2	Benzaldehyde	1.40	2.44	2.64	2.39	4.50	3.37
8	2,6-Dimethylstyrene	1.03	1.06	1.26	1.24	1.58	1.18
	$\boldsymbol{Y_{np}}$	5.87	8.00	7.98	11.10	12.50	10.50
3	2,6-Xylenol	0.193	1.06	1.21	1.08	1.12	0.59
4	4-Vinylphenol	5.49	9.43	9.91	8.09	13.67	9.28
5	Iso-creosol	0.38	0.45	0.415	0.42	0.42	0.17
6	6-Methylsalicylic acid ethyl ester	0.87	0.66	0.361	0.24	0.20	0.33
7	4-Hydroxyphenylacetic acid	3.48	3.59	4.87	3.72	5.02	5.32
9	1,5-Dihydroxy-1,2,3,4-tetrahydro naphthalene	2.08	2.69	3.10	3.58	1.58	2.73
10	2,2'-Biphenol	0.73	1.04	2.77	2.30	2.45	2.26
11	Butylated hydroxytoluene	0.15	1.21	1.25	1.17	4.05	1.31
12	1-(4-Hydroxy-3,5-dimethoxyphenyl) propan-1-one	0.00	0.16	0.26	0.65	1.25	0.68
	$\boldsymbol{Y_p}$	13.4	18.7	24.1	21.2	28.7	22.7
	$\boldsymbol{Y_{np}+Y_p}$	19.3	26.7	32.1	32.3	41.2	33.2
	$\boldsymbol{Yc}$	30.6	44.9	47.8	58.4	63.9	52.1

Y_c, total yields of carbon-based products; Y_p, yields of phenolic compounds; Y_{np}, yields of nonphenolic compounds.