nanomaterials

Supplementary Materials

Glucose Hydrogenolysis into 1,2-Propanediol Using a Pt/deAl@Mg(OH)2 Catalyst: Expanding the Application of a Core–Shell Structured Catalyst

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The supplementary Figures and Tables

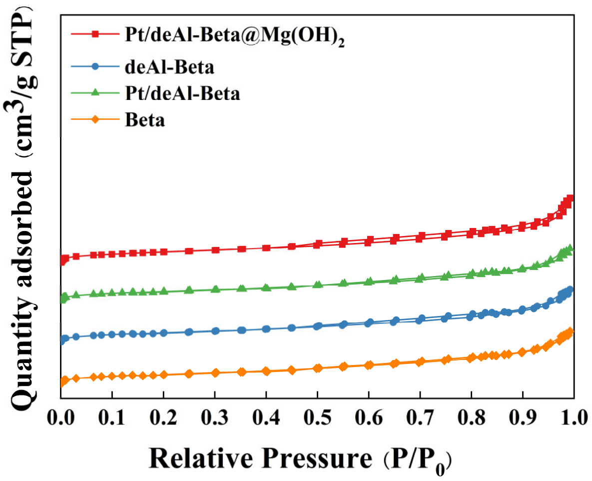

Figure S1. The Nitrogen adsorption-desorption isotherms of different catalysts.

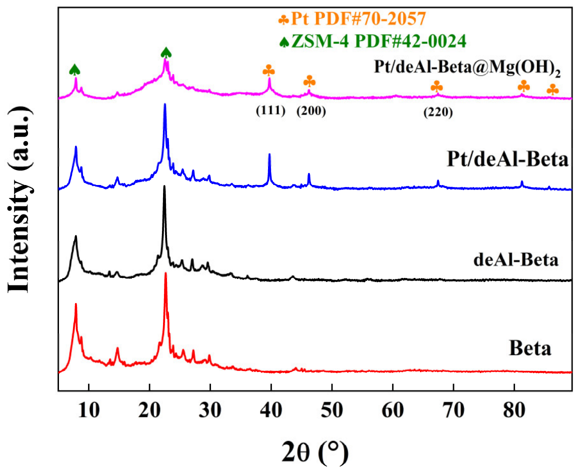

Figure S2. The XRD patterns of catalysts.

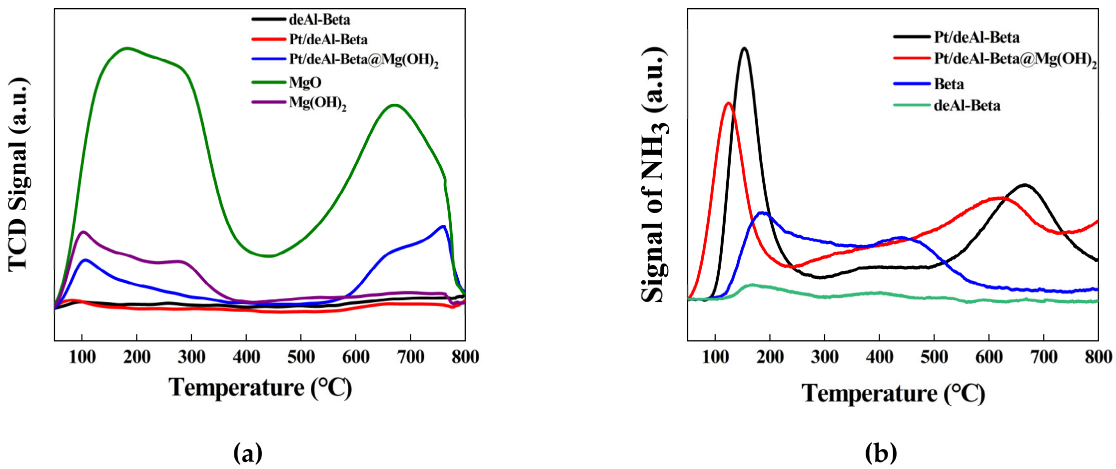

Figure S3. The results of the acid-base analysis. (a) CO_2-TPD results for different catalysts; (b) NH_3-TPD results for different catalysts.

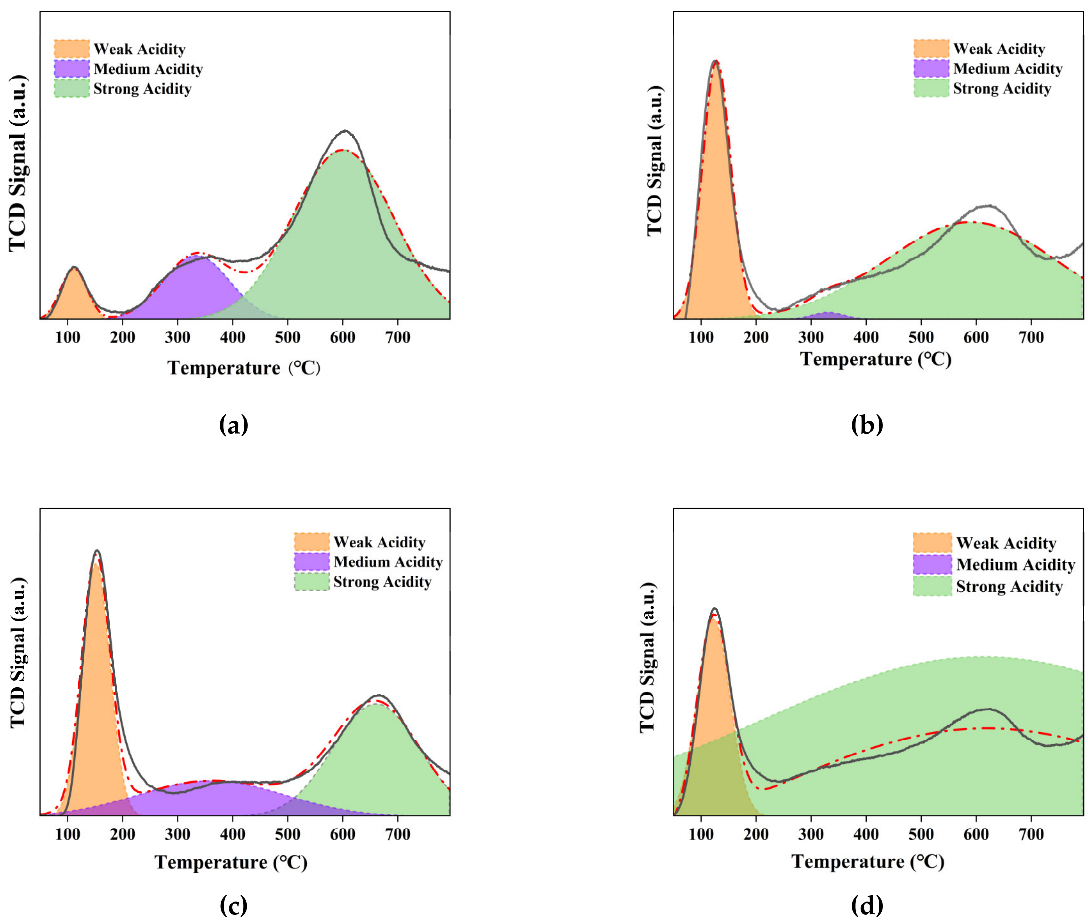

Figure S4. The results of the acid-base analysis. (a) CO_2-TPD results for Pt/deAl catalyst; (b) CO_2-TPD results for Pt/deAl@Mg(OH)$_2$ catalyst; (c) NH_3-TPD results for Pt/deAl catalyst; (d) NH_3-TPD results for Pt/deAl@Mg(OH)$_2$ catalyst.

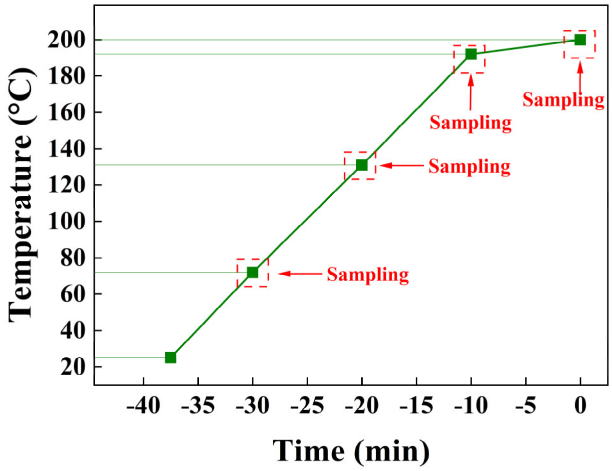

Figure S5. The temperature changes in the heating process before time 0.

Table S1. The pore properties of prepared catalysts.

Catalyst	Surface Area m^2/g	Pore Volume cm^3/g	Pore Size nm
Beta	428.19	0.36	3.40
deAl-Beta	411.69	0.37	3.64
Pt/deAl-Beta	301.75	0.33	4.42
Pt/deAl-Beta@$Mg(OH)_2$*	230.45	0.26	4.54

*The loading of $Mg(OH)_2$ is 7.5 wt%.

Table S2. The reaction performance of intermediate products over Pt/deAl-Beta and Pt/deAl-Beta@$Mg(OH)_2$.

Catalyst	Reactant	Conv. (%)	Selectivity(%)					
			1,2-PDO	EG*	Acetol	1,2-BDO*	1,2-HDO*	hexitol
Pt/deAl-Beta	glucose	100	4.3	0.8	21.2	7.7	3.8	6.8
Pt/deAl-Beta @$Mg(OH)_2$	glucose	100	34.1	8.5	0	4.3	2.5	3.1
Pt/deAl-Beta	fructose	100	35.4	6.2	5.9	3.6	5.2	2.8
Pt/deAl-Beta @$Mg(OH)_2$	fructose	100	38.6	4.8	0	1.9	3.3	5.3
Pt/deAl-Beta	sorbitol	2.7	0	0	0	0	81.7	-
Pt/deAl-Beta @$Mg(OH)_2$	sorbitol	3.3	58.6	0	0	0	0	-
Pt/deAl-Beta	mannitol	18.2	0	0	0	0	85.3	-
Pt/deAl-Beta @$Mg(OH)_2$	mannitol	39.1	68.7	0	0	0	6.7	-
Pt/deAl-Beta	1,2-HDO	7.6	0	0	0	0	-	-
Pt/deAl-Beta @$Mg(OH)_2$	1,2-HDO	9.7	0	0	0	0	-	-
Pt/deAl-Beta	DHA*	92.5	94.8	0	9.6	-	-	-
Pt/deAl-Beta @$Mg(OH)_2$	DHA	86.3	54.3	0	12.7	-	-	-
Pt/deAl-Beta	Acetol	90.2	81.3	0	-	-		-
Pt/deAl-Beta @$Mg(OH)_2$	Acetol	96.2	88.8	0	-	-		-

*1,2-PDO=1,2-propanediol; EG=ethylene glycol;.
1,2-HDO=1,2-hexanediol; 1,2-BDO=1,2-butanediol; DHA=dihydroxyacetone.

Table S3. Application of Pt loading in beta zeolite.

Catalyst	Pt loading(wt%)	Enhancing effect	References
Pt/H-Beta	0.5	guaiacol conversion larger than 90%	[1]
Pt/K-Beta-HS	1	longer lifetime(205 h), higher selectivity to aromatics (80%)	[2]
Pt/Beta	1	80% hydrogenation activity	[3]

Ni_2Pt/H-Beta	0.10	conversion of n-heptane is 55.9%, selectivity of isomerization is 91.5%	[4]
Pt/ZF-D	0.5	the highest catalytic performance of toluene combustion (T_{90} = 158 ℃)	[5]

References

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