Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supporting Information

Efficient depolymerization of PET over Ti-doped SBA-15 with abundant Lewis acid sites via glycolysis

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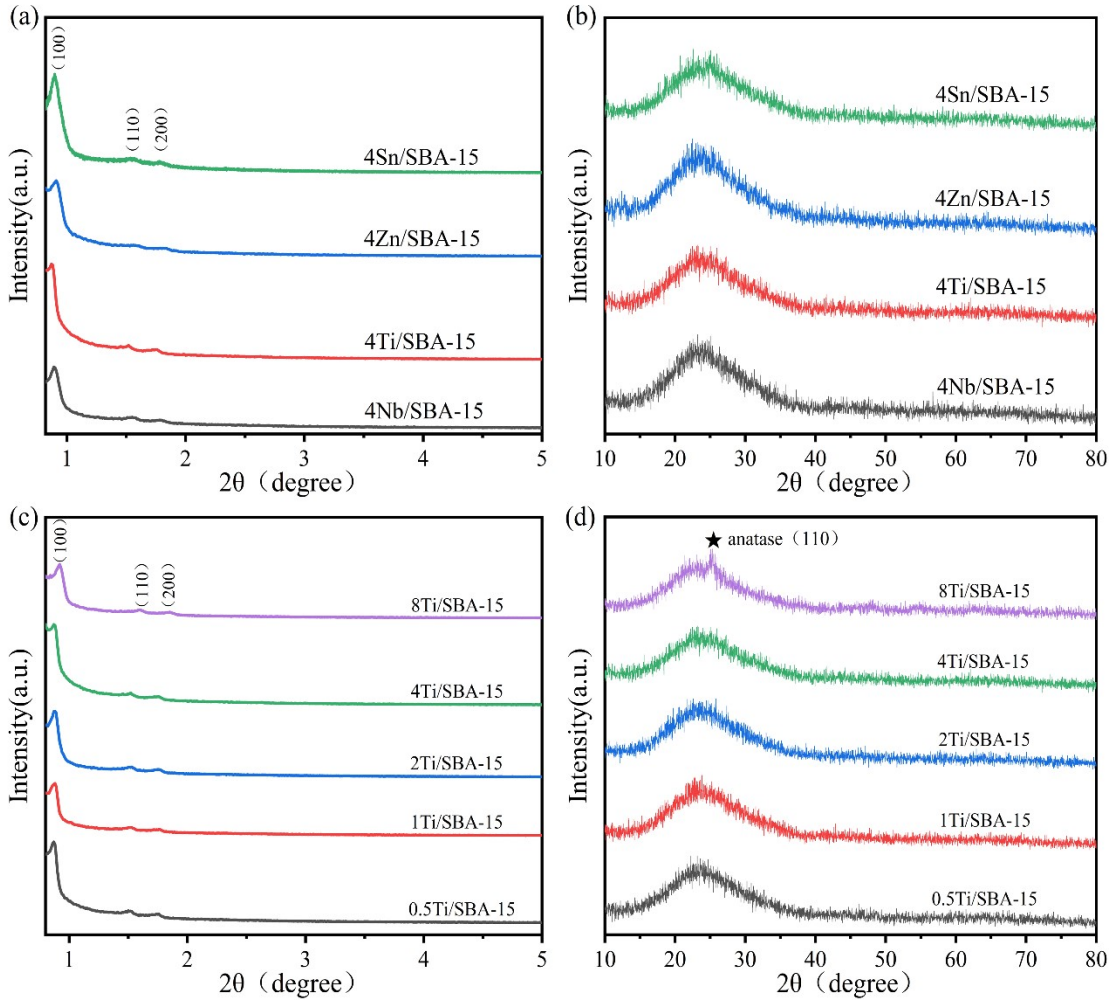

Fig. S1 (a) Small- and (b) wide-angle XRD patterns of different metal-doped SBA-15 catalysts. (c) Small- and (d) wide-angle XRD patterns of Ti/SBA-15 catalysts with different Ti loading.

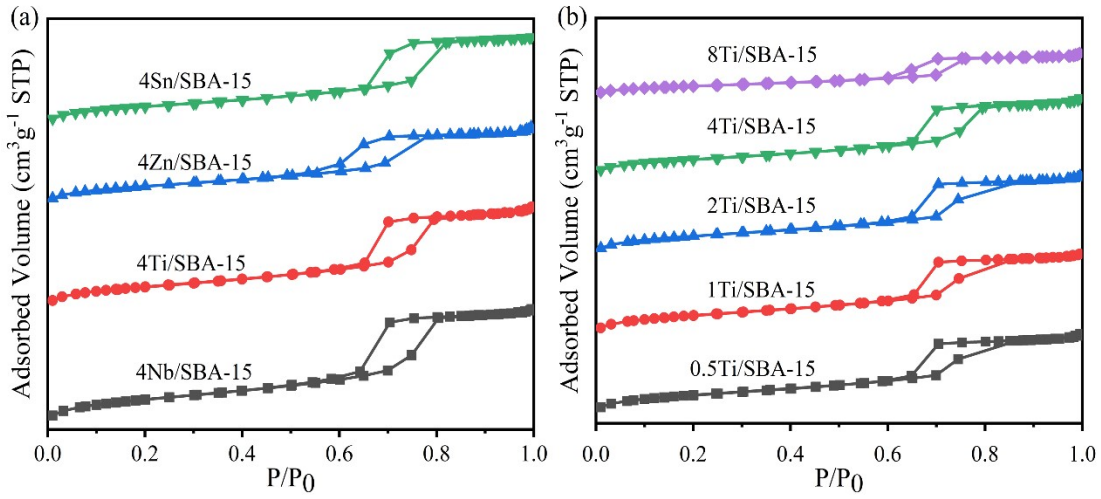

Fig. S2 (a) N_2 adsorption-desorption isotherms of different metal-doped SBA-15 catalysts. (b) N_2 adsorption-desorption isotherms of Ti/SBA-15 catalysts with different Ti loading.

Table S1 Structural properties of different metal-doped SBA-15 catalysts.

Catalyst	Metal loading[a] (wt)	Total amount of acid sites[b] (mmol/g)	S_{BET}（m^2/g）	D_p (nm)	V_p (cm^3/g)
4Nb/SBA-15	3.5	0.22	957	6.5	1.4
4Ti/SBA-15	3.4	0.24	835	6.5	1.2
4Zn/SBA-15	3.8	0.35	717	5.9	1.0
4Sn/SBA-15	3.4	0.04	724	6.6	1.1

Notes: [a] ICP-AES analysis. [b] measured by NH_3-TPD.

Table S2 Structural properties of Ti/SBA-15 catalysts with different Ti loadings.

Catalyst	Metal loading[a] (wt)	Total amount of acid sites[b] (mmol/g)	S_{BET}（m^2/g）	D_p (nm)	V_p (cm^3/g)
0.5Ti/SBA-15	0.54	0.05	955	6.2	1.3
1Ti/SBA-15	0.93	0.09	981	6.1	1.3
2Ti/SBA-15	1.8	0.14	946	6.2	1.3
4Ti/SBA-15	3.4	0.24	835	6.5	1.2
8Ti/SBA-15	7.7	0.31	504	6.0	0.7

Notes: [a] ICP-AES analysis. [b] measured by NH_3-TPD.

Table S3 Detailed data of Fig. 1a.

Entry	Catalysts	PET conversion (%)	Yield (%)	
			BHET	Dimer
1	SBA-15	1.8	0.9	0.8
2	4Ti/SBA-15	99.9	87.2	9.4
3	4Zn/SBA-15	95.8	81.6	9.6
4	4Nb/SBA-15	14.8	10.2	3.9
5	4Nb/SBA-15*	26.5	19.4	3.5
6	4Sn/SBA-15	6.0	1.6	1.9

Reaction conditions: 0.4 g PET, 2.8 g EG, 50 mg catalyst, 1 MPa N_2, 190 °C, 45 min. "*" means the reaction time is 2 h.

Table S4 Detailed data of Fig. 1b.

Entry	Catalysts	PET conversion (%)	Yield (%)	
			BHET	Dimer
1	0.5Ti/SBA-15	25.8	17.7	4.1
2	1Ti/SBA-15	63.1	52.5	7.3
3	2Ti/SBA-15	79.1	68.4	8.4
4	4Ti/SBA-15	99.9	86.7	10.8
5	8Ti/SBA-15	97.1	84.7	8.9

Reaction conditions: 0.4 g PET, 2.8 g EG, 20 mg catalyst, 1 MPa N_2, 190 °C, 45 min.

Table S5 Comparison of reported heterogeneous catalysts for the glycolysis of PET

Entry	Catalysts	Temperature (°C)	Time (min)	BHET Yield (%)	Ref.
1	4Ti/SBA-15	190	45	87.2	This work
2	Fe_3O_4 NPs	210	30	93	1
3	$Mn_3O_4/MgAl_2O_4$	190	180	95	2
4	Ultrasmall Co NPs	180	180	77	3
5	$CoFe_2O_4$	190	360	83	4
6	Si-TEA	190	102	88.5	5
7	γ-Fe_2O_3	300	60	90	6
8	$CoFe_2O_4$@ZIF-8/ZIF-67	200	60	84.3	7
9	MAF-6	180	240	81.7	8
10	n-ZnO	190	60	90	9

Fig. S3 The obtained BHET from colorless PET powder (left) and dyed polyester fabric (right).

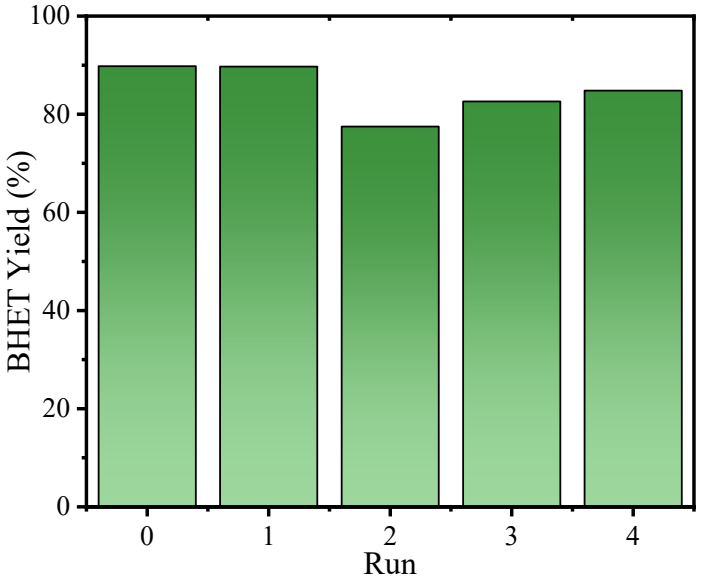

Fig. S4 Influence of other plastics on the reusability of 4Ti/SBA-15 in PET glycolysis reaction. Reaction conditions: 0.4 g PET, 30 mg PE, 30 mg PS, 2.8 g EG, 30 mg 4Ti/SBA-15, 1 MPa N_2, 196 °C, 45 min.

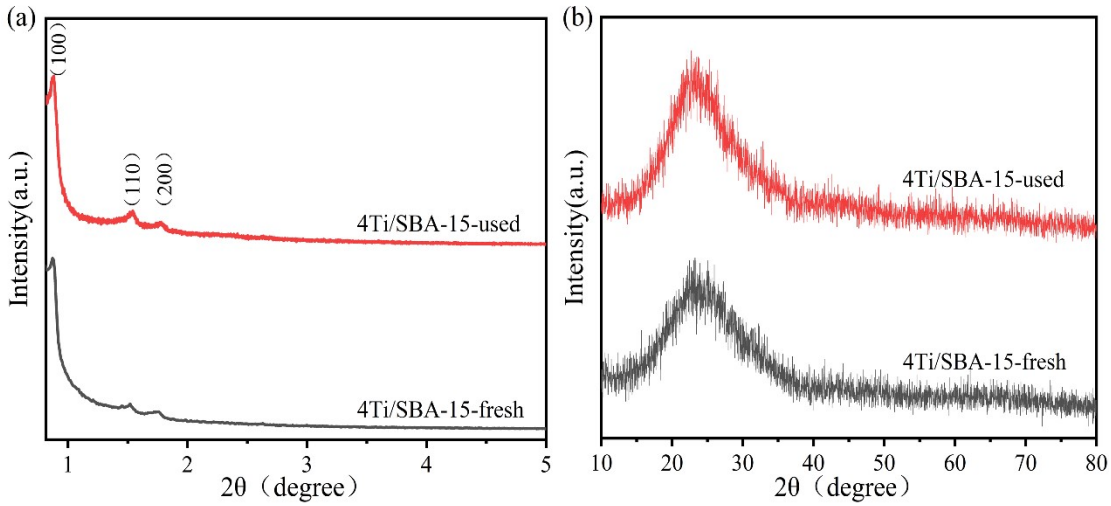

Fig. S5 (a) Small- and (b) wide-angle XRD patterns of 4Ti/SBA-15-fresh and 4Ti/SBA-15-used.

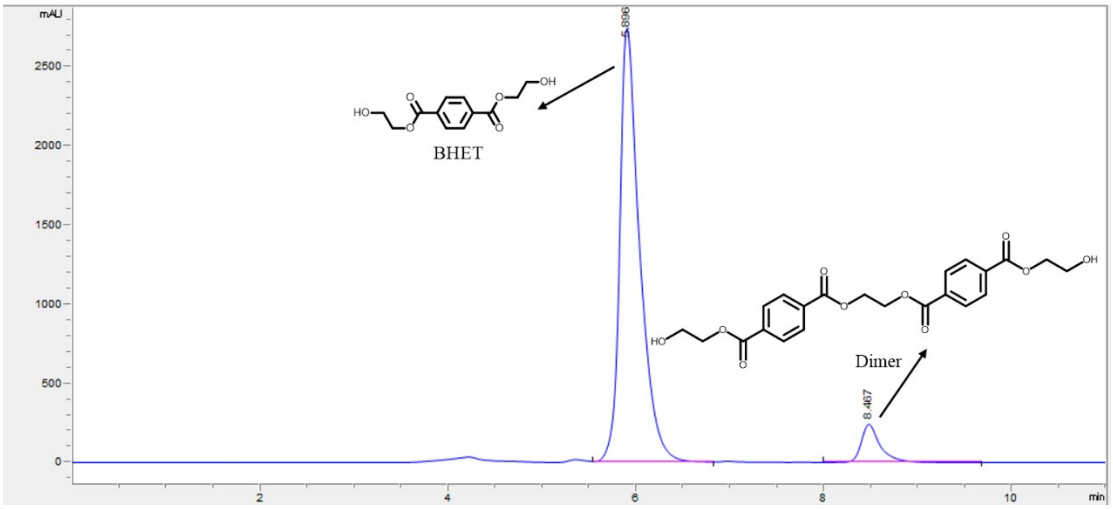

Fig. S6 HPLC chromatogram of the PET glycolysis reaction.

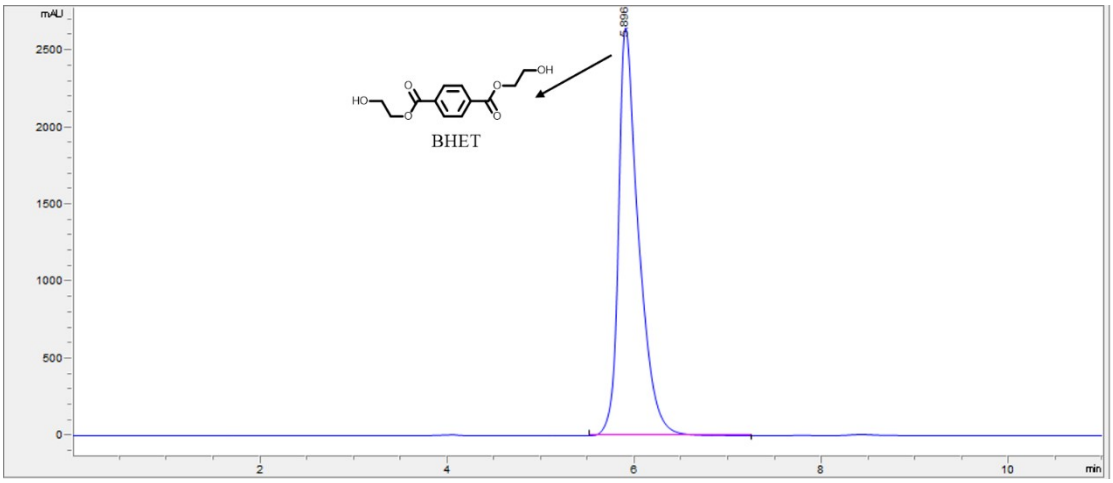

Fig. S7 HPLC chromatogram of the isolated BHET obtained from PET glycolysis.

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