Electronic Supplementary Material (ESI) for RSC Advances.

Table S1. The atomic ratios of the elements in the samples obtained at different concentration of precursors.

Sample	O (atm %)	Mn (atm %)	K (atm %)	O/Mn (%)
S1	69.48	0.52	--	2.29
S2	72.66	26.84	0.50	2.71
S3	63.29	34.21	2.50	1.85
S4	75.85	24.15	---	3.14

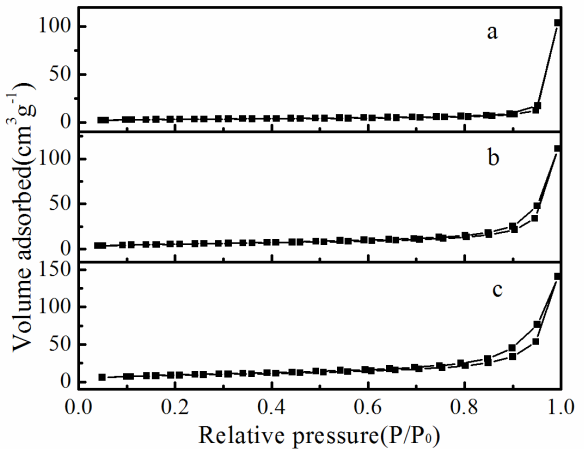

Fig. S1 Nitrogen adsorption-desorption isotherms of the sample S1 (a), S2 (b), and S3 (c) obtained at different concentration of precursors.

Table S2 The pore characters of the samples

Sample	BET ($m^2\ g^{-1}$)	Pore volume ($cm^3\ g^{-1}$)	Average pore size (nm)
S1	14.21	0.1779	61.74
S2	20.09	0.1728	34.39
S3	31.76	0.2184	27.5

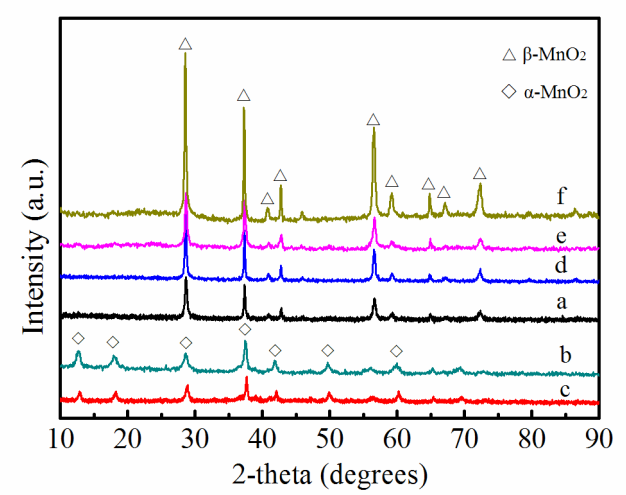

Fig. S2 The XRD patterns of samples obtained at different concentration of precursors.

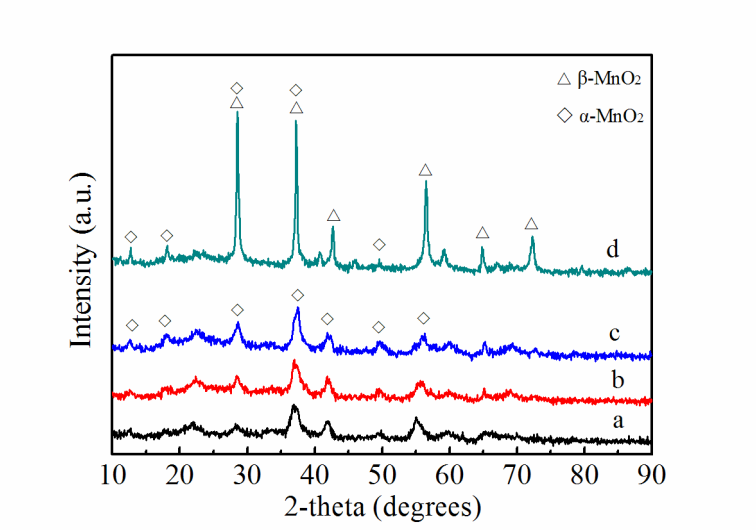

Fig. S3 The XRD patterns of samples obtained at different time: (a) 15 min, (b) 2h, (c) 6h, (d) 10h.

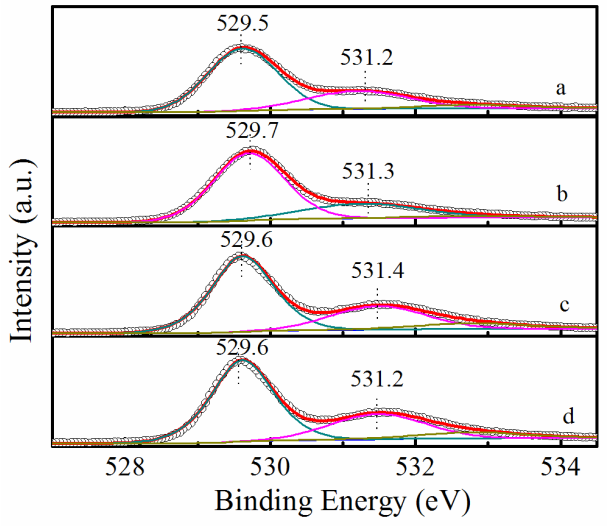

Fig. S4 O 1s XPS spectra of the sample S1 (a), S2 (b), S3 (c), and S4 (d).

Table S3 XPS results of the samples.

Samples	Binding Energy (eV)				Oxygen distribution (%)		
	Mn 2P 3/2	O_α	O_β	O_γ	O_α	O_β	O_γ
S1	642.3	529.5	531.2	532.8	61.34	32.67	5.99
S2	642.2	529.7	531.3	532.8	70.50	25.19	4.31
S3	642.1	529.6	531.4	532.8	67.02	27.37	5.61
S4	642.3	529.6	531.2	532.8	60.28	33.60	6.12

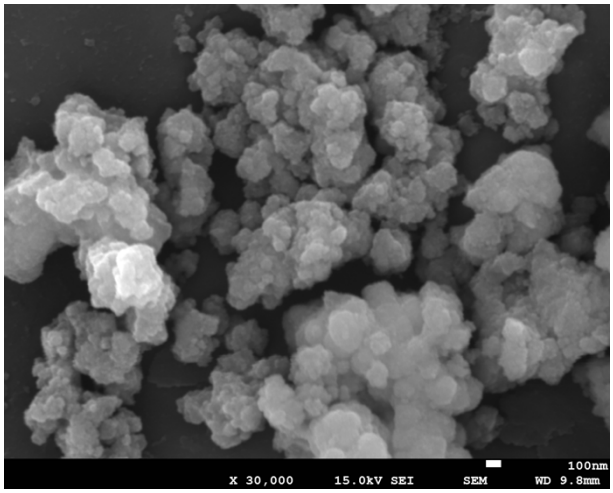

Fig. S5 SEM images of commercial MnO_2

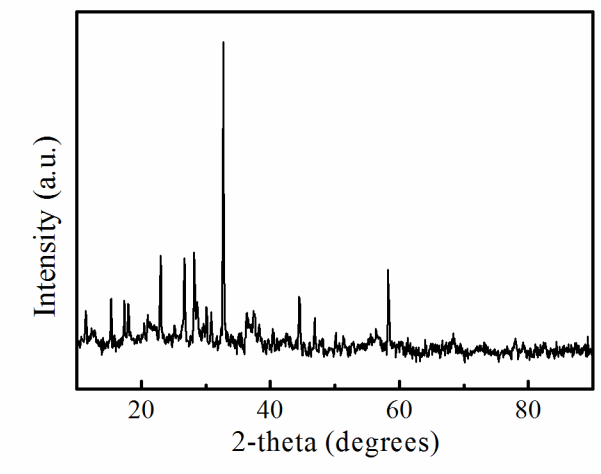

Fig. S6 XRD pattern of commercial MnO_2

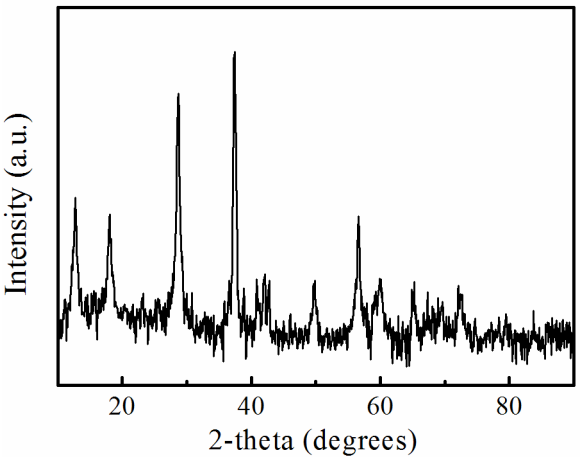

Fig. S7 *XRD pattern of the catalyst after the test of the catalytic ability cycle*

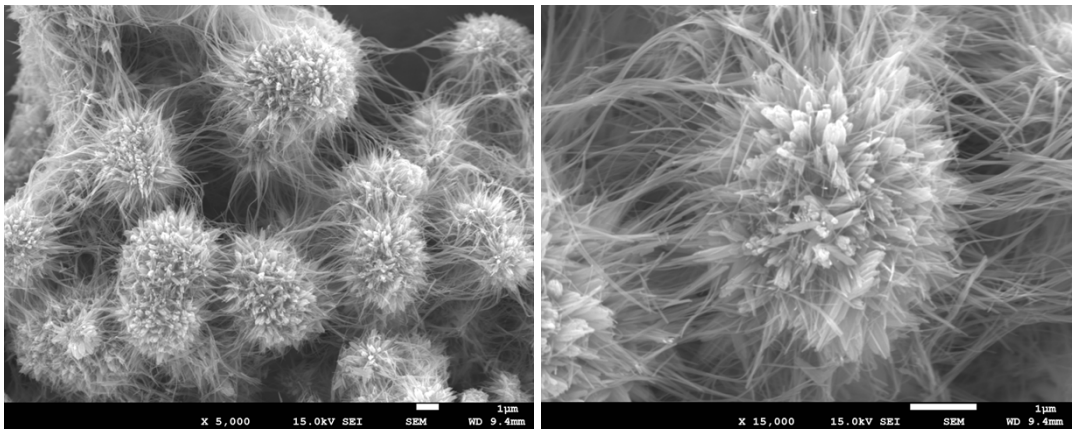

Fig. S8 *SEM images the catalyst after the test of the catalytic ability cycle*

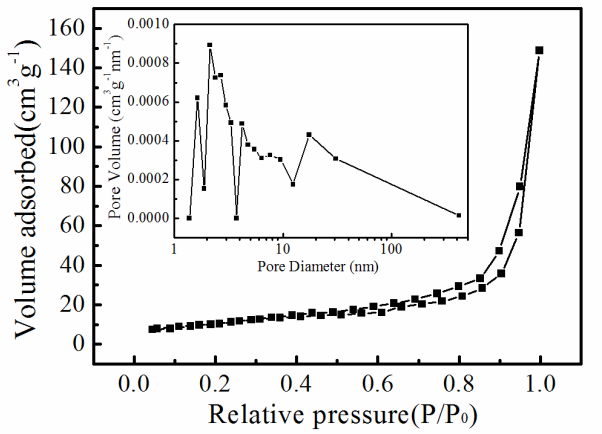

Fig. S9 *Nitrogen adsorption-desorption isotherms and pore size distribution (inset) of the catalyst after the test of the catalytic ability cycle*

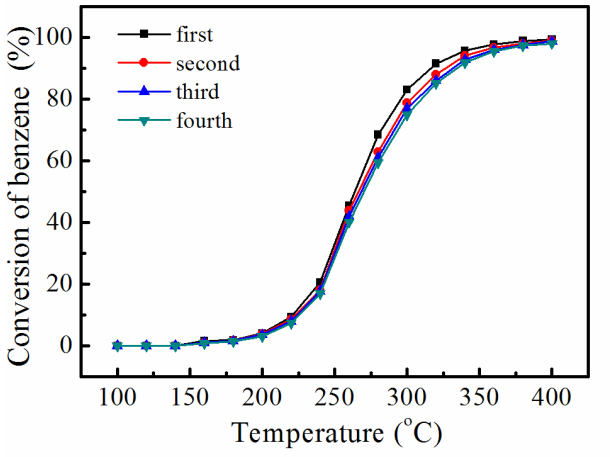

Fig. S10 *The catalytic ability cycle of S3 in the catalytic oxidation of benzene*