Facile hydrothermal synthesis of VO_2 nanosheets as robust catalysts for liquid-phase selective oxidation of benzyl alcohol under atmospheric O_2

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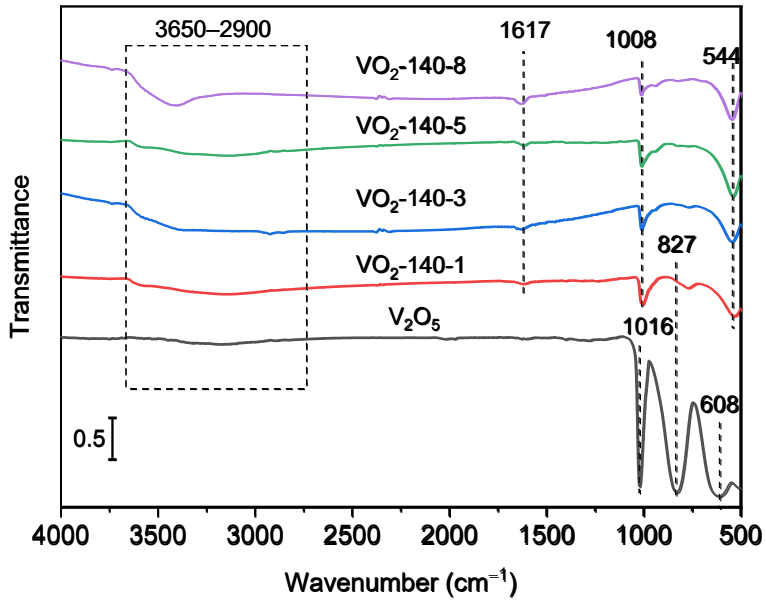

Fig. S1 FT-IR spectra of V_2O_5, VO_2-140-1, VO_2-140-3, VO_2-140-5, and VO_2-140-8 materials.

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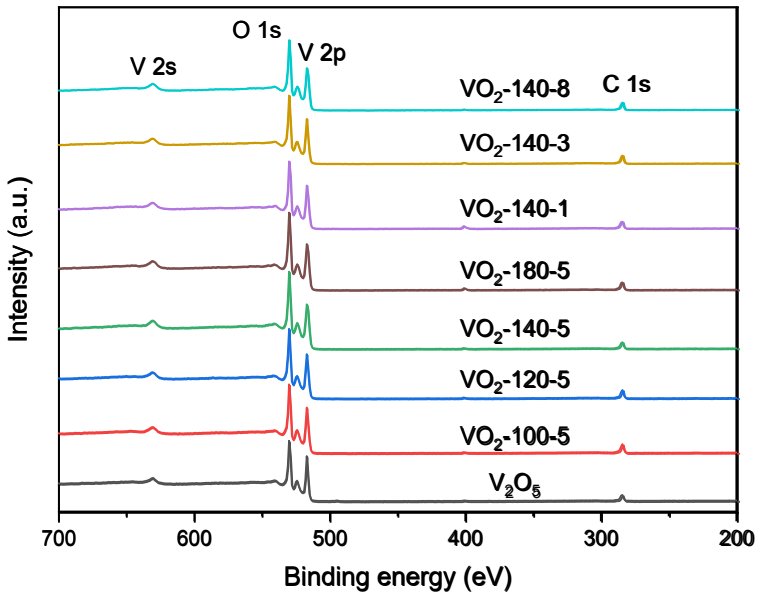

Fig. S2 XPS survey of V_2O_5, VO_2-100-5, VO_2-120-5, VO_2-140-5, VO_2-180-5, VO_2-140-1, VO_2-140-3, and VO_2-140-8.

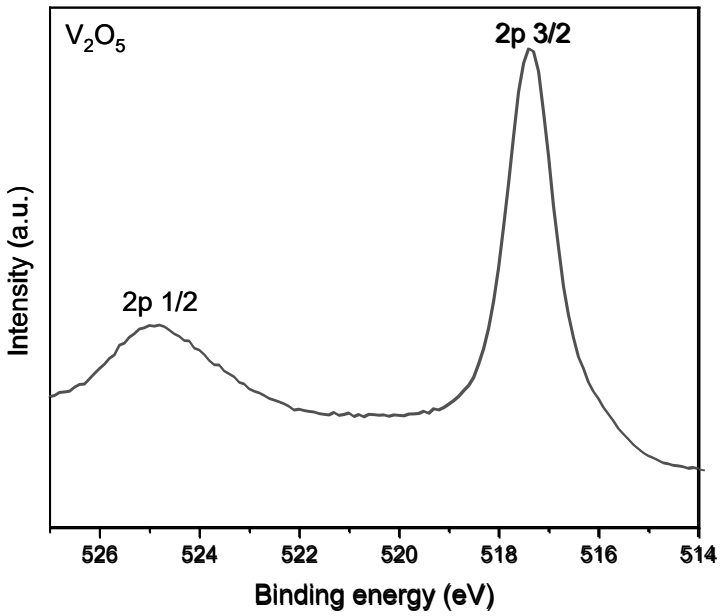

Fig. S3 V 2p spectrum of V_2O_5.

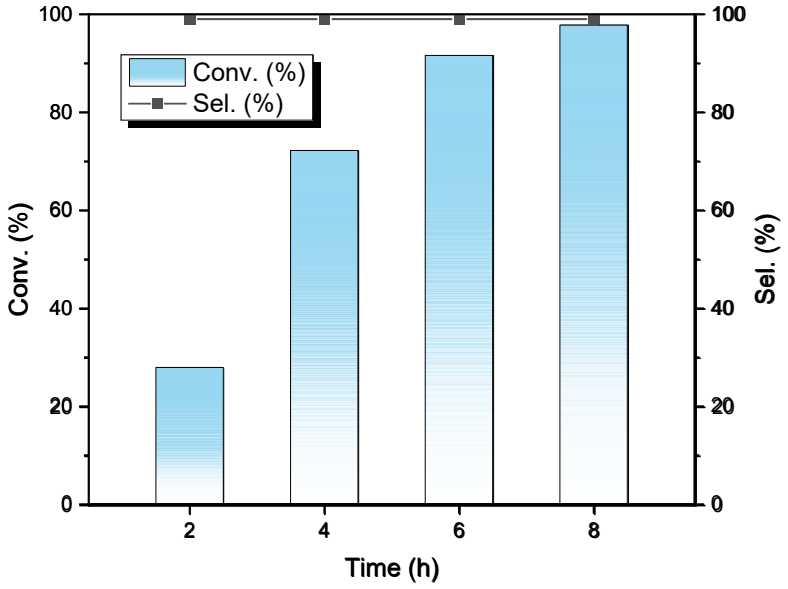

Fig. S4 Influence of reaction time on the catalytic performance of VO_2-140-5. Reaction conditions: 1 mL of BZA, 4 mL of toluene, $W_{catal.}$ = 40 mg, and T = 95 °C.

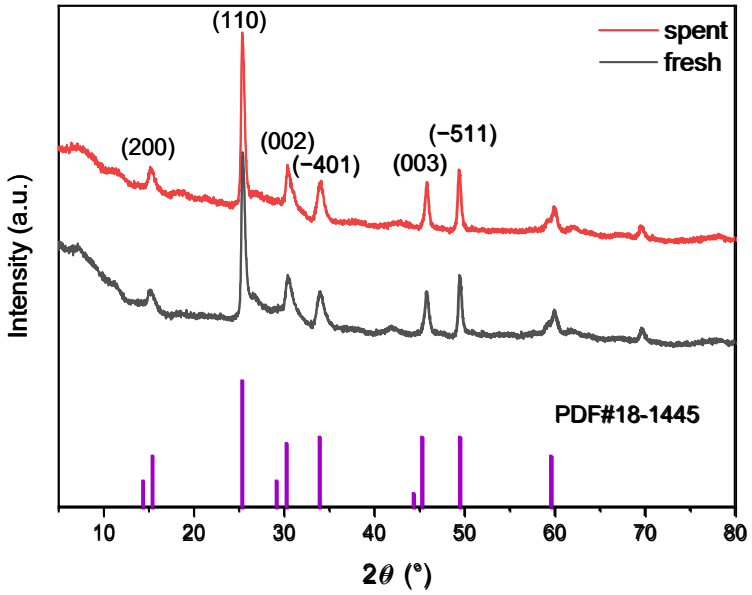

Fig. S5 XRD patterns of the fresh and spent VO_2-140-5.

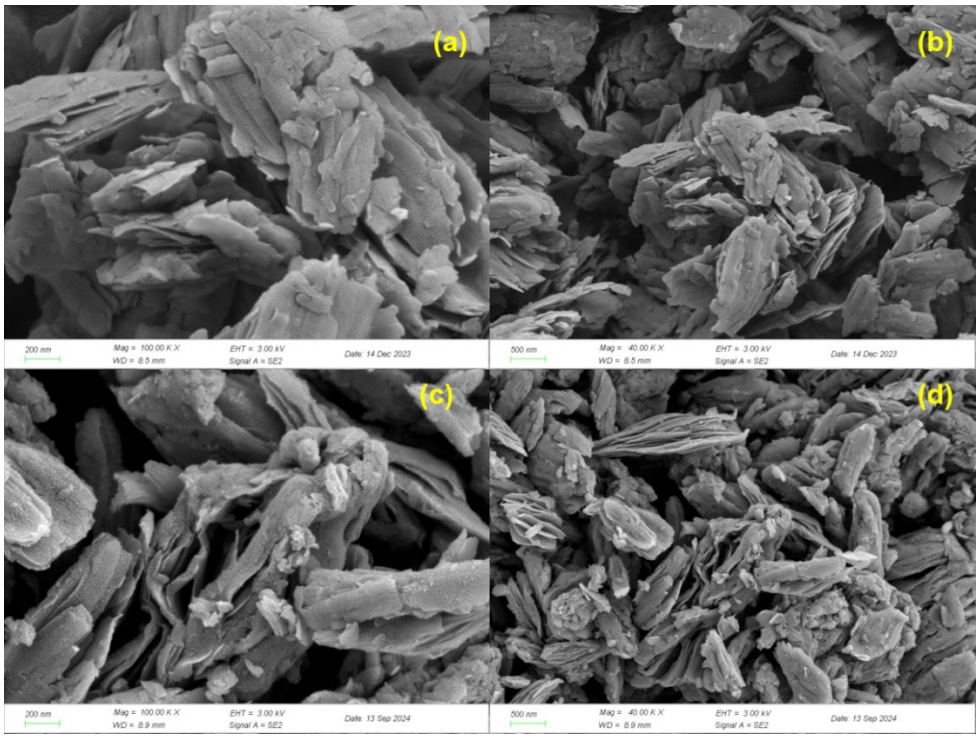

Fig. S6 SEM images of fresh (a&b) and recycled VO_2-140-5 (c&d) catalysts. The figures a and c were the magnified images of figures b and d.

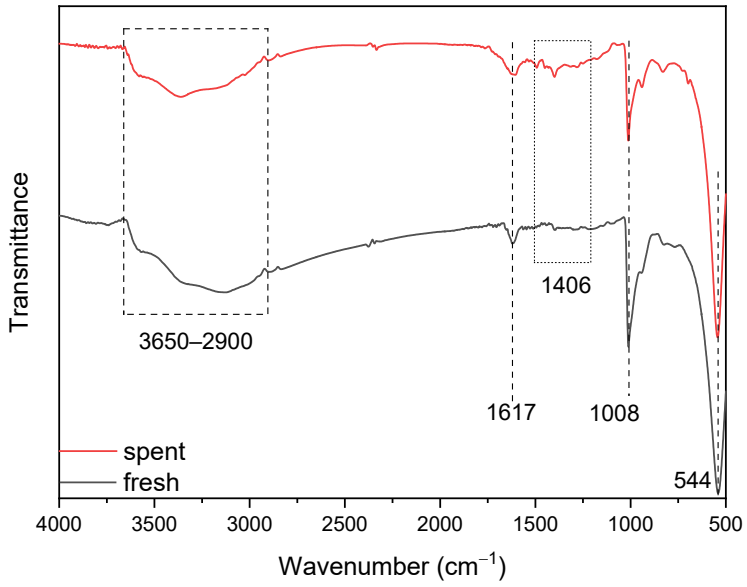

Fig. S7 FT-IR spectra of the fresh and spent VO_2-140-5.

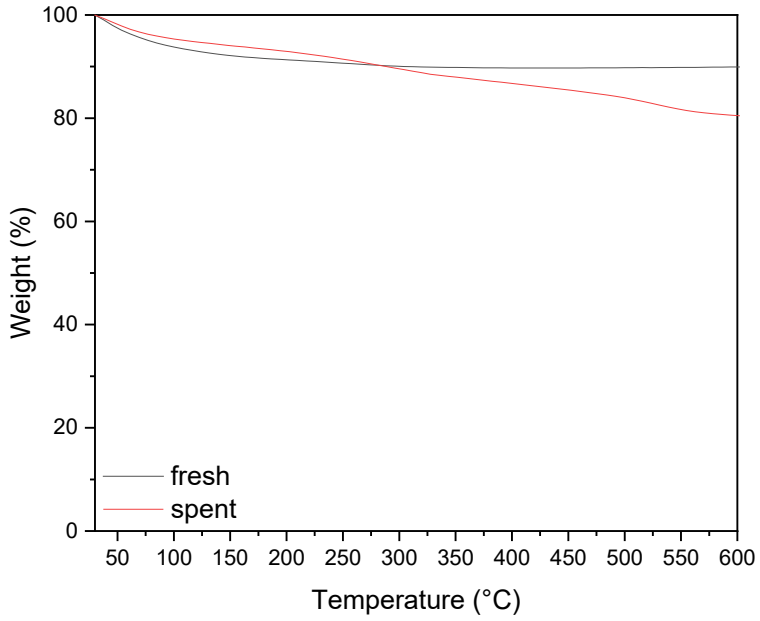

Fig. S8 TG curves (N_2 atmosphere) of the fresh and spent VO_2-140-5 catalysts

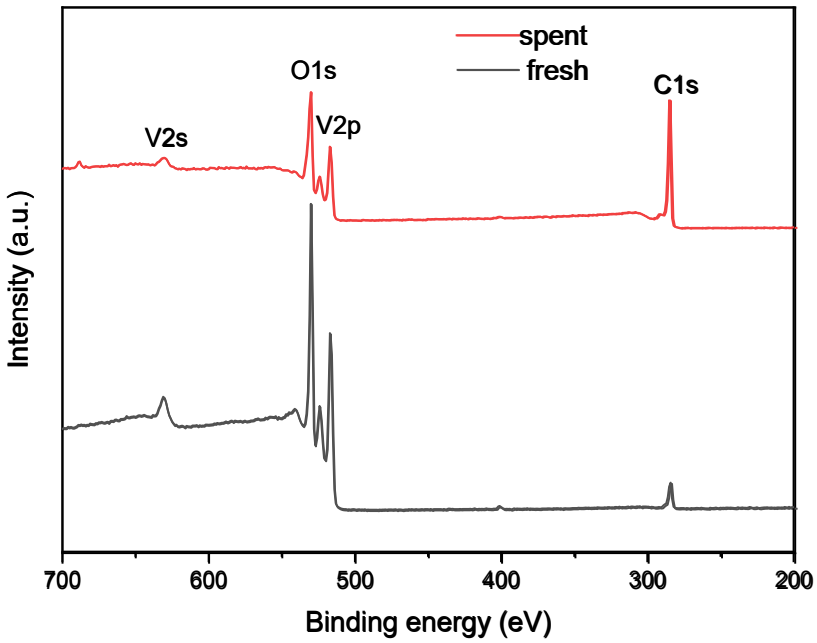

Fig. S9 XPS survey of the fresh and spent VO_2-140-5.

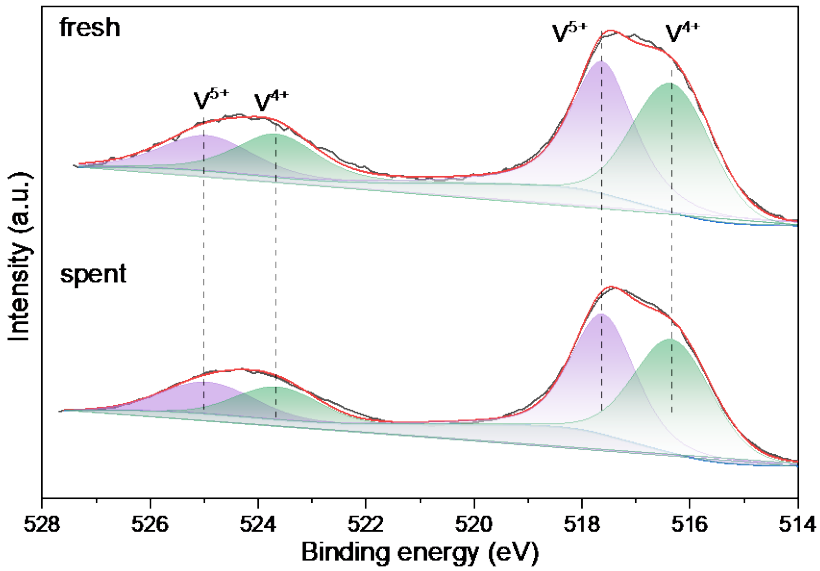

Fig. S10 V 2p spectra of the fresh and spent VO_2-140-5.

Table S1 Molar percentages of various O species.

Material	O_H (%) [a]	O_V (%)	O_L (%)
VO_2-140-1	7.8	20.3	71.9
VO_2-140-3	7.7	25.7	66.6
VO_2-140-5	7.0	28.5	64.5
VO_2-140-8	7.6	26.6	66.8

[a] The O_H, O_V, and O_L indicate hydroxyl oxygen in V–OH, oxygen vacancy, and lattice oxygen, respectively.

Table S2 Catalytic performance of VO_2-140-5 with various volumes of BZA [a].

V_{BZA} (mL)	$V_{toluene}$ (mL)	Conv. (%)	Sel. (%)
1	4	91.6	>99.9
2	3	63.4	>99.9
3	2	20.3	>99.9
4	1	9.6	>99.9
5	–	7.5	>99.9

[a] Reaction conditions: $W_{catal.}$ = 40 mg, T = 95 °C, and t = 6 h