Supplementary Information

Spongy titanosilicate promotes the catalytic performance and reusability of WO_3 in oxidative cleavage of methyl oleate

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1 Experimental

1.1 Characterization

Nitrogen adsorption-desorption isotherms were collected at 77 K on a Quantachrome Auotosorb-iQ2 apparatus. Texture properties were derived from the isotherms using Brunauer-Emmett-Teller (BET) method and t-plot method.

1.2 Catalytic reaction

The reactions were carried out in a 25 mL round-bottom flask under constant temperature and pressure. The reactor was equipped with a condenser, a magnetic stirrer, and an oil bath. A typical procedure for the catalytic oxidative cleavage of MO is as follows: MO, H_2O_2 (30%), WO_3, STS and t-BuOH were fed to the flask. Then, the flask was placed into the oil bath under 80 °C and reacted for 4 h.

1.3 Product analysis

The consumption of H_2O_2 was determined by indirect iodine titration method. Products were determined on Agilent 9790/5875C GC-MS equipped with HP-5MS(30 m×0.25 mm×0.25 m) column. The conversion of MO and product distribution were analyzed on Agilent 9790 GC equipped with a flame ionization detector and SE-54 (30 m×0.25 mm×0.25 m) column with methyl palmitate as internal standard. The conversion and selectivity were calculated according to the following equations.

$$Conversion\ \text{of MO} = \frac{n_{0,\text{MO}} - n_{\text{MO}}}{n_{0,\text{MO}}} \times 100\%$$

$$Selectivity\ \text{of Product} = \frac{n_i}{n_{0,\text{MO}} - n_{\text{MO}}} \times 100\%$$

Where, n_0 is thre mole of compound, *i* refers to generated products, eg. MES, nonyl aldehyde (NA), pelargonic acid (PA), methyl azelaaldehydate (MAA), methyl hydrogen azelate (MHA) and MDS.

2 Results

Table S1 Catalytic performance of different WO_3 and STS content.

m(WO_3)：m(STS)	Conversion (%)	Selectivity (%)					
		NA	PA	MAA	MHA	MES	MDS
0	30.8	5.3	2.5	5.5	2.0	69.5	15.2
0.01	68.9	16.8	0	15.6	0	44.9	22.7
0.02	89.5	26.1	1.8	24.3	1.5	17.2	29.1
0.03	91.9	28.5	2.6	29.7	2.3	6.3	30.6
0.04	92.1	28.3	2.8	29.9	2.6	6.2	30.2

Note: *n*(MO):*n*(H_2O_2):*n*(*t*-BuOH)=1:2.5:20, *m*(catalyst):*m*(MO) = 1:10.

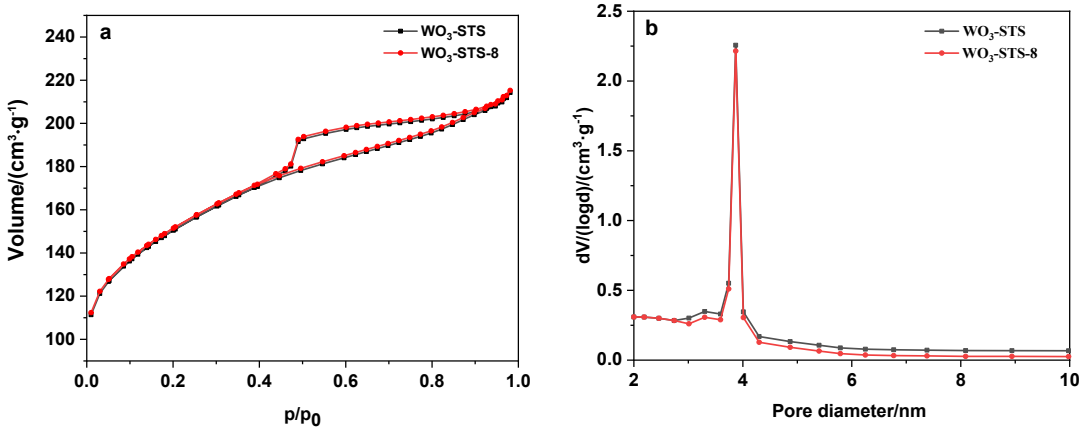

Fig. S1 (a) Nitrogen adsorption-desorption isotherms of WO3-STS and WO3-STS-8, (b) Pore size distribution of WO3-STS and WO3-STS-8.

Table S2 Texture properties of WO_3-STS and WO_3-STS-8.

Samples	S_{BET} ($m^2 \cdot g^{-1}$)	S_{ext} ($m^2 \cdot g^{-1}$)	S_{micro} ($m^2 \cdot g^{-1}$)	V_{meso} ($cm^3 \cdot g^{-1}$)
WO_3-STS	528	129	206	0.143
WO_3-STS-8	519	132	186	0.136