Supporting information

Regulation of the oxygen vacancies of WO_x for highly efficient catalytic epoxidation of cyclooctene

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Materials. All chemical reagents were used as received without any further purification. WCl_6 (99%), cyclooctene (95%), acetonitrile (99%) were purchased from Aladdin. All the other chemicals were from Sinopharm Chemical Reagent Co. Ltd.

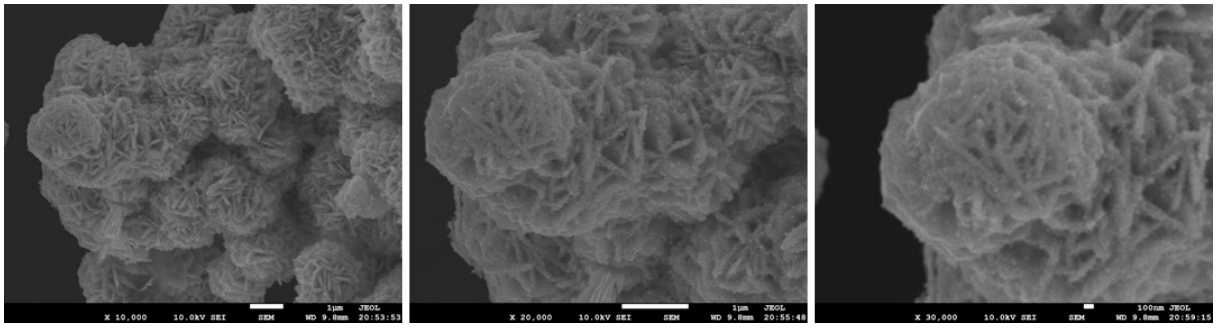

Fig. S1 SEM images of $WO_{2.72}$.

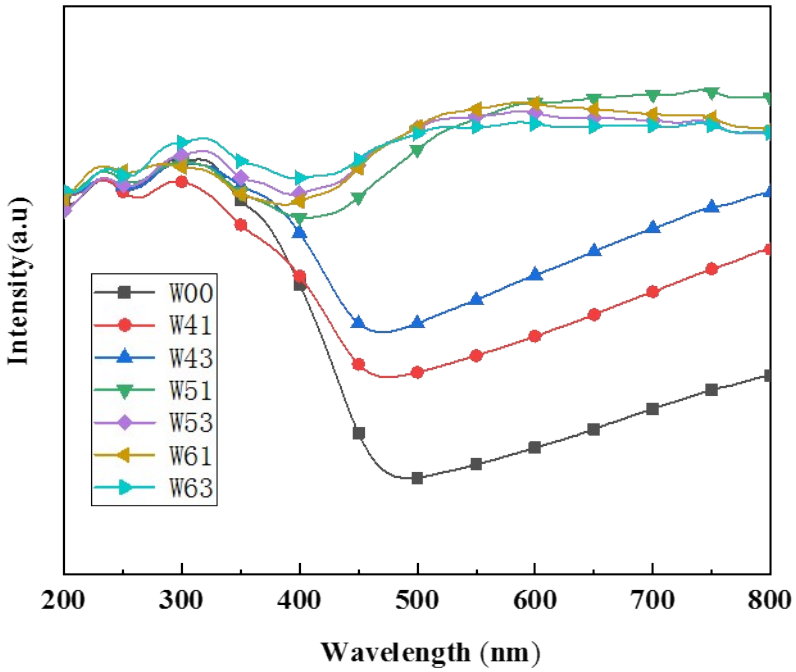

Fig. S2 UV-Vis DRS of different WO_x catalysts.

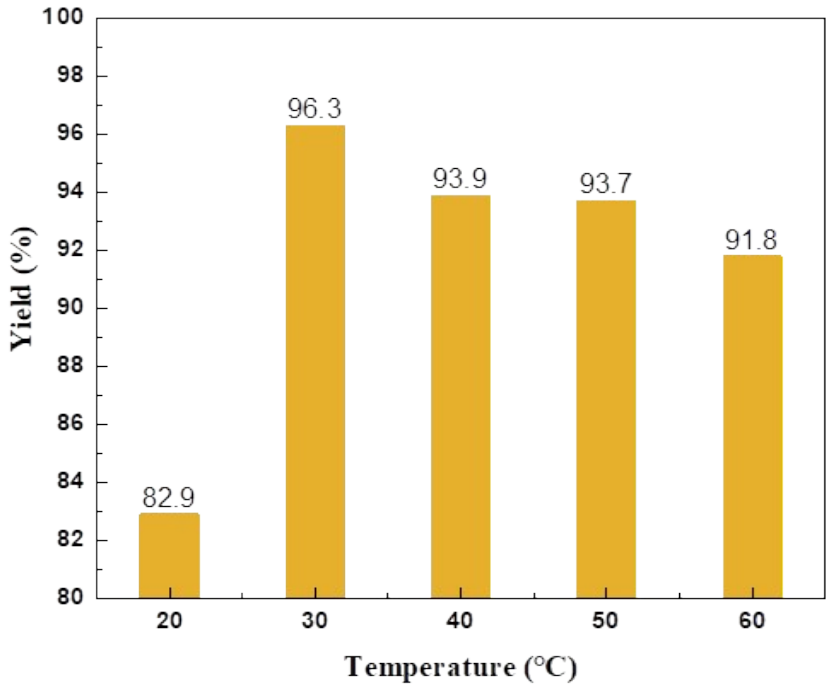

Fig. S3 Influence of reaction temperature on catalytic epoxidation of cyclooctene.

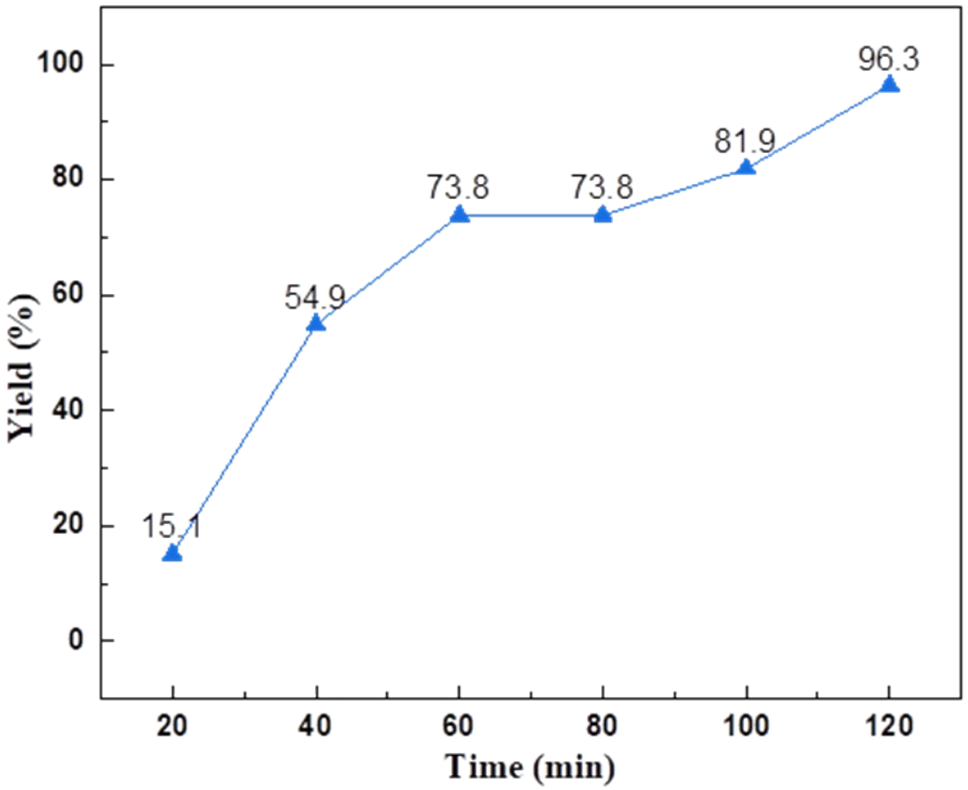

Fig. S4 Time profile of epoxidation of cyclooctene catalyzed by W53.

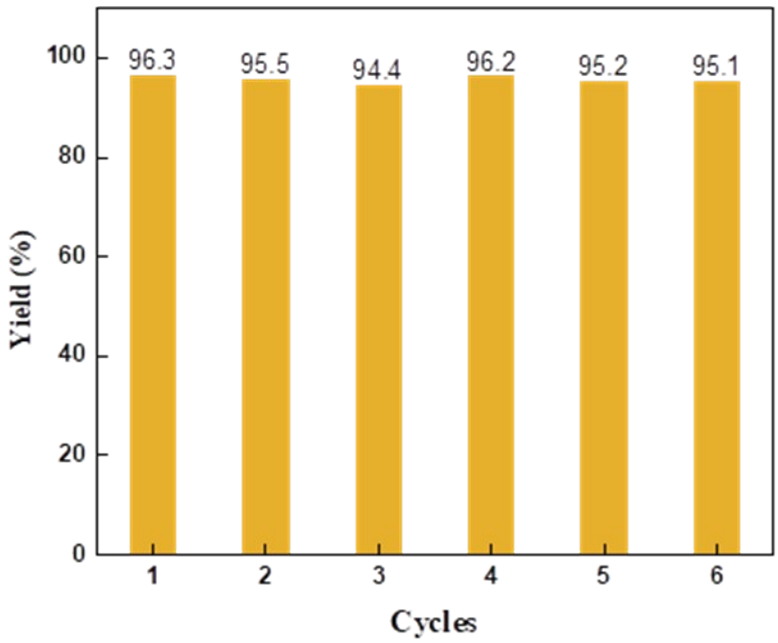

Fig. S5 Recycle stability of W53 catalyst.

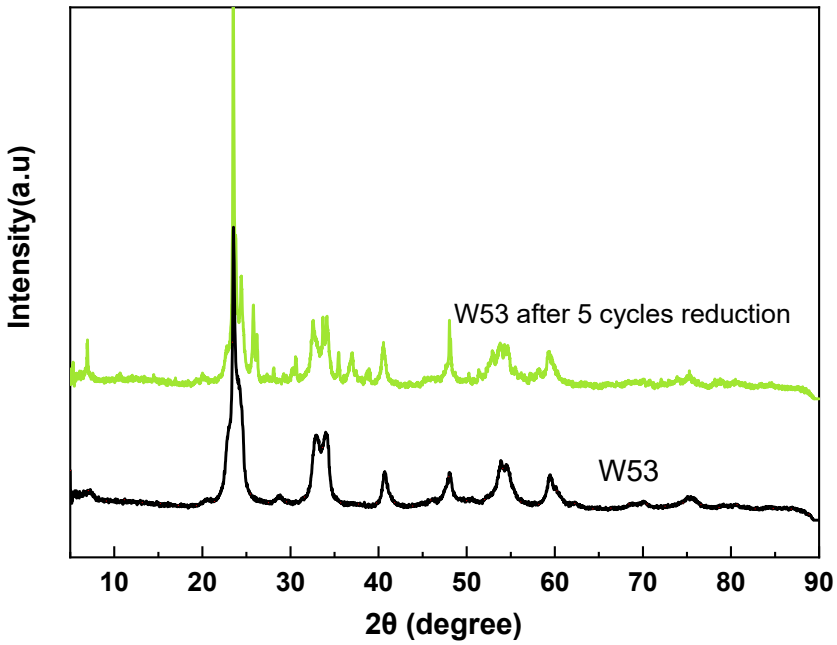

Fig. S6 XRD patterns of W53 catalyst before and after reaction.

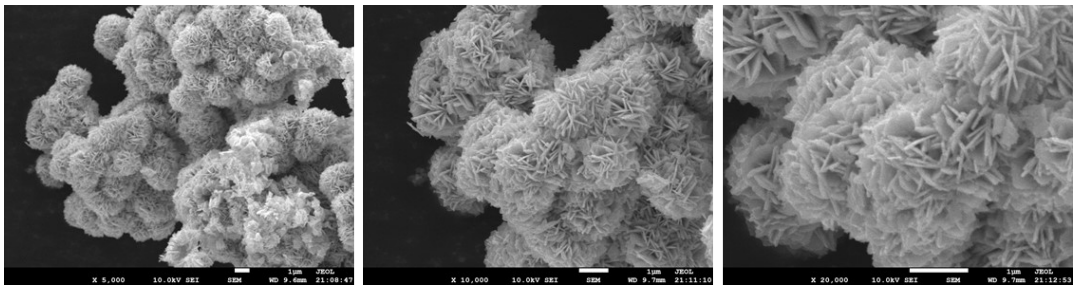

Fig. S7 SEM images of W53 after reaction.

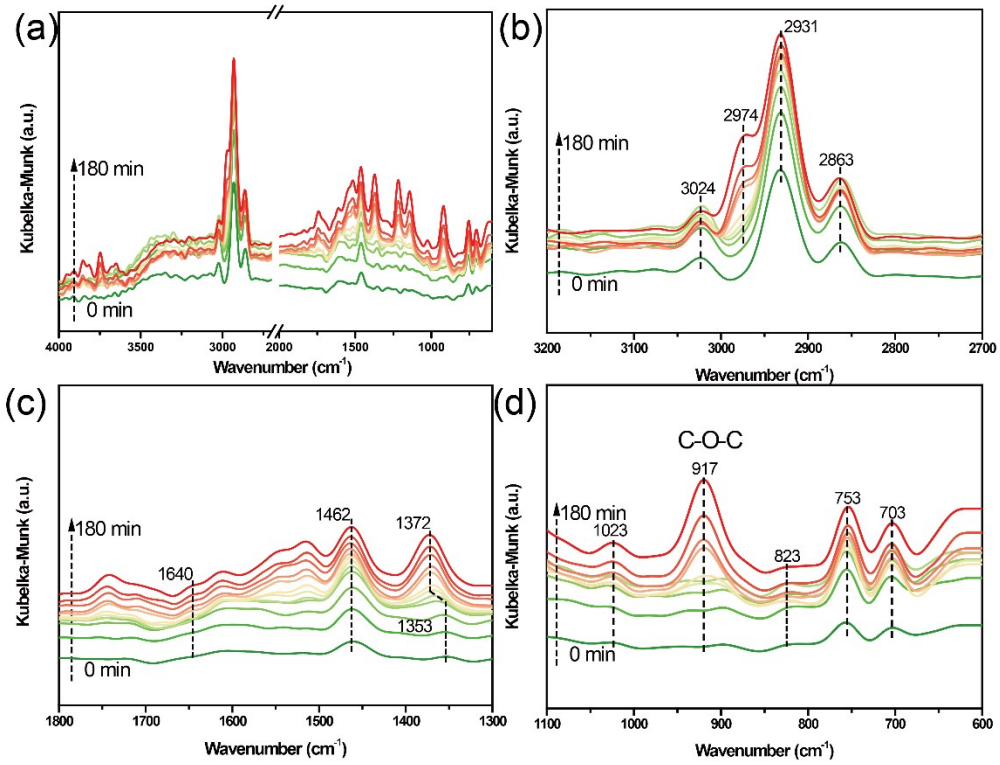

Fig. S8 In situ DRIFTS of epoxidation of cyclooctene over W53 catalyst.

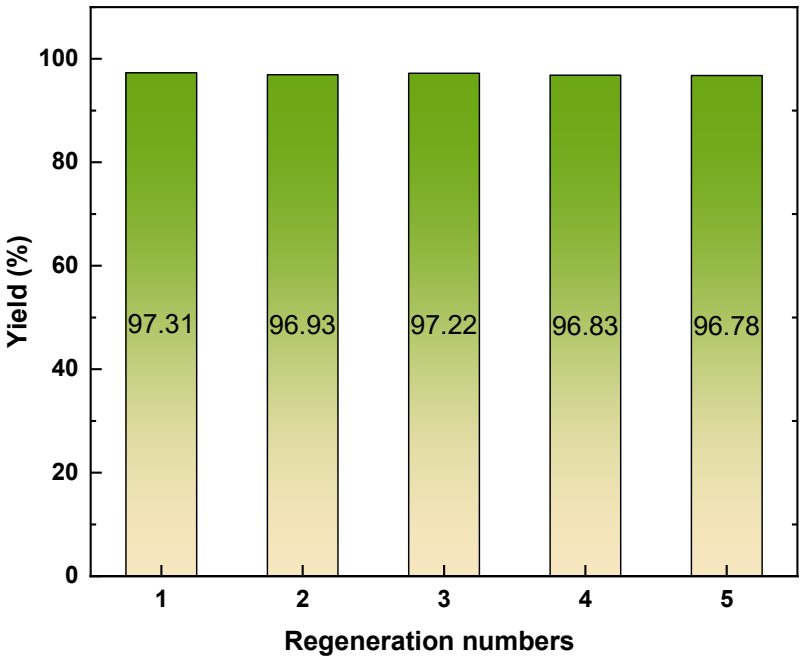

Fig. S9 Regeneration stability of W53 catalyst.

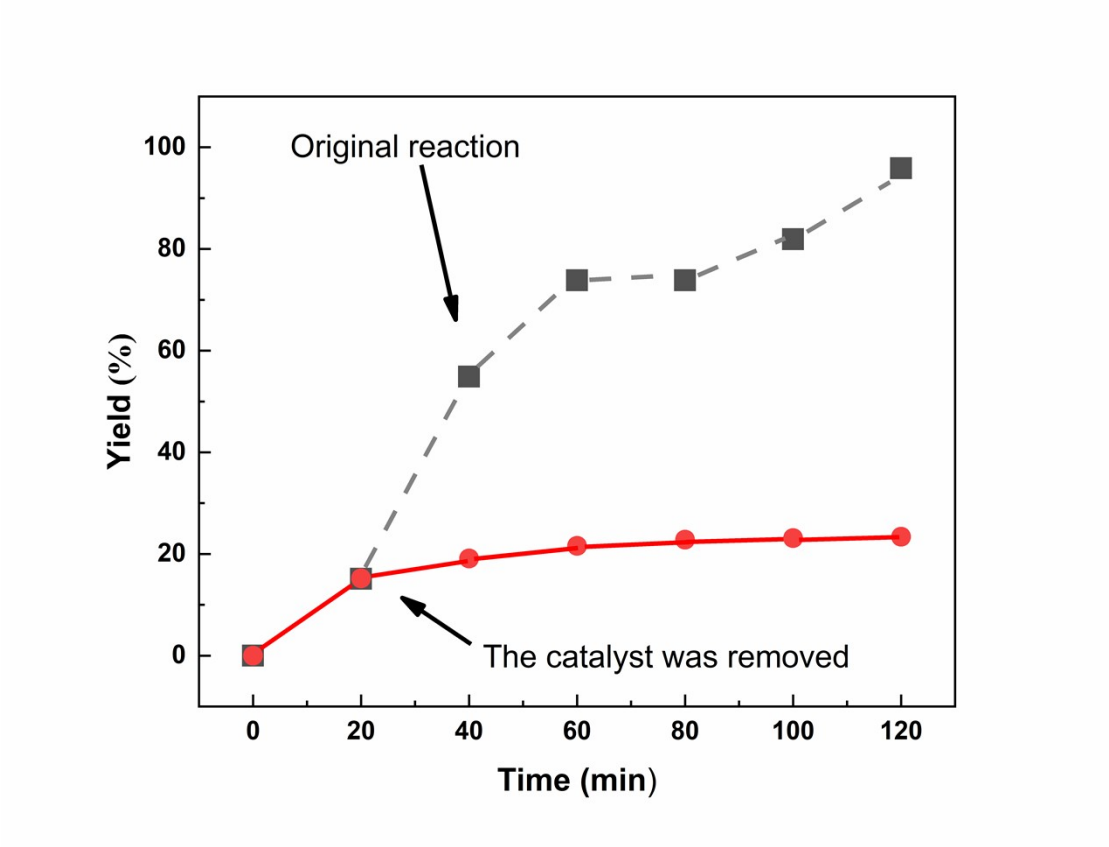

Fig. S10 The catalyst leaching experiment.

Table S1. Comparison between catalyst used in this work and some other typical heterogeneous catalysts preciously reported in catalytic epoxidation of cyclooctene

Entry	Catalyst	Substrate	T (°C)	Solvent	Oxidant	Yield(%)	Sel.(%)	Ref.
1	$[PW_4O_{32}]$	Cyclooctene	65	Ethyl acetate	H_2O_2 30%	99	99	[1]
2	Na_2WO_4/H_2WO_4	Cyclooctene	60	Solvent-free	H_2O_2 30%	99	99	[1]
3	TiO_2-SiO_2	Cyclooctene	60	Acetonitrile	H_2O_2 30%	31	56	[2]
4	molybdenum chelate complexes/MCM-41	Cyclooctene	61	$CHCl_3$	tBuOOH	99	>99	[3]
5	Mn_3O_4	Cyclooctene	70	CH_2Cl_2:CH_3OH (1:1)	tBuOOH	92	>99	[4]
6	Co_3O_4	Cyclooctene	70		tBuOOH	85	>99	[4]
7	$WO_{2.72}$	Cyclooctene	30	Ethyl acetate	H_2O_2 30%	97.6	>99	This work

References

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