Supporting Information

Valence-engineered modulation of MoS_2 clusters for enhancing biocatalytic activity

*Xiaoyan Xue[†a], Meili Guo[*a], Hao Zhang[†b], Qingshan Liu[b], Xuyan Li[b], Xin Sun[b], Xiaoyu Mu[*b], Xiao-Dong Zhang[*b]*

[a]Department of Physics, School of Science, Tianjin Chengjian University, Tianjin 300384, China.

[b]Tianjin Key Laboratory of Brain Science and Neural Engineering, Academy of Medical Engineering and Translational Medicine, Tianjin University, Tianjin 300072, China. E-mail: xiaodongzhang@tju.edu.cn;

**Correspondence to Xiao-Dong Zhang, E-mail: xiaodongzhang@tju.edu.cn. Meili Guo, E-mail: meiliguo314@163.com. Xiaoyu Mu, E-mail: muxiaoyu@tju.edu.cn.*

† These authors contributed equally to this work

Fig. S1. Unique Tyndall effect for (a) water, (b) MoS_2 clusters and (c) Ce-MoS_2 clusters under 532 nm excitation.

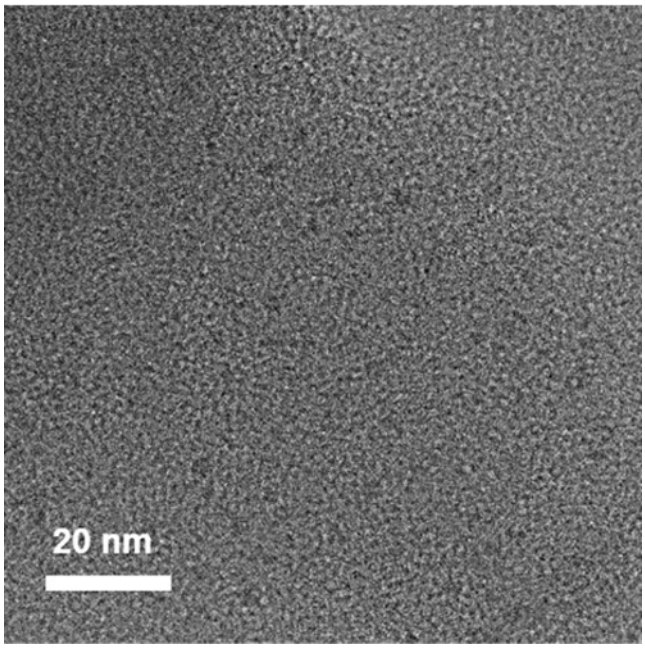

Fig. S2. TEM image of MoS_2 clusters. Scale bar: 20 nm.

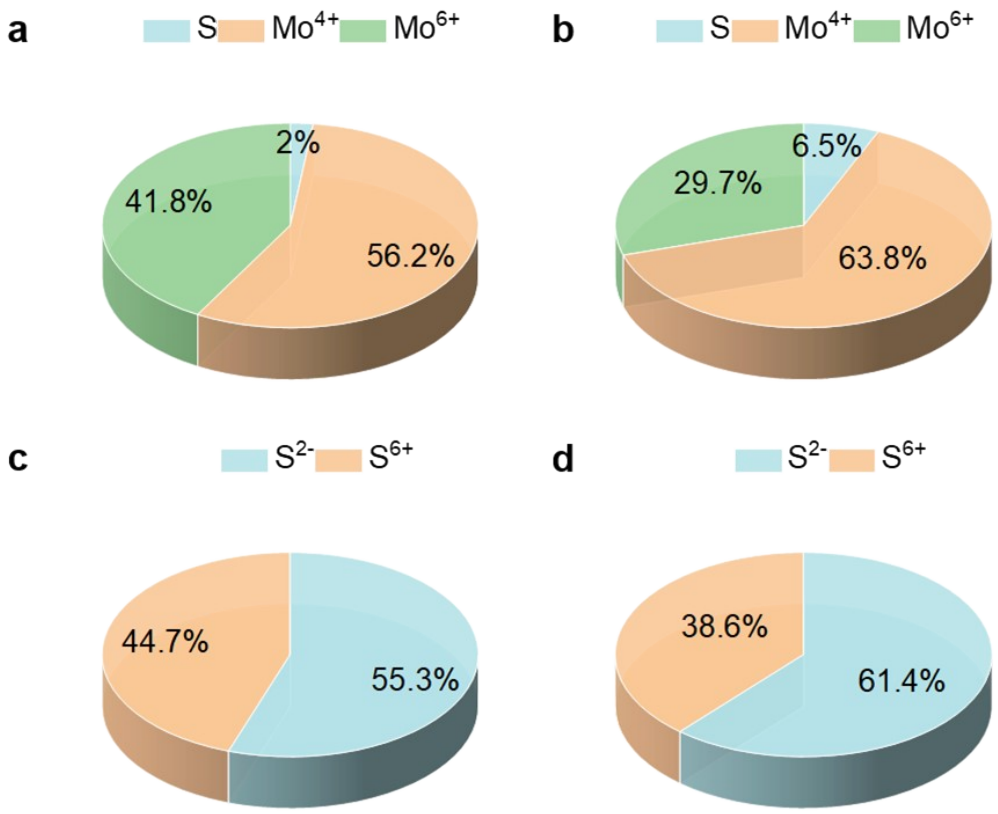

Fig. S3. Distribution of elemental content in XPS spectra. Elemental content distribution of Mo 3d in (a) MoS_2 clusters and (b) Ce-MoS_2 clusters. Elemental content distribution of S 2p in (c) MoS_2 clusters and (d) Ce-MoS_2 clusters.

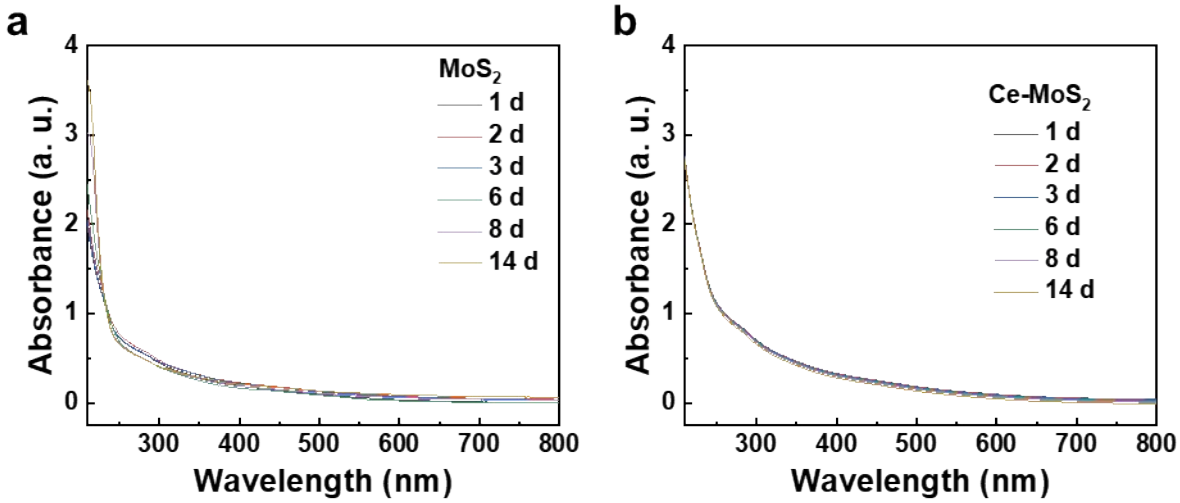

Fig. S4. UV-vis absorption spectra for 14 consecutive days of (a) MoS_2 clusters and (b) Ce-MoS_2 clusters, indicating high stability.

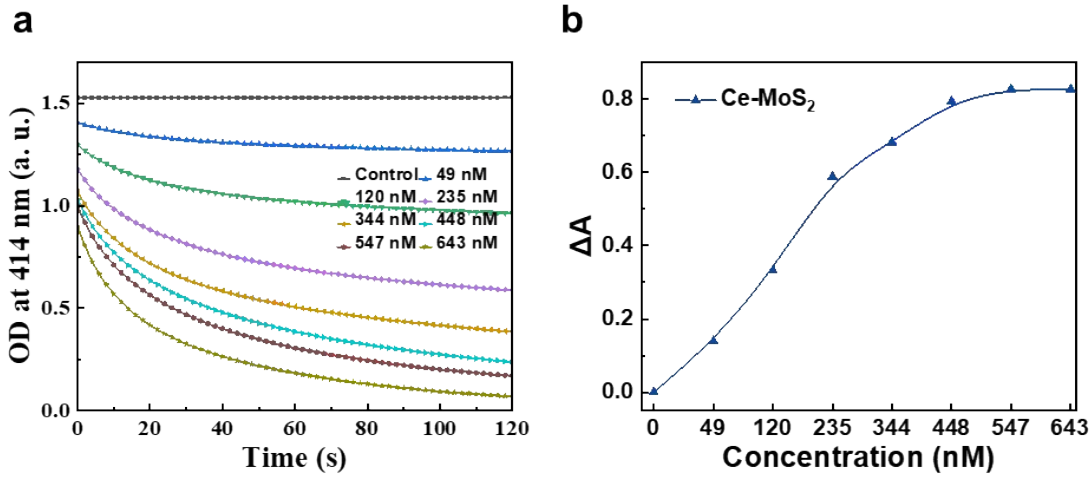

Fig. S5. (a) Time-dependent changes in absorbance value at 414 nm with Ce-MoS_2 clusters at different concentrations. (b) Absorbance difference with concentration of Ce-MoS_2 clusters.

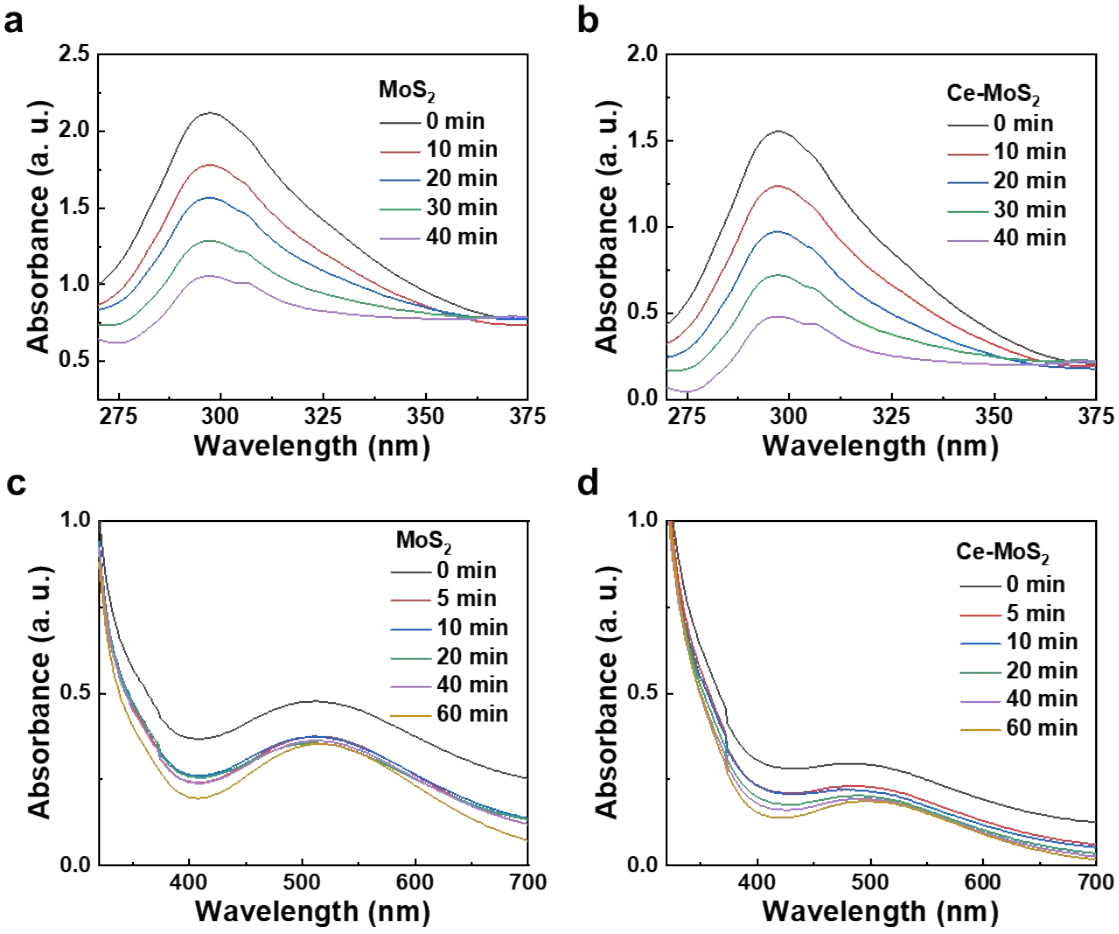

Fig. S6. RNS scavenging properties of MoS_2 and Ce-MoS_2 clusters. UV-vis absorption spectra of $ONOO^-$ eliminated by (a) MoS_2 and (b) Ce-MoS_2 clusters at different times**.** UV-vis

absorption spectra of DPPH• eliminated by (c) MoS_2 and (d) Ce-MoS_2 clusters at different times.