

**Oxygen deficiency introduced Z-scheme CdS/WO_{3-x} nanomaterials
with MoS₂ as cocatalyst towards enhancing visible-light-driven
hydrogen evolution**

Fengyuan Li,^a Yanping Hou,^{a,b} Zebin Yu,^{*a} Lun Qian,^a Lei Sun,^c Jun
Huang,^d Qi Ran,^a Ronghua Jiang,^e Qianqian Sun,^a Heqing Zhang^a

^aSchool of Resources, Environment and Materials, Guangxi University, Nanning
530004, PR China

^bGuangxi Bossco Environmental Protection Technology Co., Ltd, 12 Kexin Road,
Nanning 530007, China

^cCollege of Chemical Engineering and Technology, Hainan University, Haikou
570228, PR China

^dCollege of Civil Engineering, Guangxi University, Nanning 530004, PR China

^eSchool of Chemical and Environmental Engineering, Shaoguan University,
Shaoguan 512005, PR China

*Corresponding author: Tel.: + 8613877108420;

E-mail: xxzx7514@hotmail.com (Z. Yu)

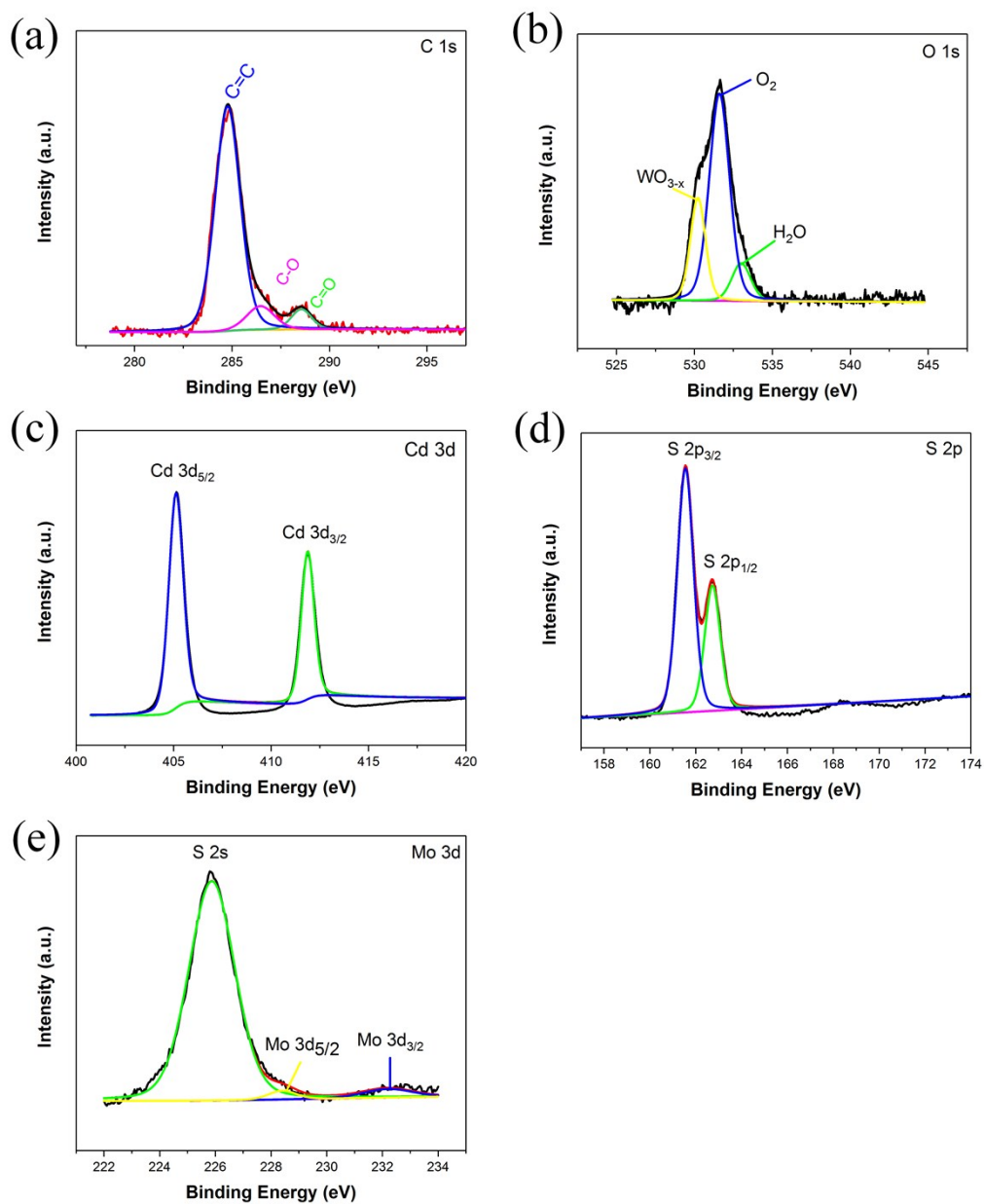


Fig. S1 XPS spectra of M0.1CW30-120:(a) C 1s, (b) O 1s, (c) Cd 3d, (d) S 2p, (e) Mo 3d.

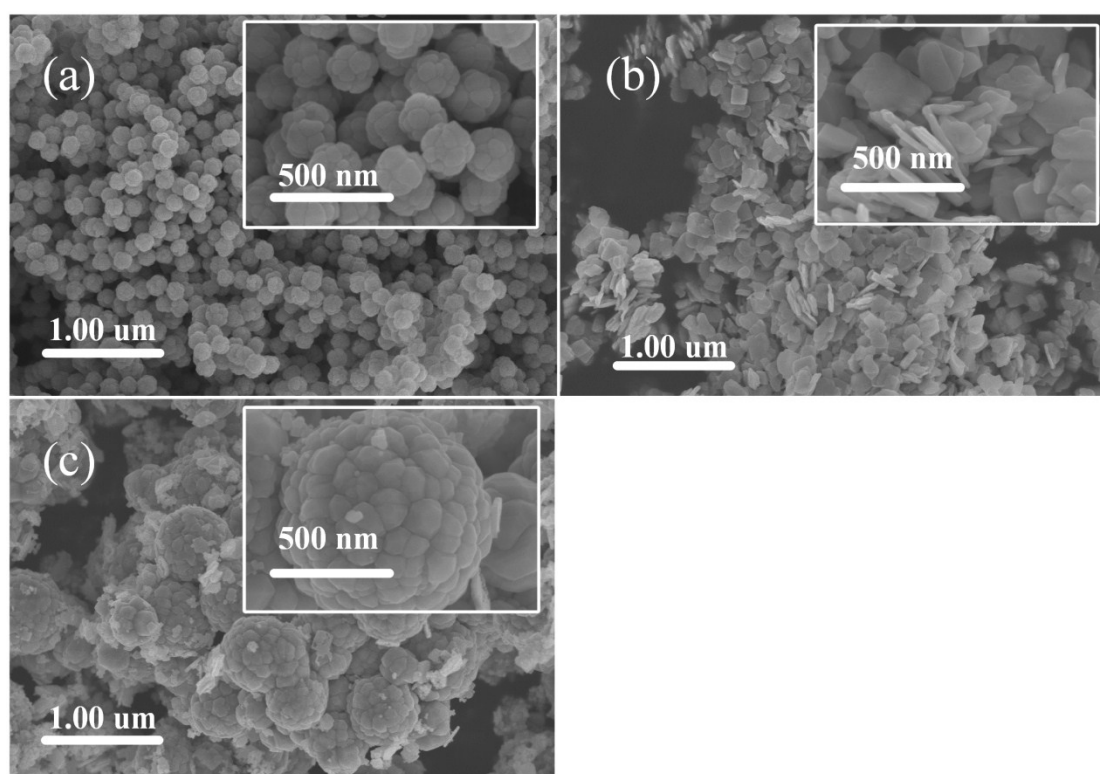


Fig. S2 FE-SEM of catalysts: (a) pure CdS, (b) WO_{3-x} , (c) CW30.

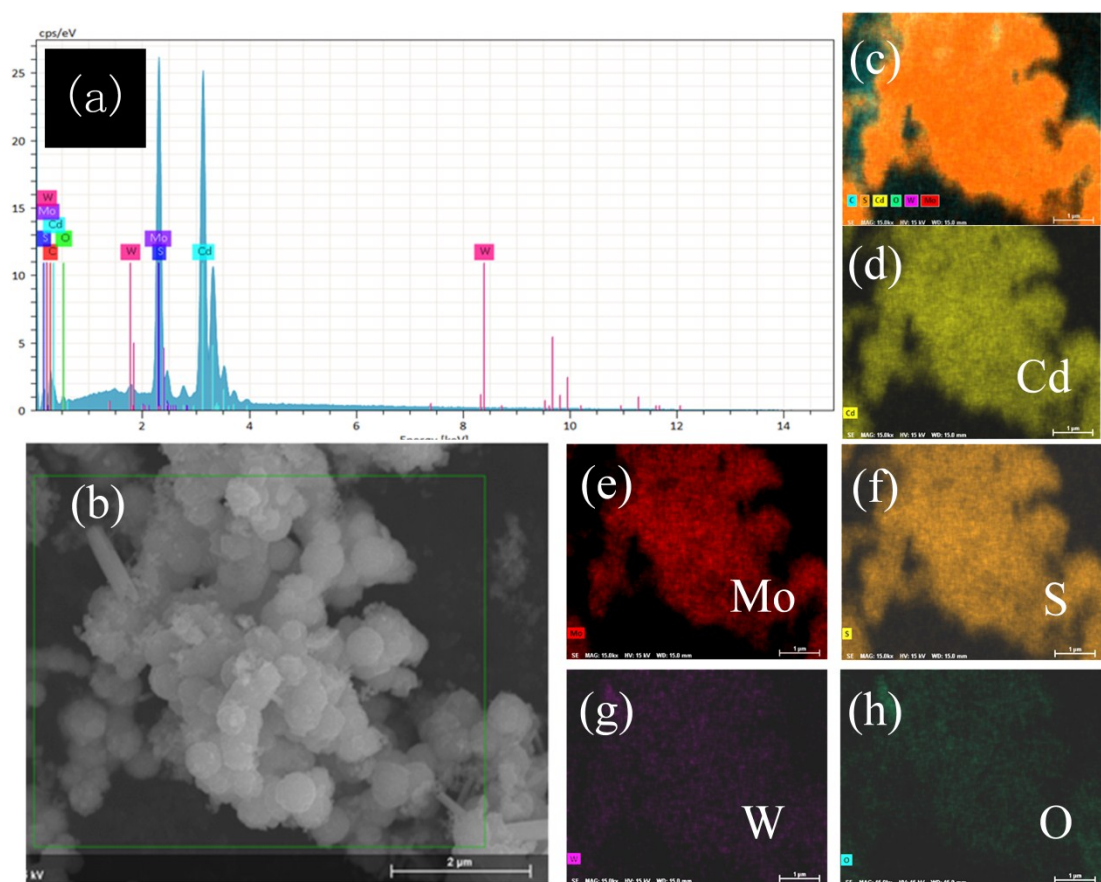


Fig. S3. The EDS (a), SEM image (b) and element mapping of M0.1CW30-120 : (c) general map, (d) Cd element, (e) Mo element, (f) S element, (g) W element and (h) O element.

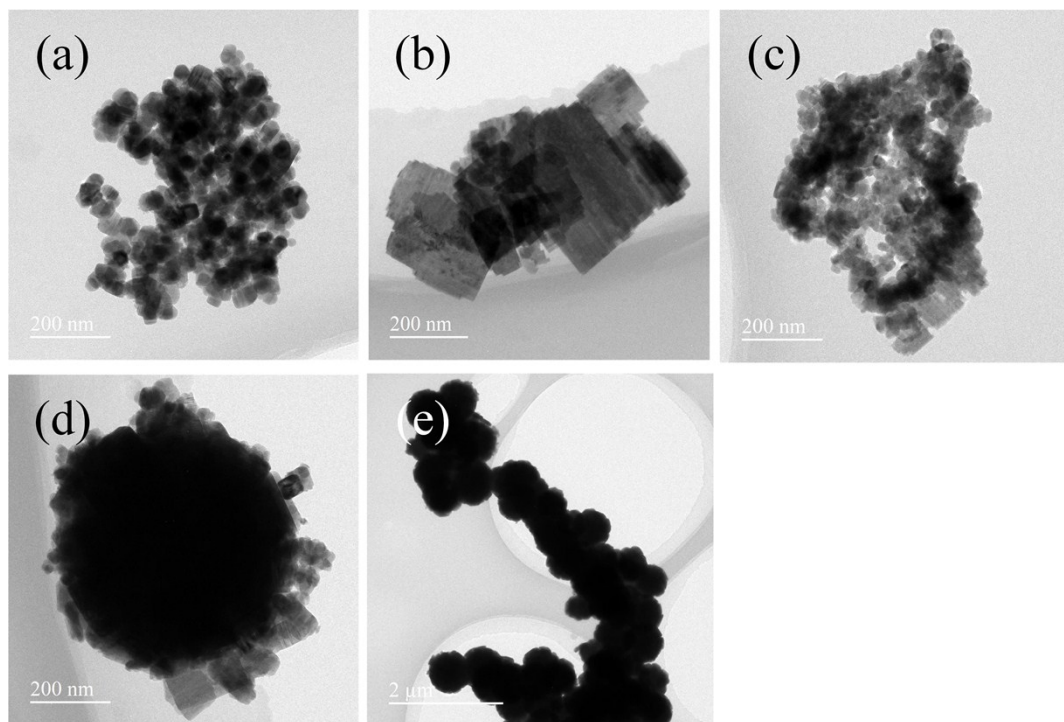


Fig. S4. TEM images of M0.1CW30-120:(a-e).

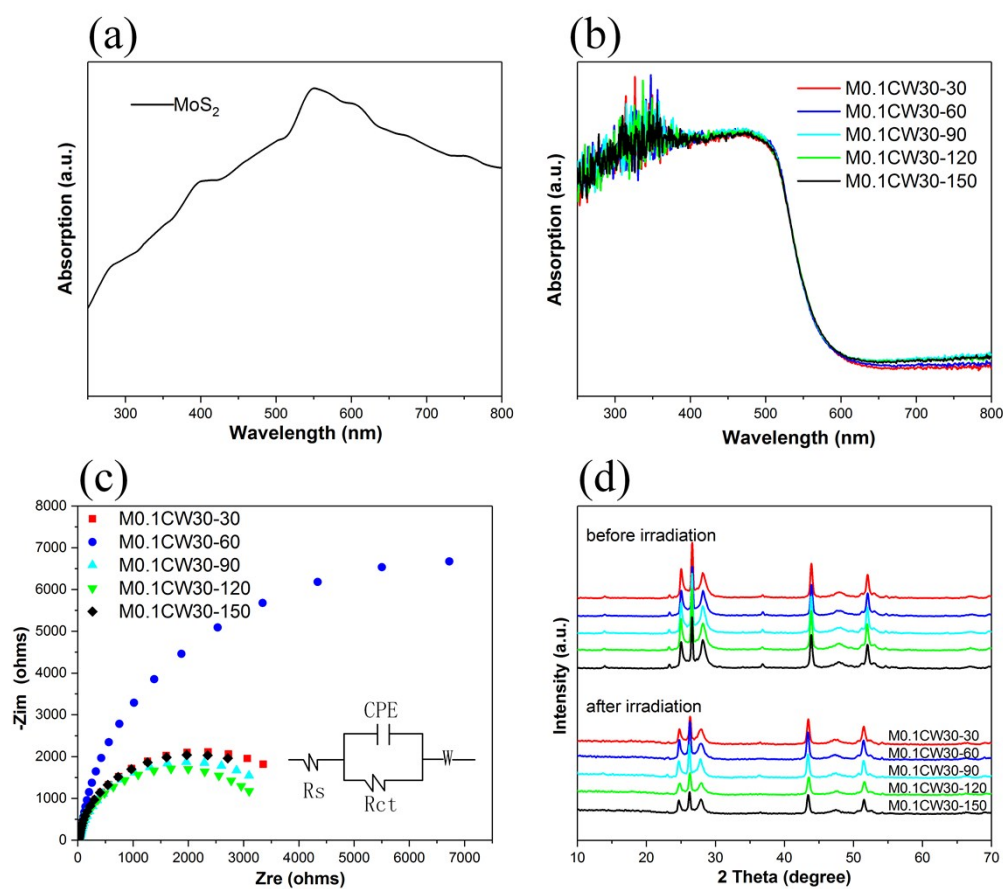


Fig. S5. UV-vis DRS spectra of MoS₂ (a), The composites prepared with different synthesis time (b). (c) EIS spectra of composites prepared with different synthesis time. (d) XRD patterns contrast of ternary photocatalysts before and after 4 cycles.

Table S1. The photocatalytic hydrogen productions from different catalysts in this study.

Photocatalyst	Activity ($\mu\text{mol/g/h}$)
CdS	519.1
CdS/5 wt% WO_3	341.7
CdS/10 wt% WO_3	452.1
CdS/20 wt% WO_3	1171.5
CdS/30 wt% WO_3	1879.0
CdS/40 wt% WO_3	520.8
0.1 wt% MoS_2 /CdS/30 wt% WO_3	2163.1
0.3 wt% MoS_2 /CdS/30 wt% WO_3	2044.1
0.5 wt% MoS_2 /CdS/30 wt% WO_3	2004.0
0.7 wt% MoS_2 /CdS/30 wt% WO_3	901.7
0.1 wt% MoS_2 /CdS/30 wt% WO_3 - 30	2163.1
0.1 wt% MoS_2 /CdS/30 wt% WO_3 - 60	1259.4
0.1 wt% MoS_2 /CdS/30 wt% WO_3 - 90	2183.8
0.1 wt% MoS_2 /CdS/30 wt% WO_3 - 120	2852.5
0.1 wt% MoS_2 /CdS/30 wt% WO_3 - 150	1572.8