Electronic Supplementary Information

Synergism of Carbon Quantum Dots and Au Nanoparticles with Bi_2MoO_6 for Activity Enhanced Photocatalytic Oxidative Degradation of Phenol

Qiang Zhao[1†], Zhuangzhuang Zhang[1†], Ting Yan[1], Li Guo[1], Chunming Yang[1], Ge Gao[1], Yu Wang[1], Feng Fu[1*], Bin Xu[1,2*],Danjun Wang[1,2*]

[1] College of Chemistry & Chemical Engineering, Yan'an University, Shaanxi Key Laboratory of Chemical Reaction Engineering, Yan'an 716000, China

[2] State Key Laboratory of Organic-Inorganic Composites, Beijing Key Laboratory of Electrochemical Process and Technology for Materials, Beijing University of Chemical Technology, Beijing 100029, China

*Corresponding authors

E-mail address: yadxfufeng@126.com

E-mail address: binxumail@163.com

E-mail address: wangdj761118@163.com

† These authors contributed equally to this work.

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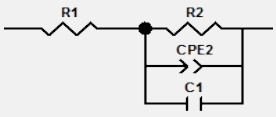
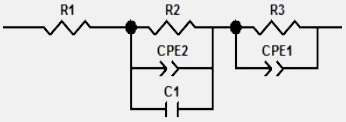
Table S1 Photocatalytic activity comparison of Bi_2MoO_6-based photocatalysts.

Catalyst	Light source	Photocatalytic activities						Refs.
	[a]type/power (W)	[b]t time(min)	[c]$C_{pollutants}$ ($mg·L^{-1}$)	[d]$C_{catalyst}$ ($g·L^{-1}$)	[e]k_{app}/($\times10^{-4}min^{-1}$)	[f]η(%)	[g]TR(%)	
$CQDs/Bi_2MoO_6$	300 W Xe lamp λ > 400 nm	120	BPA, 10 $mg·L^{-1}$	1.0	-	54	-	[36]
Au/Bi_2MoO_6@TiO_2 NTAs	300 W Xe lamp	300	Phenol, 10 $mg·L^{-1}$	-	31	65	-	[43]
		90	BPA, 10 $mg·L^{-1}$	-	108	63	-	
	300 W mercury lamp	300	Phenol, 10 $mg·L^{-1}$	-	126	89	68	
		90	BPA ,10 $mg·L^{-1}$	-	197	93	-	
$Fe(III)/Bi_2MoO_6$	400 W halogen lamp	180	Phenol, 10 $mg·L^{-1}$	1.0	150.3	93.4	85.6	[45]
Au/Bi_2MoO_6	400 W halogen lamp	180	Phenol, 10 $mg·L^{-1}$	1.0	84.9	100	45.0	[46]
Ag/Bi_2MoO_6-SOVs	400W halogen lamp	180	Phenol, 10 $mg·L^{-1}$	1.0	343.9	100	57.1	[56]
		180	4-nitrophenol, 10 $mg·L^{-1}$	1.0	77.8	-	48.7	
Bi_2O_3/Bi_2MoO_6	400W halogen lamp	180	Phenol, 10 $mg·L^{-1}$	1.0	145.8	96.4	75.5	[60]
Pd-rGO-Bi_2MoO_6	300W halogen tungsten 310~800 nm	120	Phenol, 10 $mg·L^{-1}$	1.0	161.0	88.2	-	[66]
F-Bi_2MoO_6	500W Xe lamp Simulated Sunlight	300	4-chlorophenol, 20 $mg·L^{-1}$	0.5	132	33.6	28.6	[67]
		100	Phenol, 20 $mg·L^{-1}$	0.5		80.7	80.2	
		100	BPA, 20 $mg·L^{-1}$	0.5		98.3	77.8	
Bi_2MoO_{6-x}@Bi_2MoO_6	250 W Xenon lamp	240	Phenol, 10 $mg·L^{-1}$	1.0	52.9	70.2	-	[68]
Bi_2MoO_6/CNTs/g-C_3N_4	500W Xenon lamp (λ > 420 nm)	120	2,4-dibromophenol, 20 $mg·L^{-1}$	1.0	78	68.2	49.8	[69]
CdS/Bi/Bi_2MoO_6	solar light	60	Phenol, 20 $mg·L^{-1}$	1.0	-	47.5	-	[70]
CQDs/Au/Bi_2MoO_6-SOV	400W halogen lamp	120	Phenol, 10 $mg·L^{-1}$	1.0	228.2	94	72.4	this work

Note: [a] UVC-lamp were the UV-light sources, Xe lamp, tungsten lamp and halogen lamp(λ > 420 nm) were the visible-light source; [b]irradiation time; [c]concentration of pollutants; [d]concentration of photocatalyst, $g·L^{-1}$; [e]Apparent rate constants, ($k_{app}/\times10^{-4}min^{-1}$); [f]Degradation rate, η(%); [g]TOC Removal rate,TR, %.

Table S2 The equivalent circuit model for electrochemical impedance spectroscopy (EIS) of samples

	BMO	BMO-SOVs	CQDs/BMO	Au/BMO	CQDs/Au/BMO
The equivalent circuit model					
R_1/Ω	20.19	17.95	16.21	15.63	20.4
R_2/Ω	35995	30006	21731	2873	14733
R_3/Ω	-	-	-	21928	3334

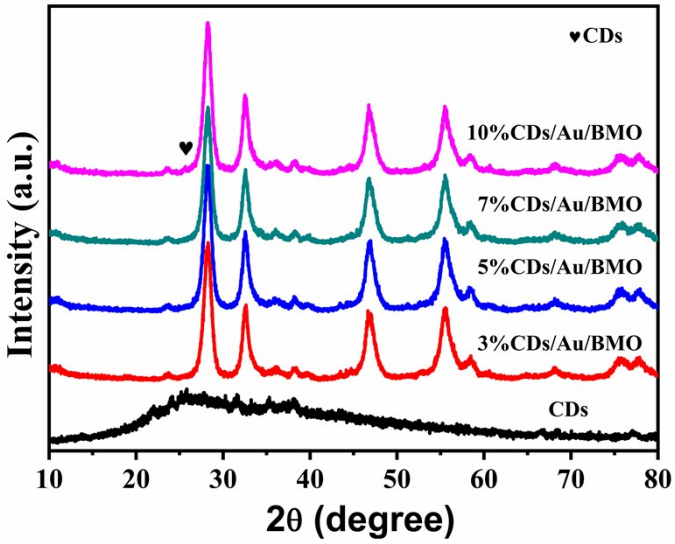


Fig. S1 XRD patterns of series of CQDs/Au/BMO heterostructures and CQDs.

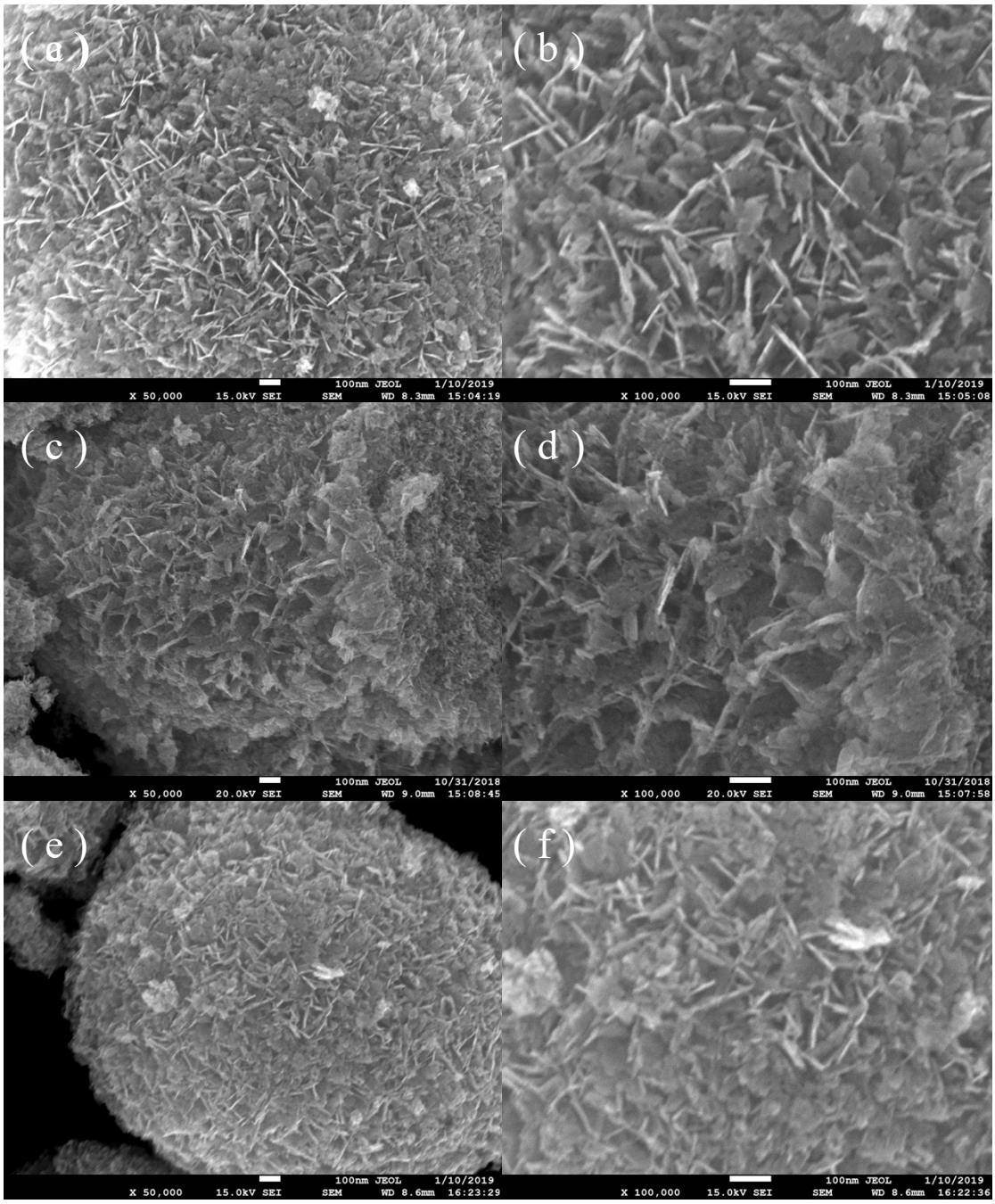


Fig. S2 FE-SEM images of BMO-SOVs(a,b), Au/BMO(c,d) and CQDs/BMO(e,f).

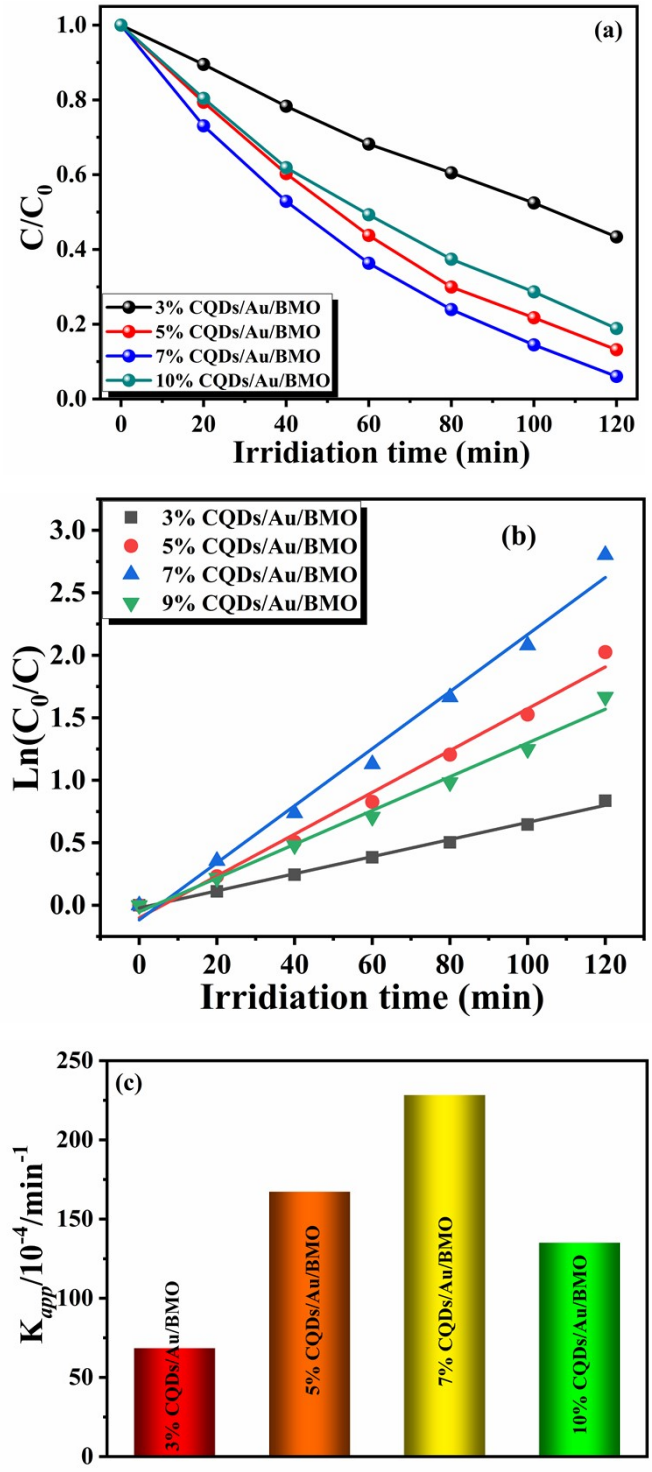


Fig. S3 (a) photocatalytic degradation efficiency of phenol by the series of CQDs/Au/BMO composites, (b) kinetic plot of C/C_0 versus with irradiation time for the photo-degradation of phenol, (c) The photodegradation rate constants(K_{app}/min^{-1}) of phenol using different catalysts.

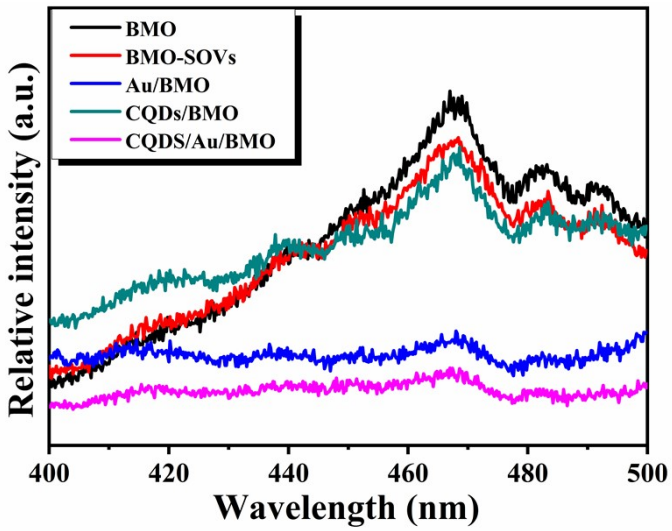


Fig. S4 The photoluminescence spectra of pure BMO, BMO-SOVs, Au/BMO, CQDs/BMO and CQDs/Au/BMO composites.

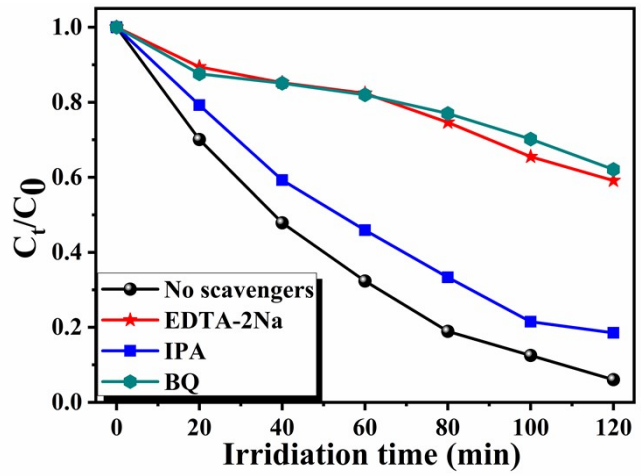


Fig. S5 The capture agent experiment for photodegradation of phenol by 7 wt% CQDs/Au/BMO under visible light irradiation (λ> 420 nm).

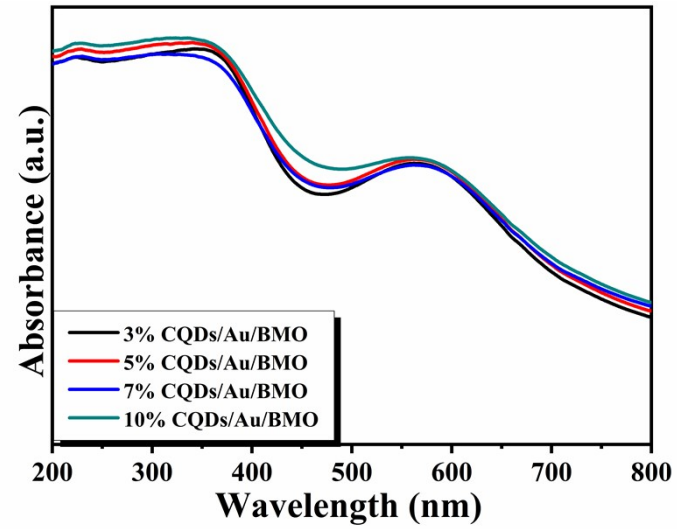


Fig. S6 (a) UV-Vis diffuse reflectance spectra of series of CQDs/Au/BMO samples.

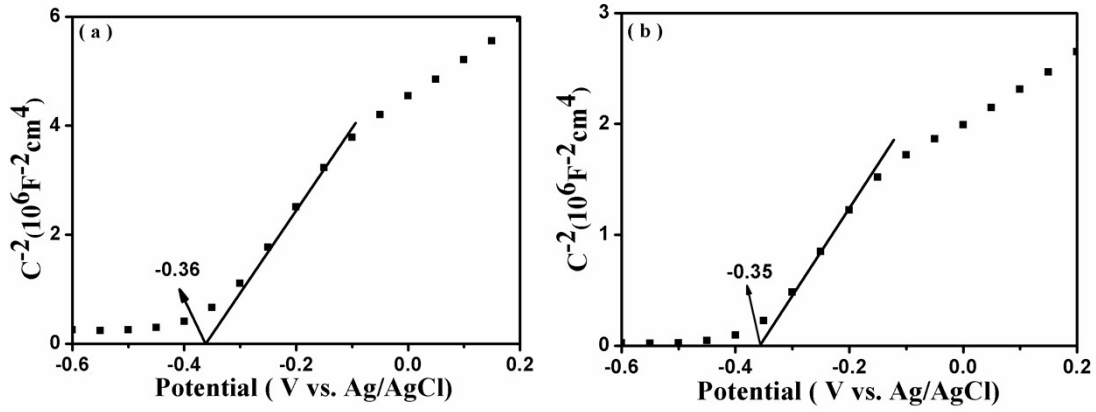


Fig. S7 Mott-Schottky plots of (a) BMO and (b) BMO-SOVs.

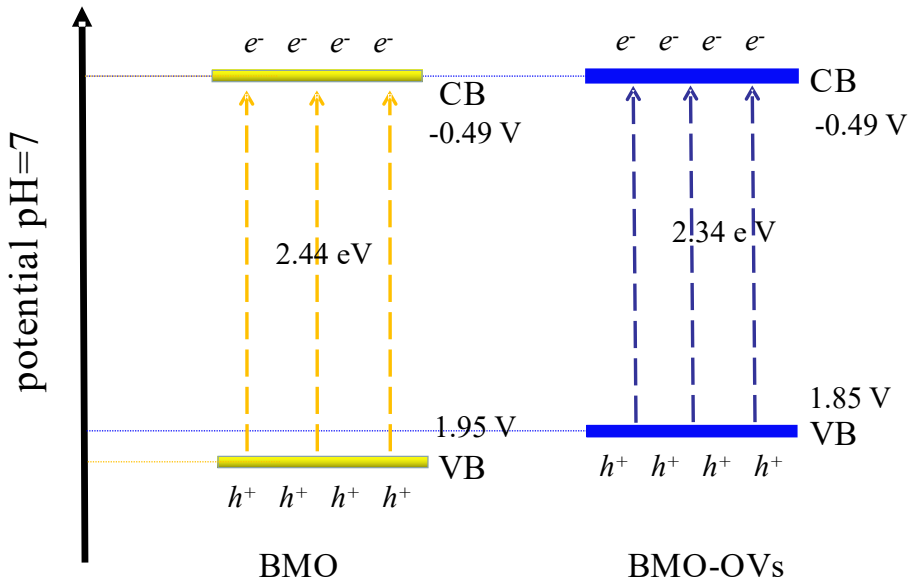


Fig. S8 Band diagram of BMO and BMO-SOVs.

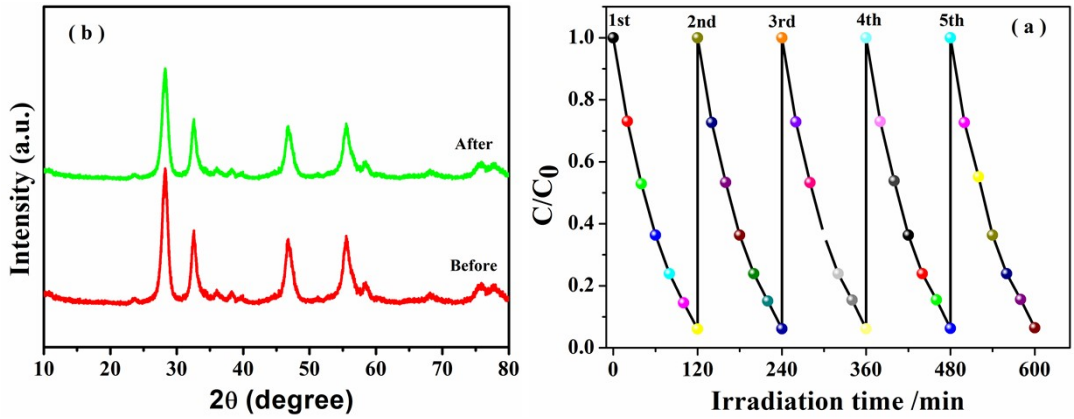


Fig. S9 (a) Photocatalytic degradation of phenol with the 7 wt% CQDs/Bi_2MoO_6 sample for four cycles, (b) XRD patterns of the 7 wt% CQDs/Au/Bi_2MoO_6 sample before and after the photodegradation test for four cycles.