

## ***Supplementary Materials***

### **Synergetic effect of dual co-catalysts on the activity of BiVO<sub>4</sub> for photocatalytic carbamazepine degradation**

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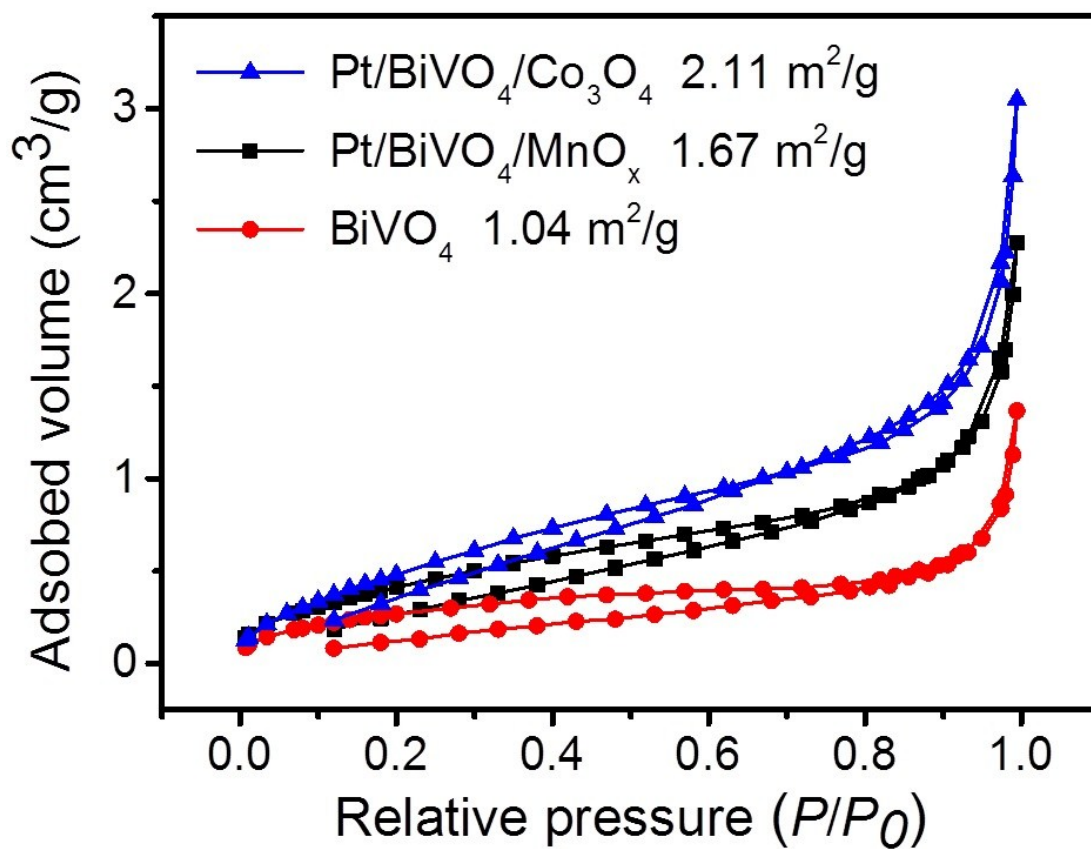
**Zhang<sup>b</sup> and Fuyu Wen<sup>b\*</sup>**

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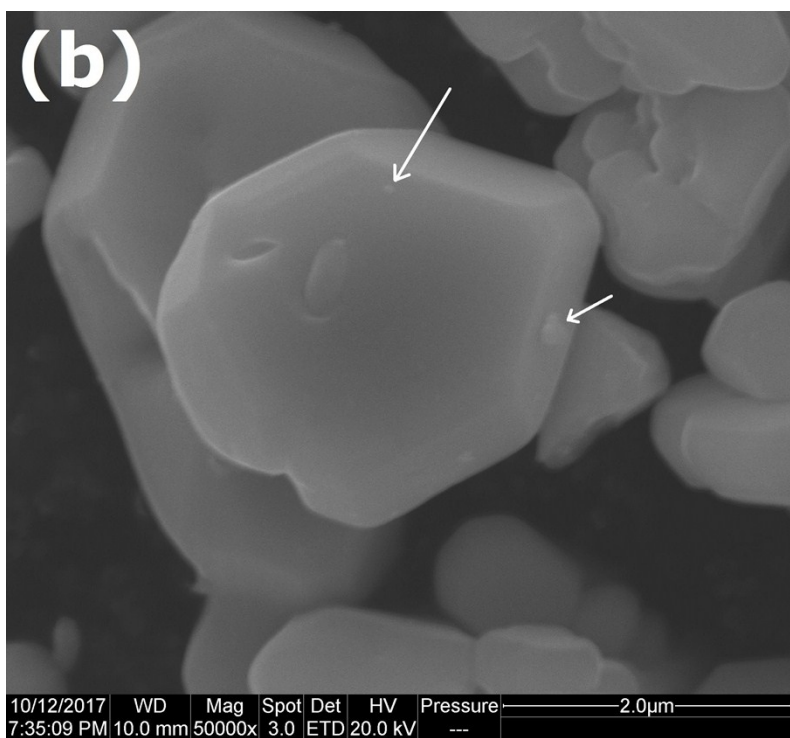
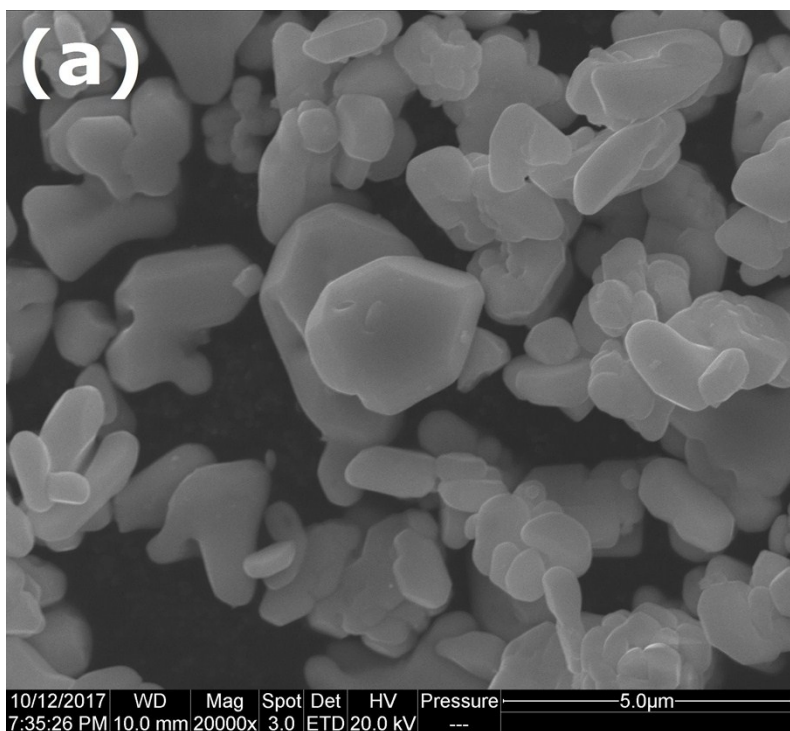
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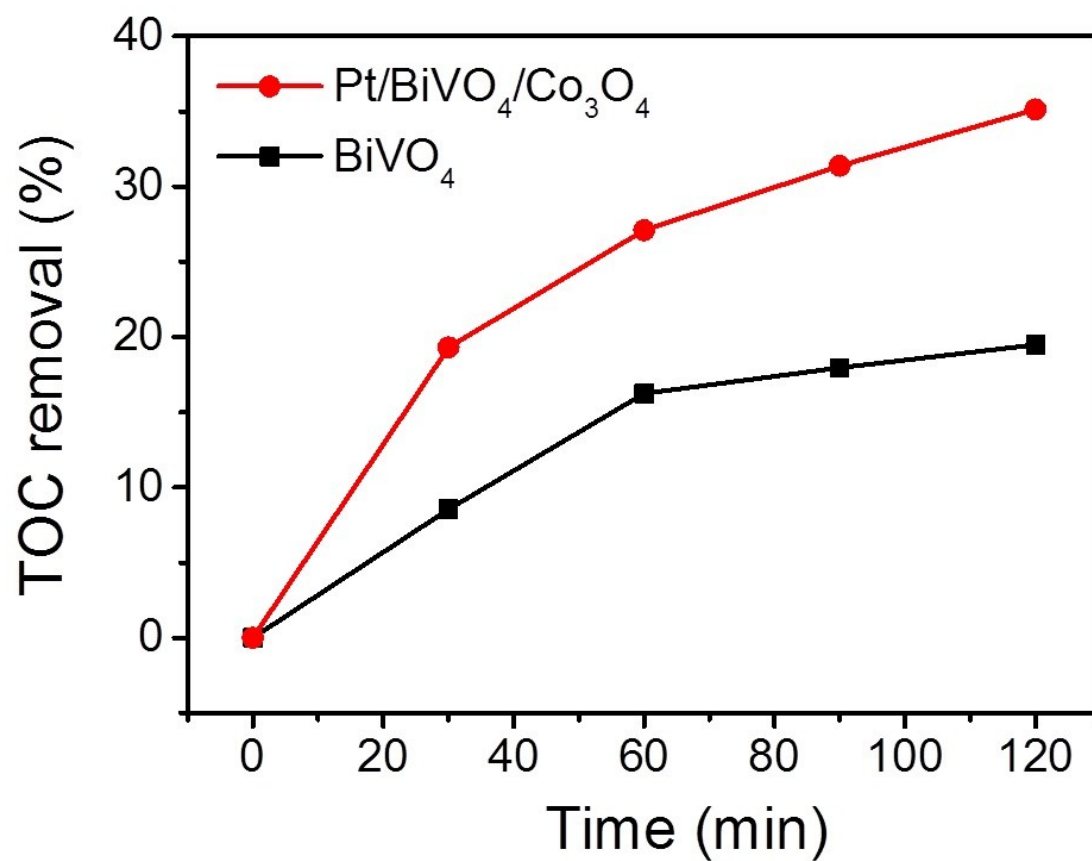
E-mail addresses: wenfuyu@vip.163.com (Fuyu Wen)



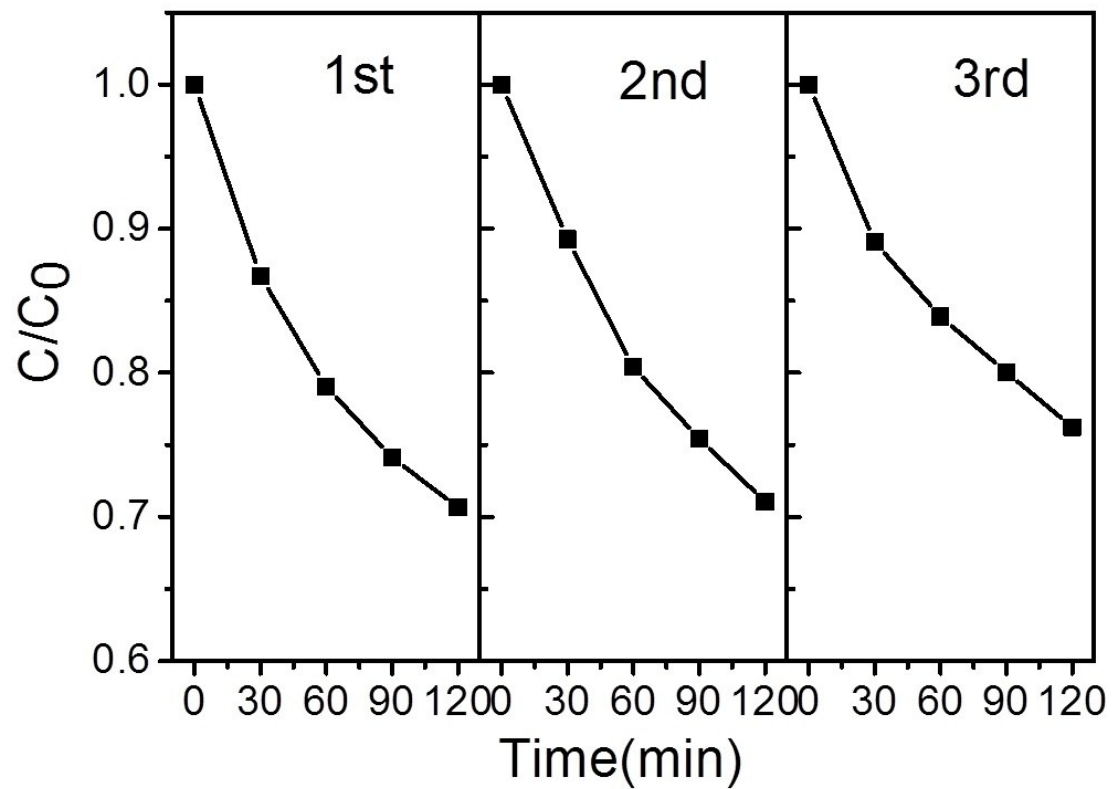
**Fig. S1.** N<sub>2</sub> adsorption and desorption isotherms of Pt/BiVO<sub>4</sub>/Co<sub>3</sub>O<sub>4</sub>, Pt/BiVO<sub>4</sub>/MnO<sub>x</sub> and BiVO<sub>4</sub>.



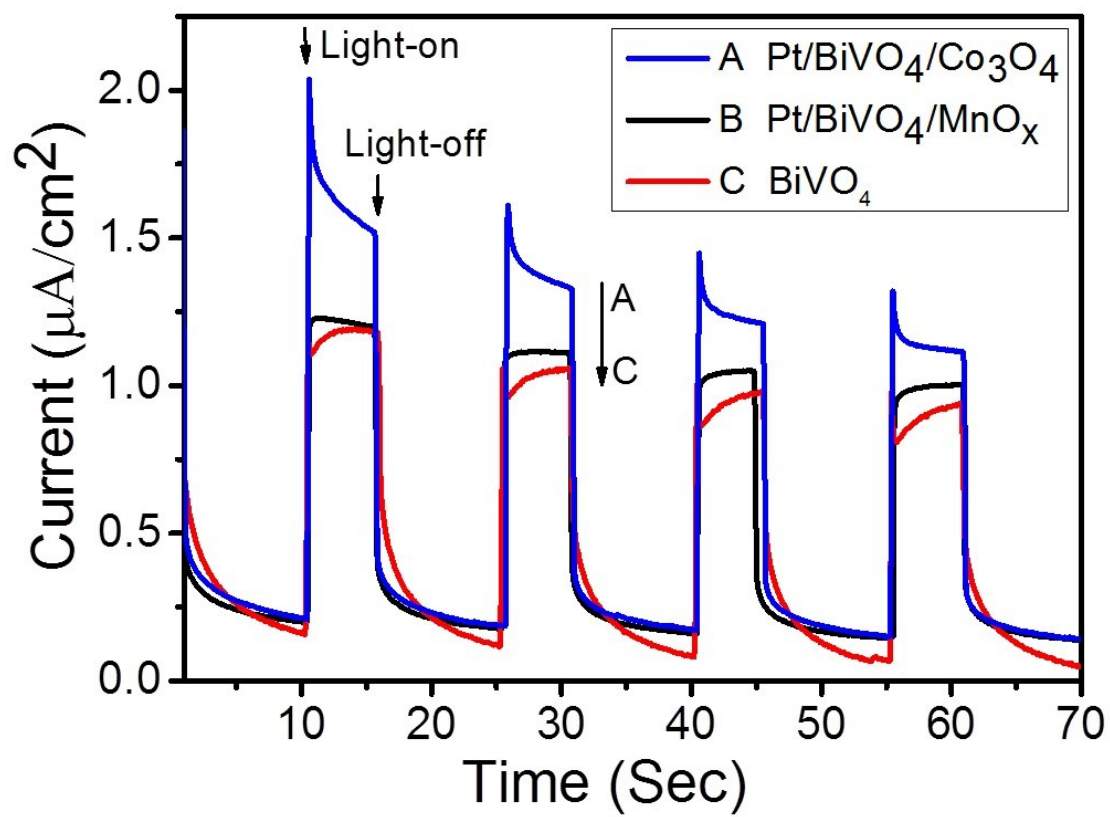
**Fig. S2.** SEM images of (a) prepared Pt/BiVO<sub>4</sub>/Co<sub>3</sub>O<sub>4</sub> and (b) Pt/BiVO<sub>4</sub>/Co<sub>3</sub>O<sub>4</sub> (enlarged). The contents of the deposited Pt and Co<sub>3</sub>O<sub>4</sub> are 0.2 wt% and 0.1 wt%, respectively.



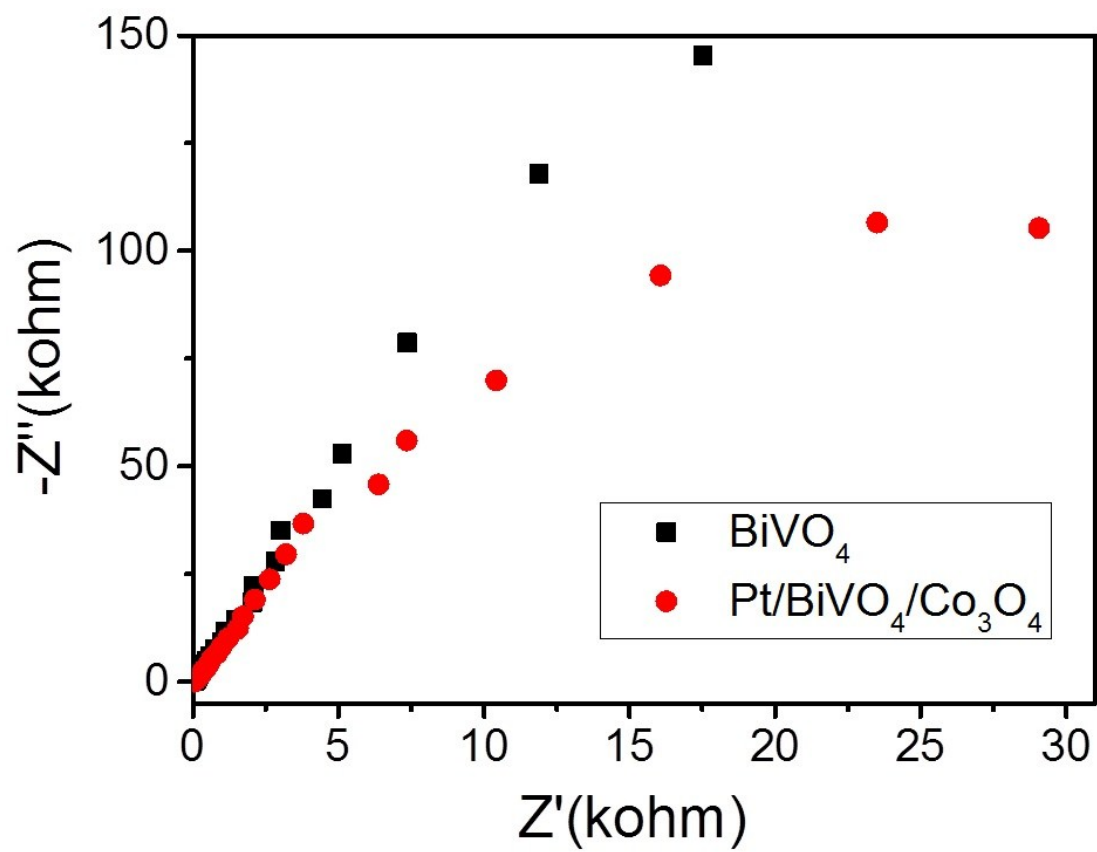
**Fig. S3.** TOC removal of CBZ in the presence of Pt/BiVO<sub>4</sub>/Co<sub>3</sub>O<sub>4</sub> and BiVO<sub>4</sub> photocatalysts after 60 min of visible light irradiation.



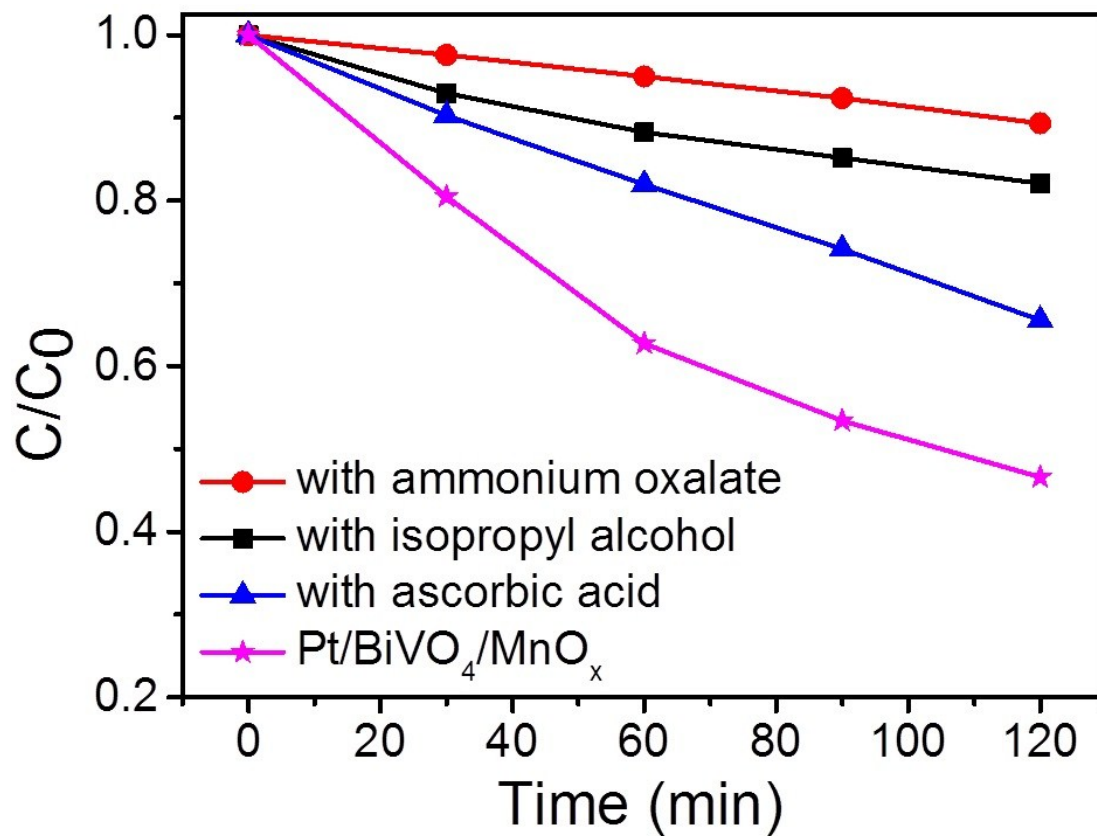
**Fig. S4.** Cycling runs in the photocatalytic activity of Pt/BiVO<sub>4</sub>/Co<sub>3</sub>O<sub>4</sub> photocatalyst under the visible light irradiation.



**Fig. S5.** Transient photocurrent responses of different photocatalysts under visible light irradiation ( $\lambda > 420$  nm).



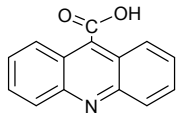
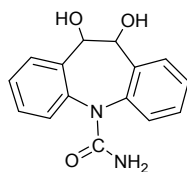
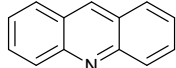
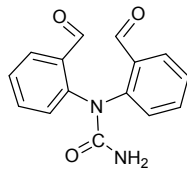
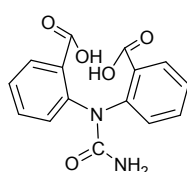
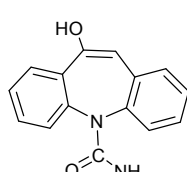
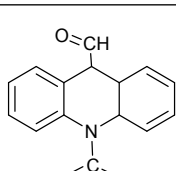
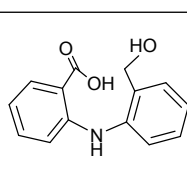
**Fig. S6.** Electrochemical impedance spectra of  $\text{BiVO}_4$  and  $\text{Pt/BiVO}_4/\text{Co}_3\text{O}_4$ .

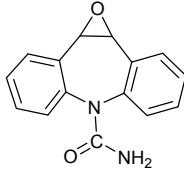
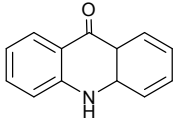
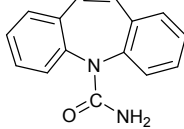


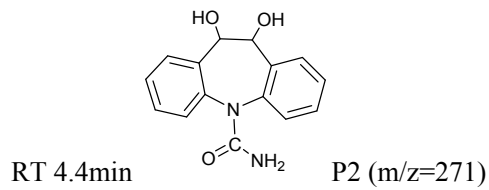
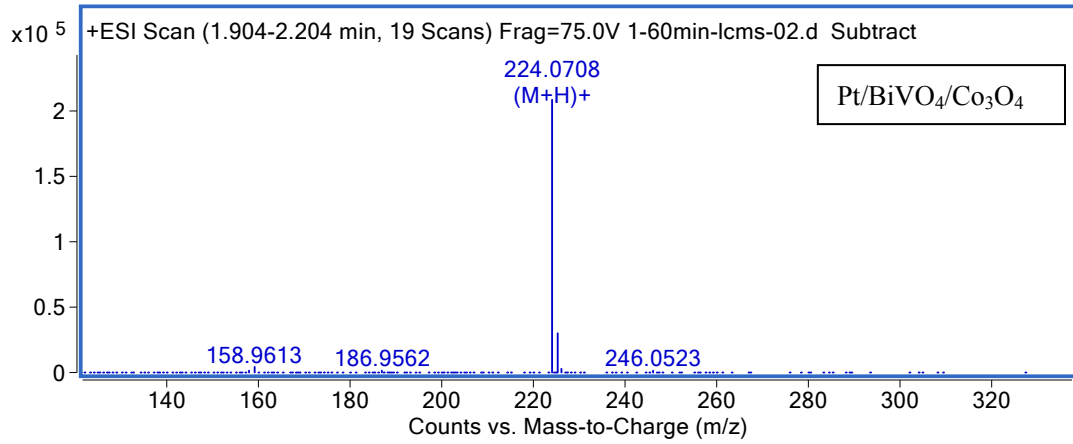
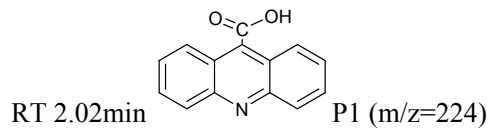
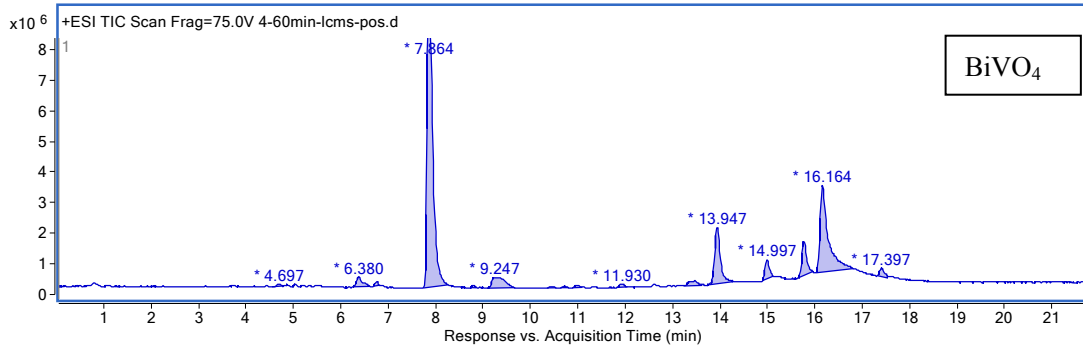
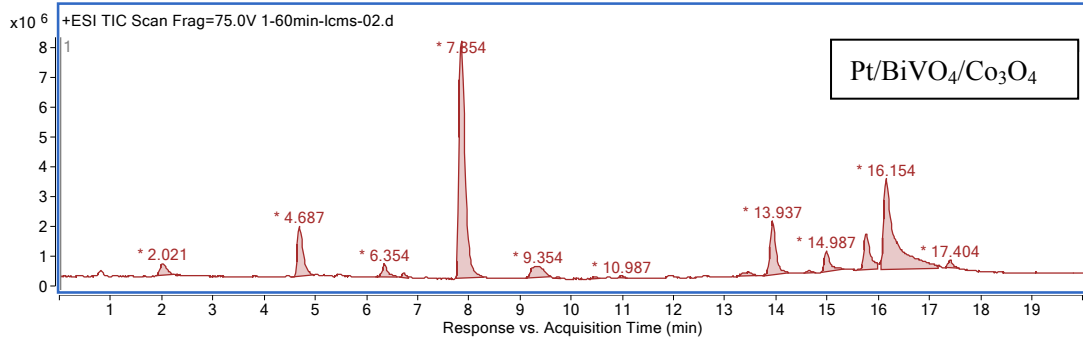
**Fig. S7.** Effect of scavengers on photocatalytic degradation of CBZ over Pt/BiVO<sub>4</sub>/MnO<sub>x</sub> photocatalyst. Reaction conditions: 100 mL CBZ solution with initial concentration of 10 mg/L, scavenger concentration 50 mmol/L, catalyst dosage 1 g/L, the contents of the deposited Pt and MnO<sub>x</sub> are 0.2 wt% and 0.1 wt% respectively and 300 W Xe lamp ( $\lambda > 420$  nm), top irradiation.

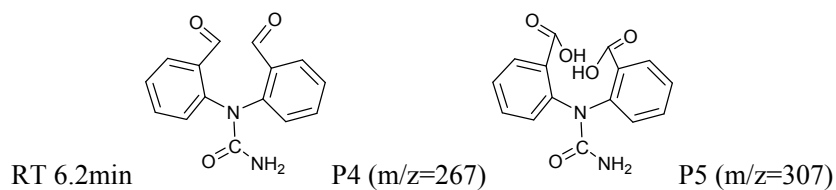
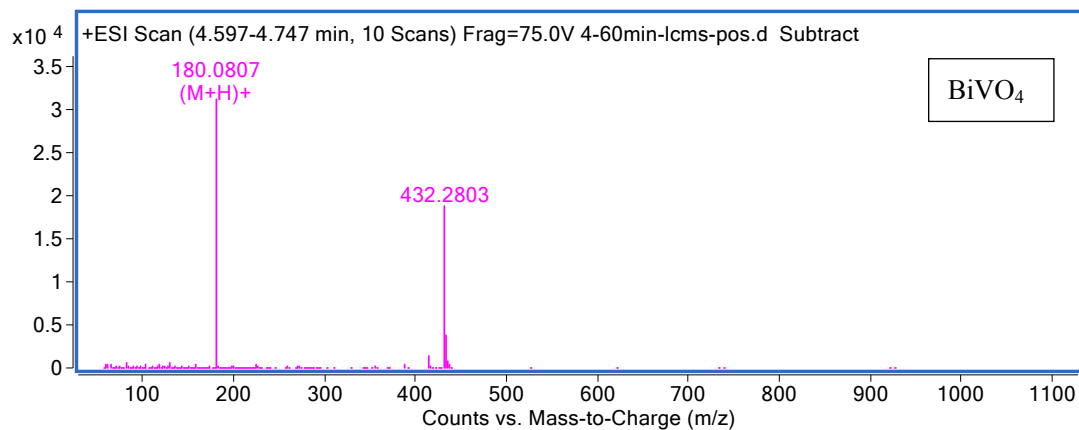
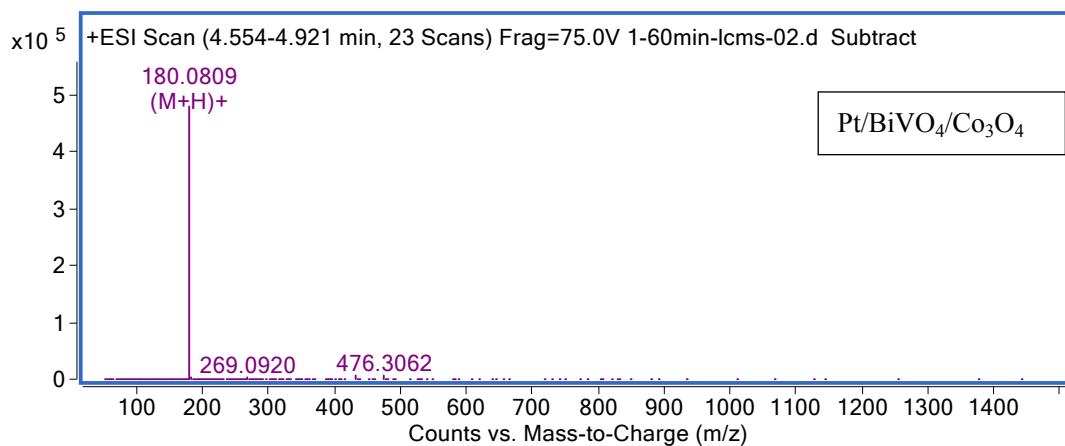
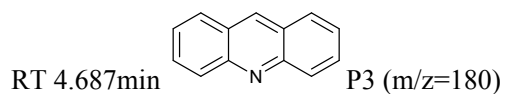
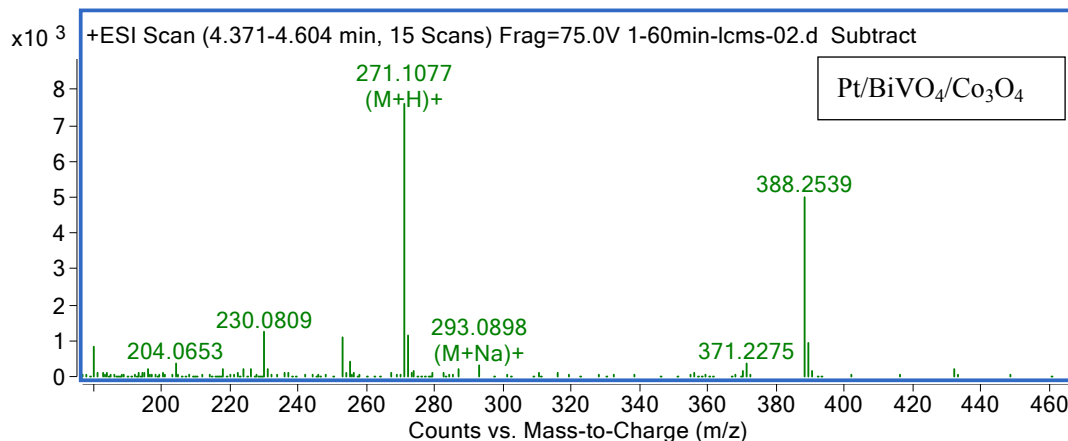


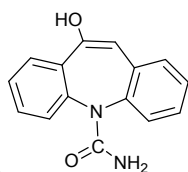
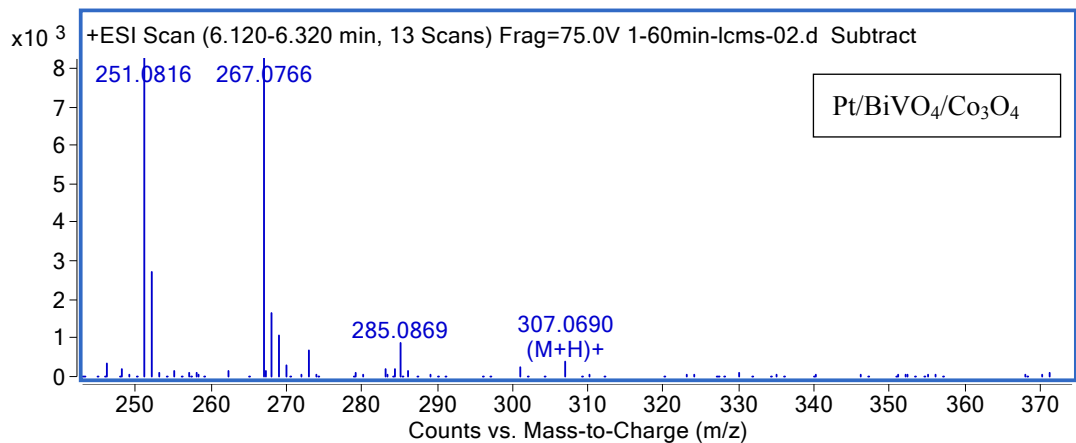
Table S1 HPLC-MS information about main fragment ions of identified degradation intermediates of CBZ by Pt/BiVO<sub>4</sub>/Co<sub>3</sub>O<sub>4</sub> and BiVO<sub>4</sub> photocatalysts.

Product	Compounds	RT/min	ESI(+)MS1 m/z	ESI(+)MS2 m/z	Pt/BiVO <sub>4</sub> /Co <sub>3</sub> O <sub>4</sub>	BiVO <sub>4</sub>
P1		2.02	224		√	
P2		4.4	271		√	
P3		4.687	180	180	√	√
P4		6.2	267	251,267,285	√	
P5		6.2	307	251,267,307	√	
P6		6.354	253	218,253,269	√	
P7		6.7	253		√	√
P8		7.1	246	237,246,259	√	√

P9		7.1	253		√	
P10		7.1	196		√	√
CBZ		7.85	237	237,246	√	√

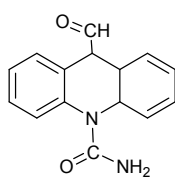
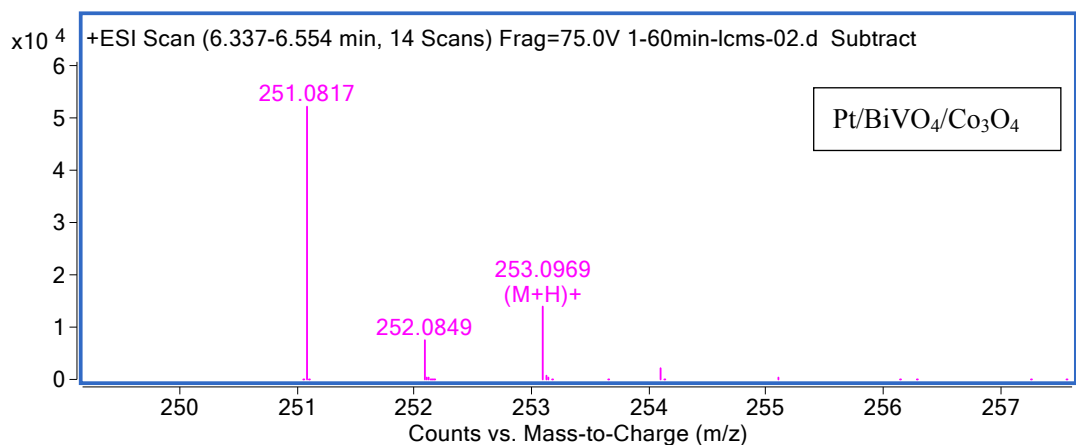






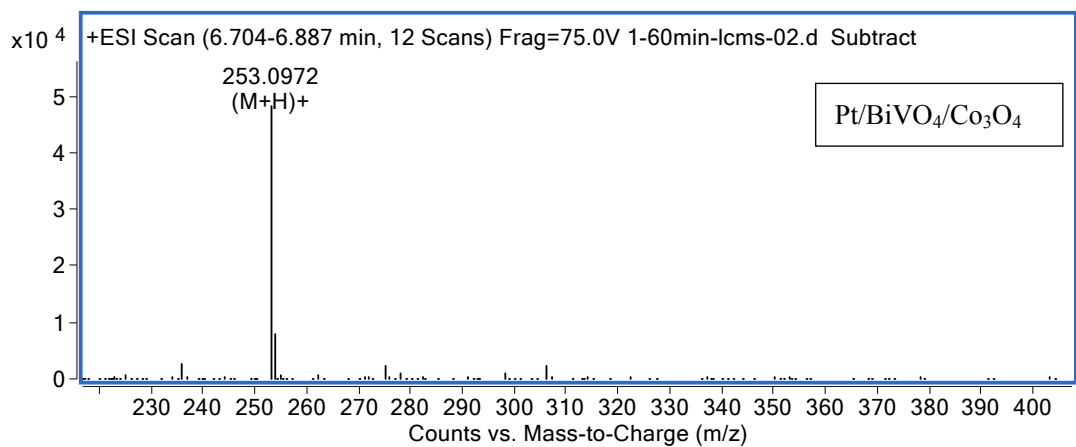
RT 6.354min

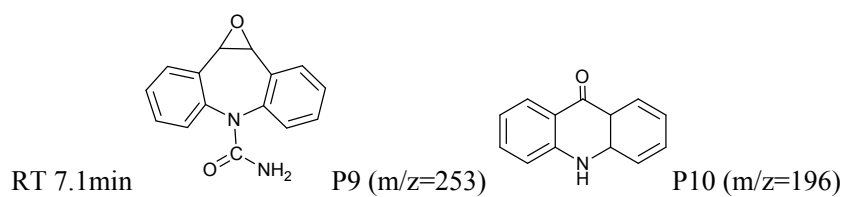
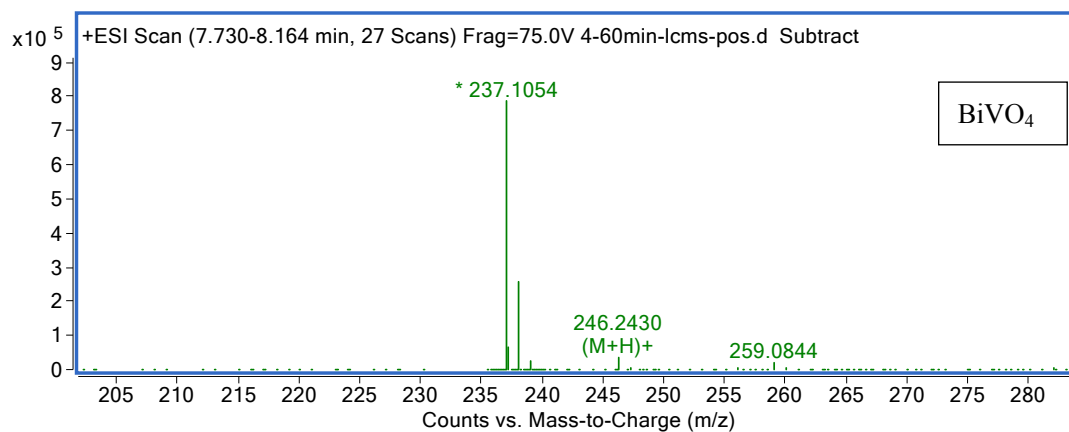
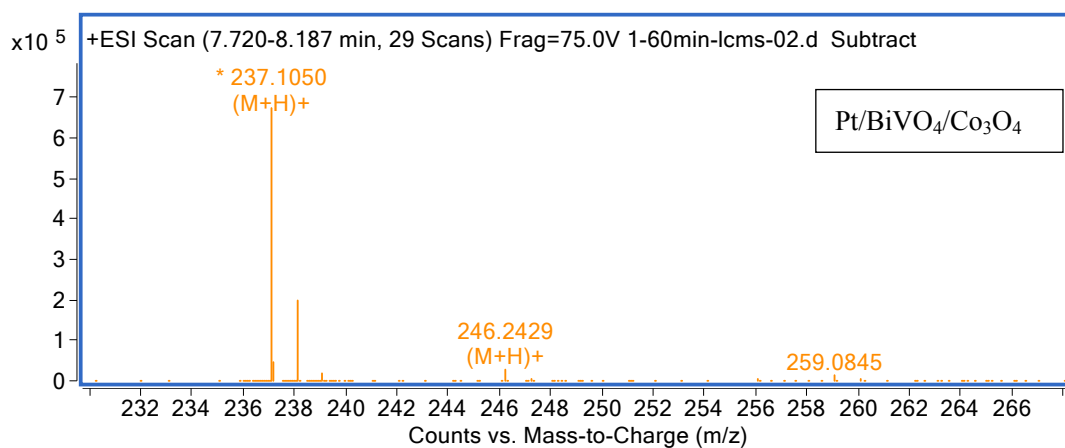
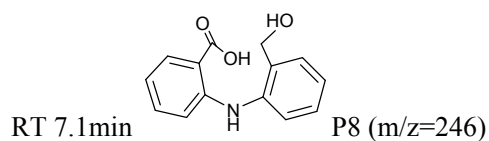
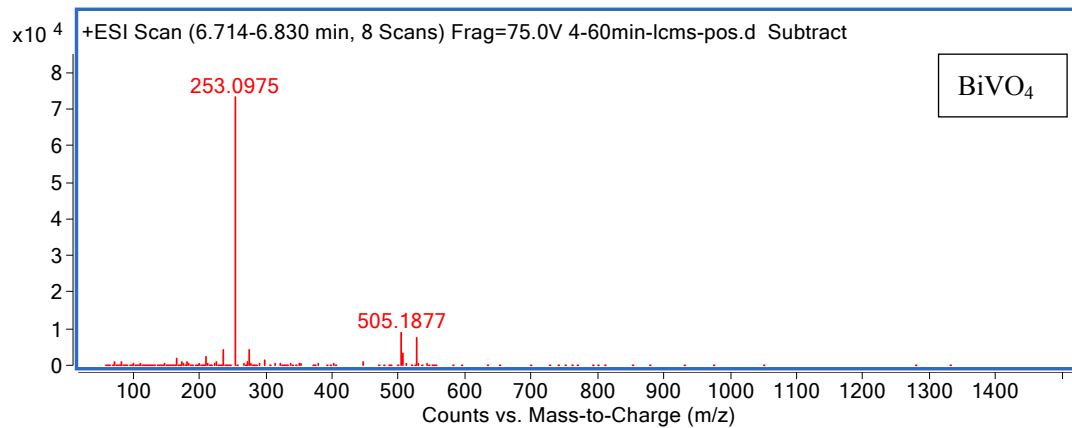
P6 (m/z=253)

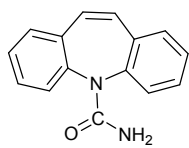
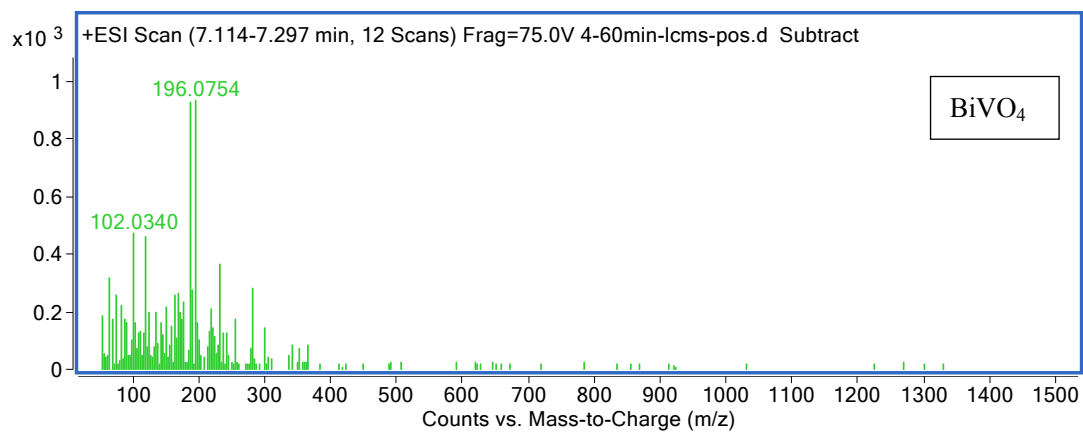
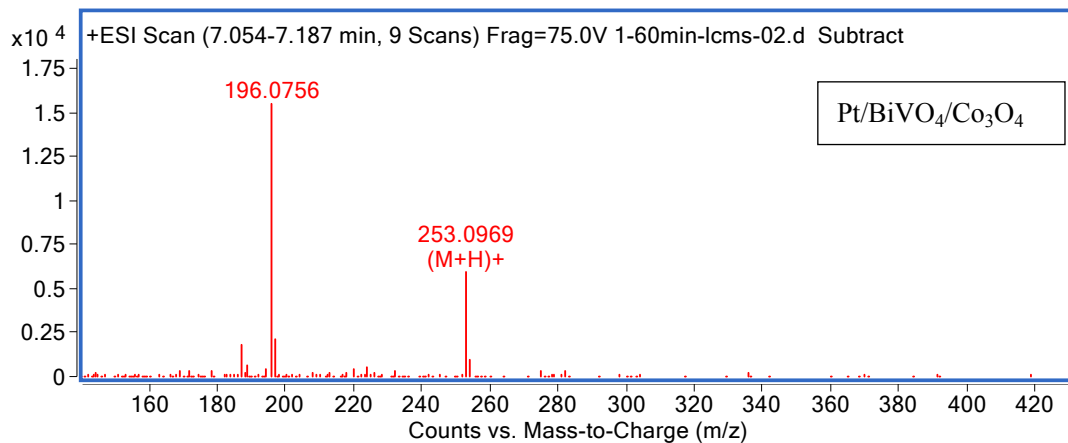


RT 6.7min

P7 (m/z=253)

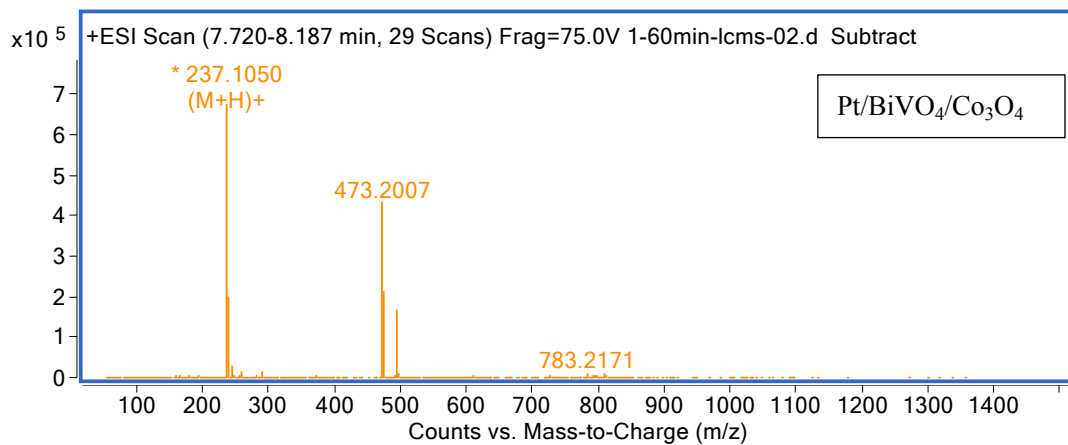






RT 7.85

CBZ (m/z=237)



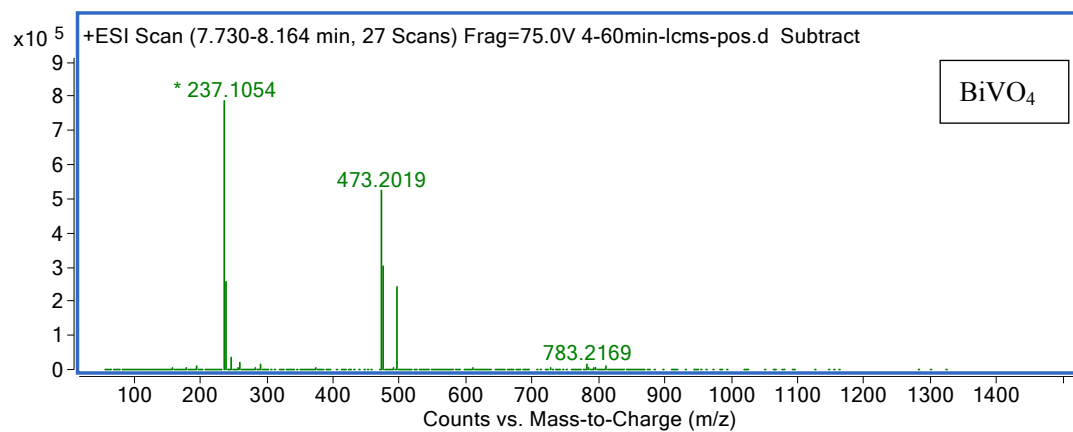


Fig. S8 Total ion current (TIC) of HPLC-MS analysis of the intermediates for CBZ degradation by Pt/BiVO<sub>4</sub>/Co<sub>3</sub>O<sub>4</sub> and BiVO<sub>4</sub> (reaction time 60 min) and the mass spectra of the detected intermediates.