

Modulating Formation Rates of Active Species Population by Optimizing Electron Transport Channels for Boosting Photocatalytic Activity of $\text{Bi}_2\text{S}_3/\text{BiO}_{1-x}\text{Cl}$ Heterojunction

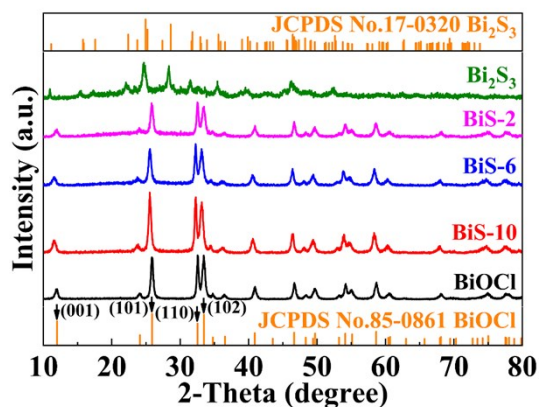


Fig. S1. XRD patterns of the as-prepared samples.

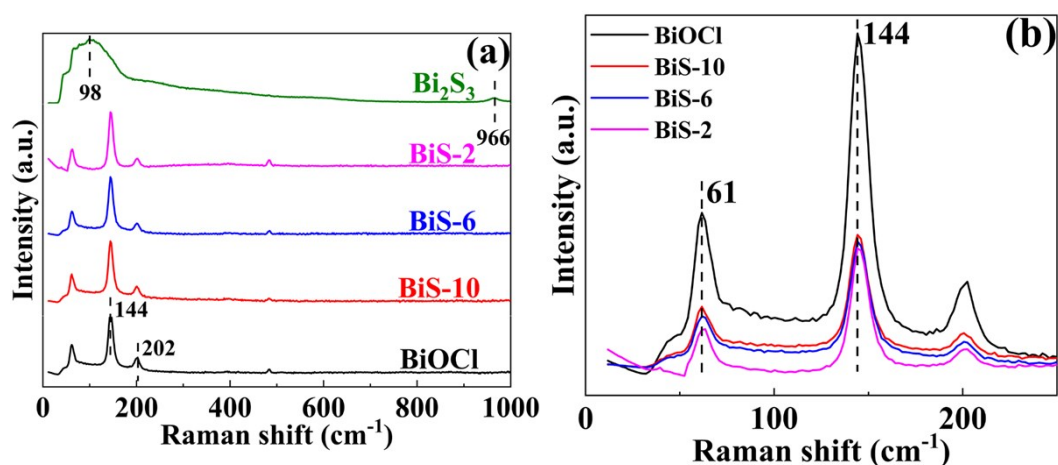


Fig. S2. Raman spectra of the as-prepared samples.

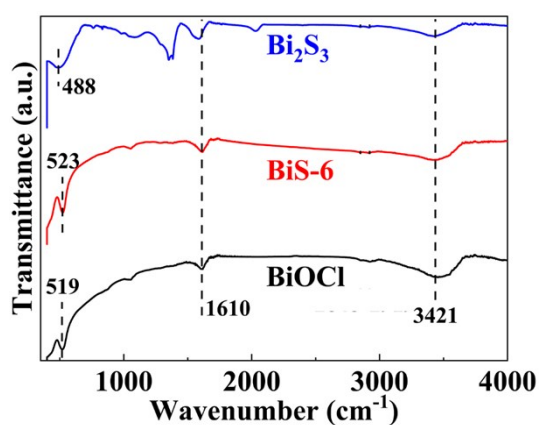


Fig. S3. FT-IR spectra of the as-prepared samples.

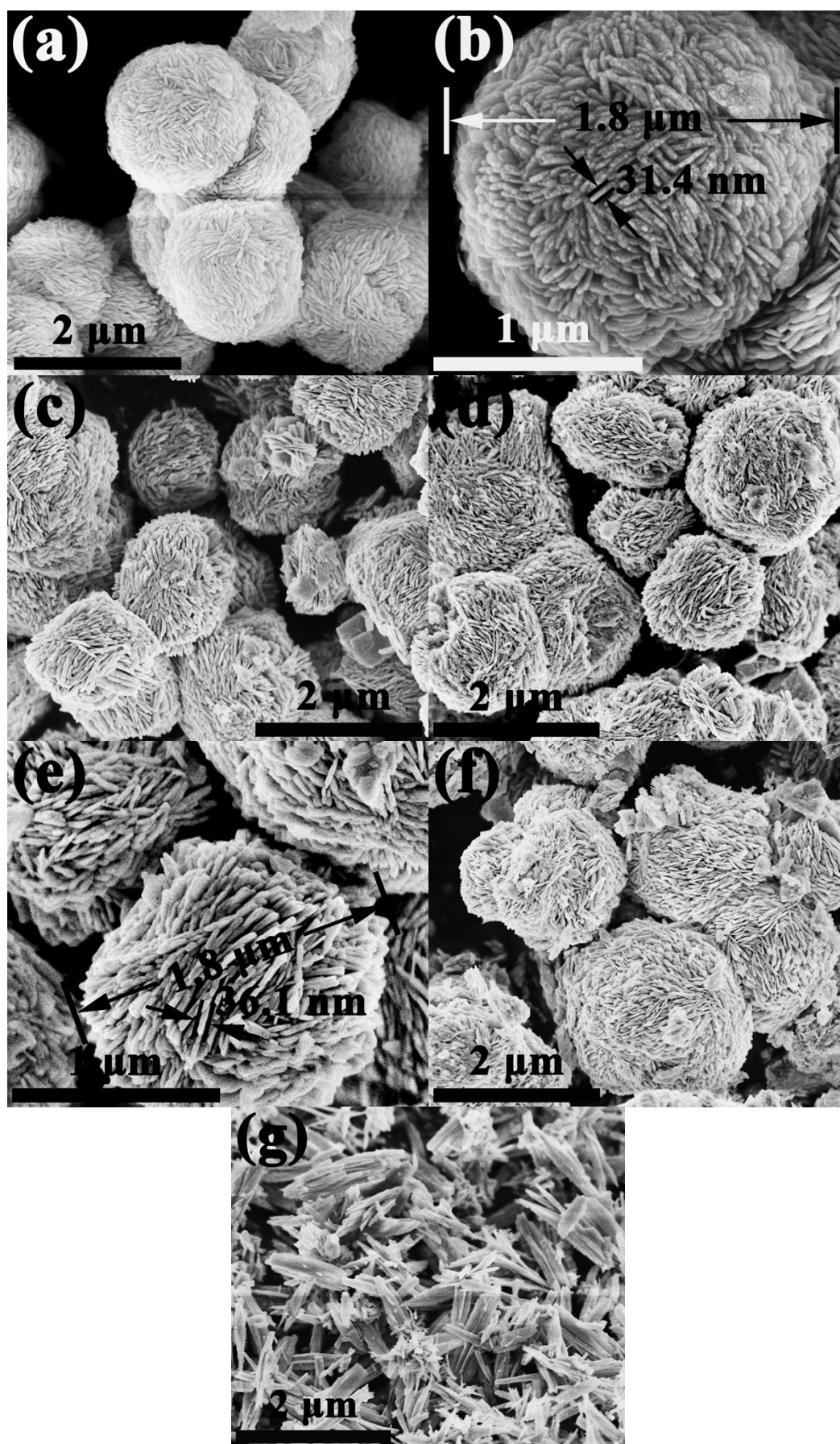


Fig. S4. SEM images of the as-prepared samples: (a-b) BiOCl, (c) BiS-10, (d-e) BiS-6, (f) BiS-2, (g) Bi₂S₃.

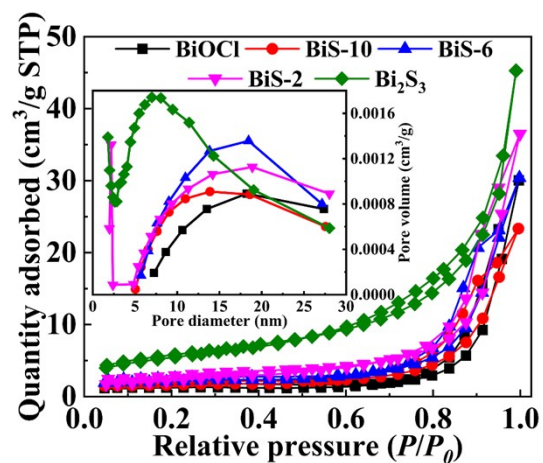
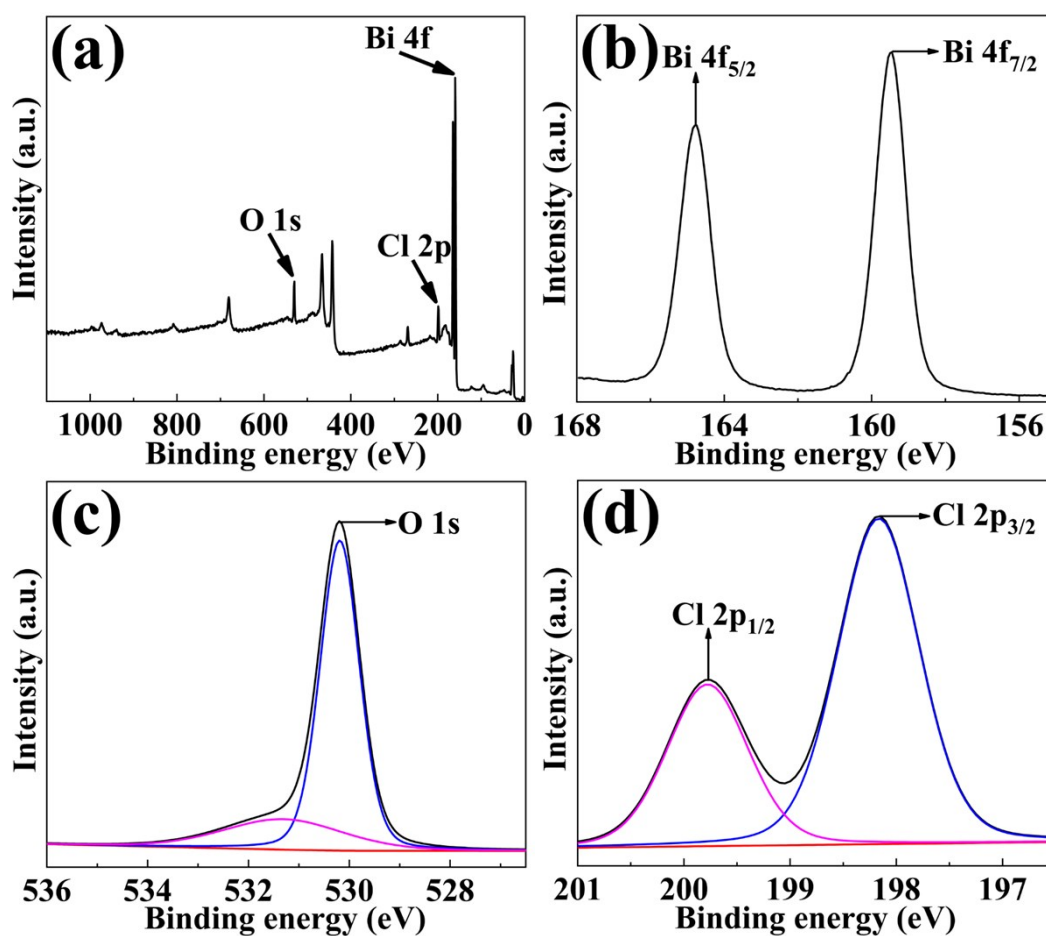


Fig. S5. Nitrogen adsorption-desorption isotherms and the corresponding pore-size distributions (inset) of the as-prepared samples.



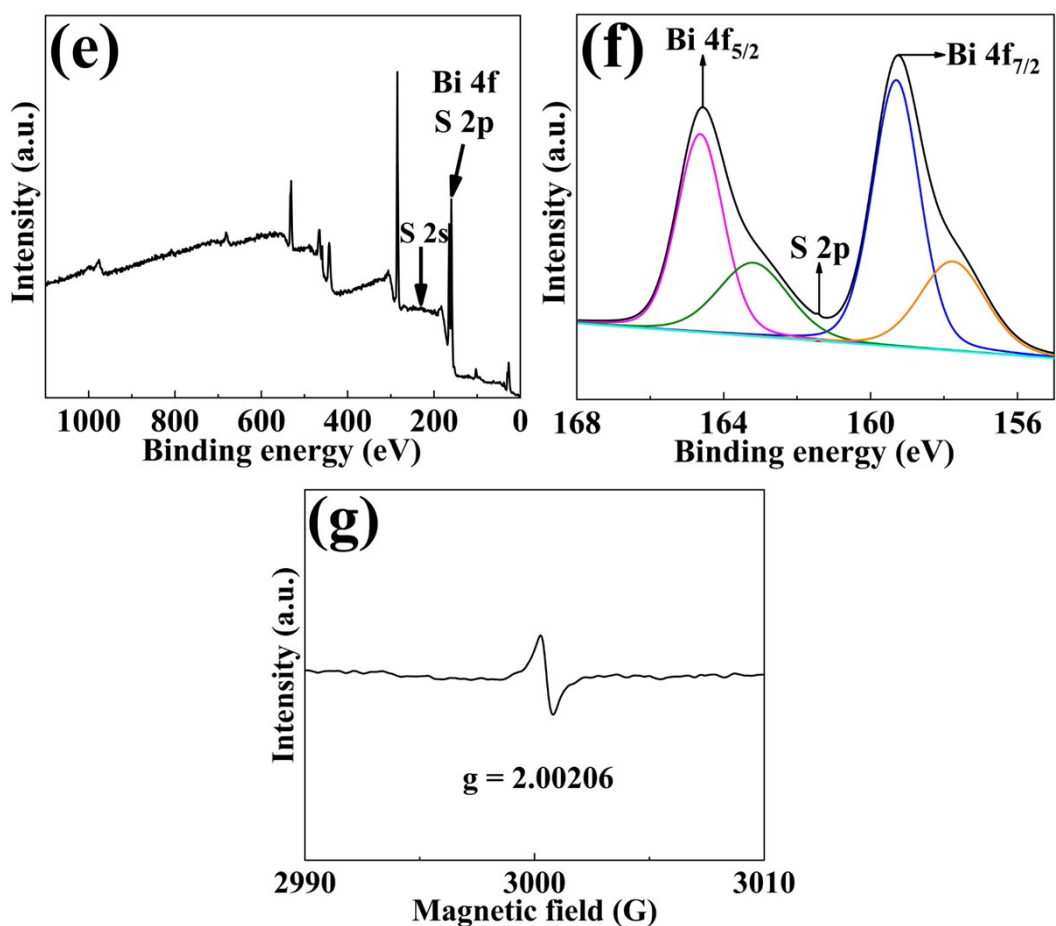
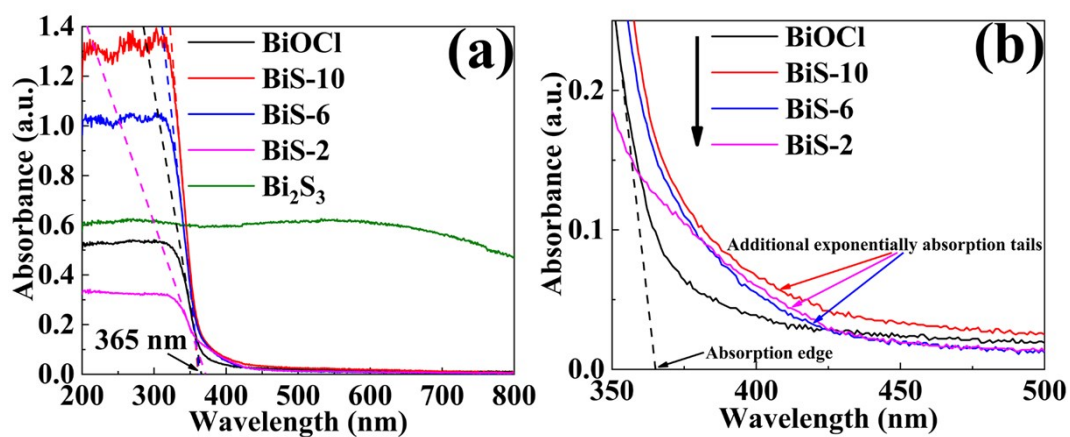


Fig. S6. (a) Survey XPS spectrum of BiOCl, The fine XPS spectra of (b) Bi 4f, (c) O 1s, (d) Cl 2p, (e) Survey XPS spectrum of Bi₂S₃, The fine XPS spectra of (f) Bi 4f / S 2p, (g) ESR pattern of Bi₂S₃.



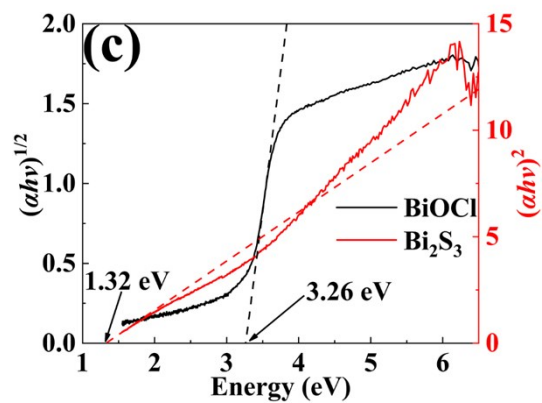


Fig. S7. (a-b) UV-vis diffuse reflectance spectra of the as-prepared samples, (c) Transformed Kubelka-Munk function vs. photon energy.

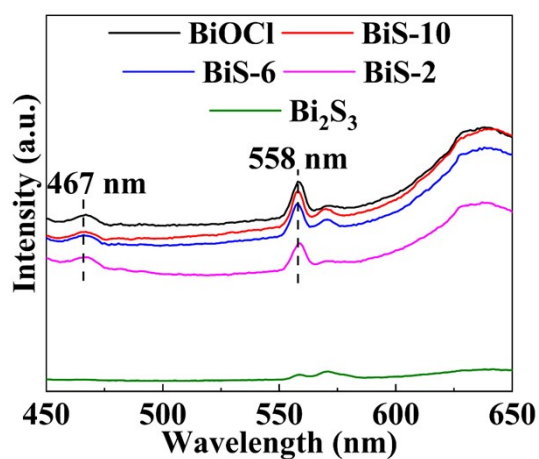


Fig. S8. PL spectra of the as-prepared samples at excitation wavelength of 380 nm.

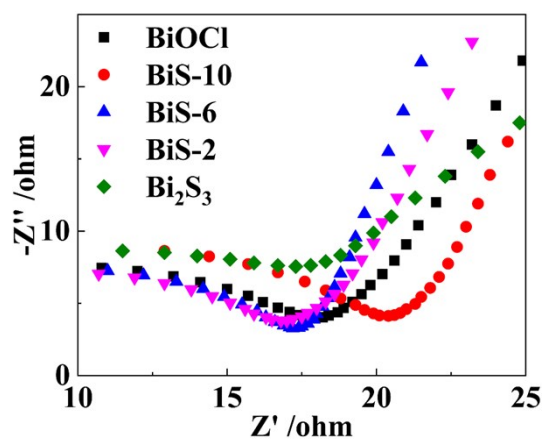


Fig. S9. Nyquist plots of the as-prepared samples.

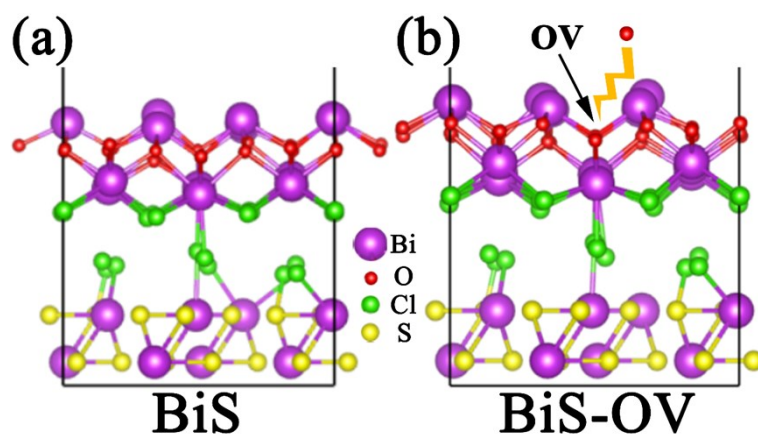


Fig. S10. The optimized structural models of (a) BiS and (b) BiS-OV.

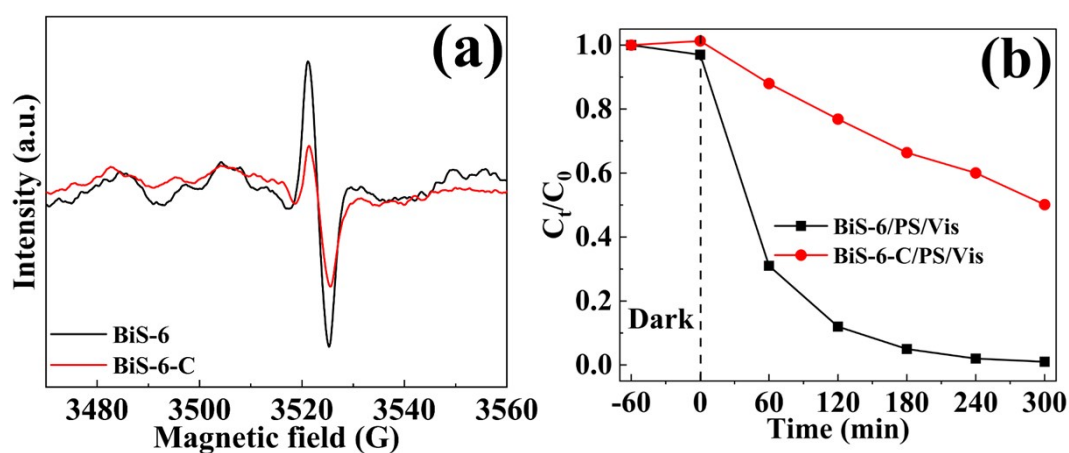


Fig. S11. (a) ESR patterns of BiS-6 and BiS-6-C, (b) Photocatalytic performance of BiS-6 and BiS-6-C for removing dinotefuran under adding PS and visible light illumination.

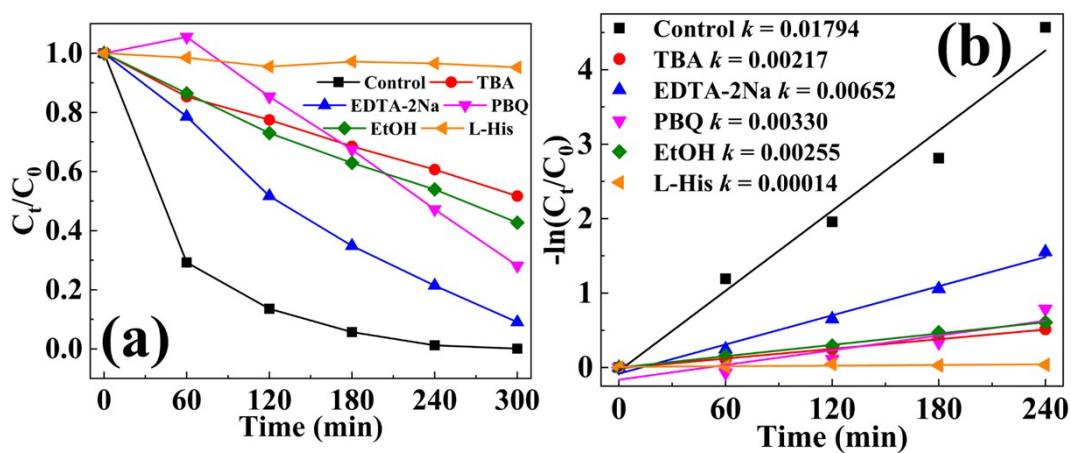


Fig. S12. (a) Active species trapping experiments for the degradation of dinotefuran in the BiS-6/PS/Vis system, (b) Comparison of the apparent reaction rate constant (k).

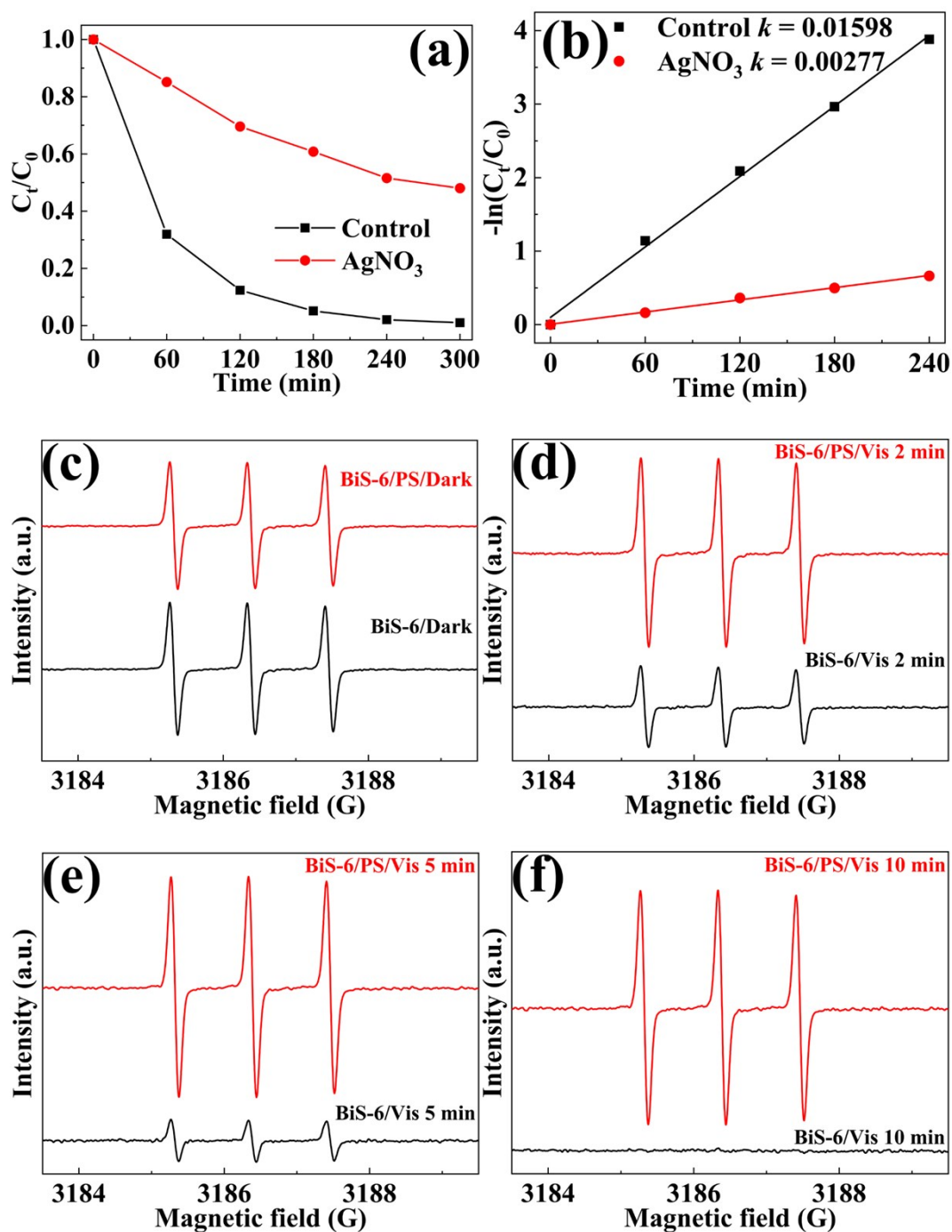


Fig. S13. (a) Active species trapping experiments for the degradation of dinotefuran in the BiS-6/PS/Vis system, (b) Comparison of the apparent reaction rate constant (k), ESR patterns of $\text{TEMP-}^1\text{O}_2$ of the BiS-6/Vis system and the BiS-6/PS/Vis system at the different time points: (c) Dark, Light for (d) 2 min, (e) 5 min and (f) 10 min.

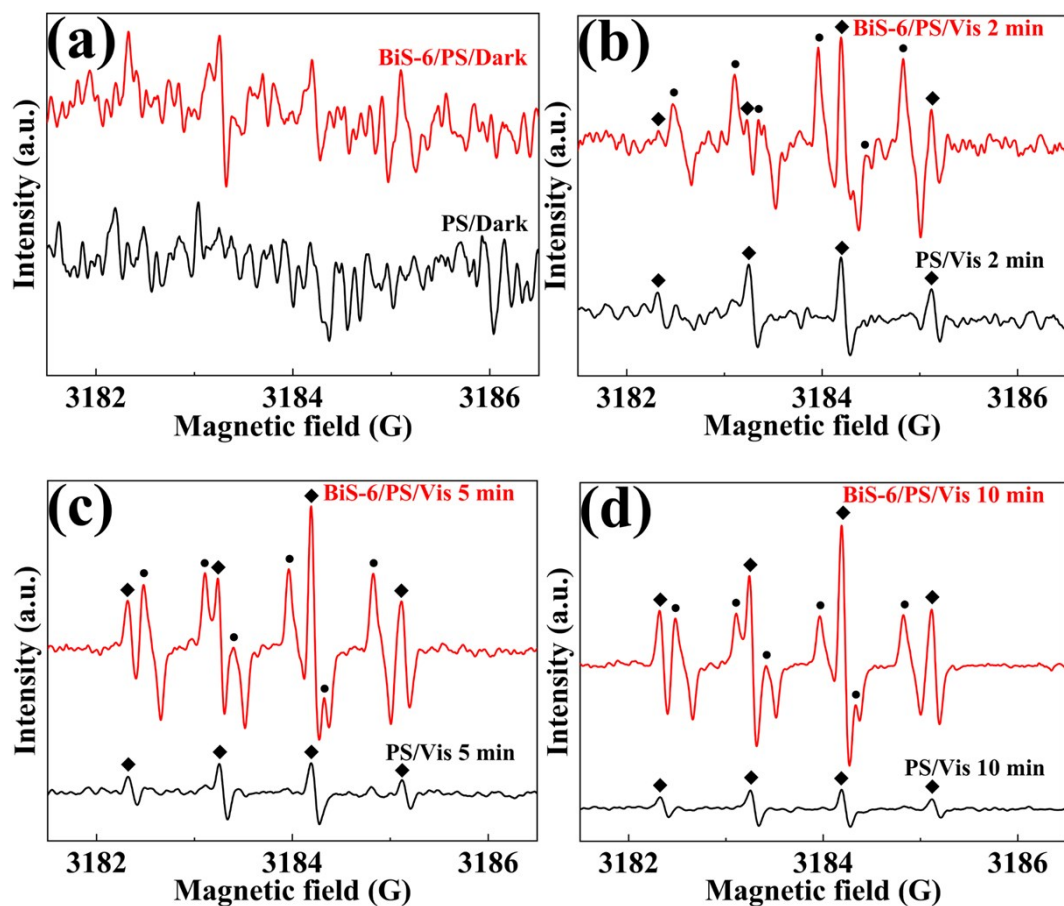
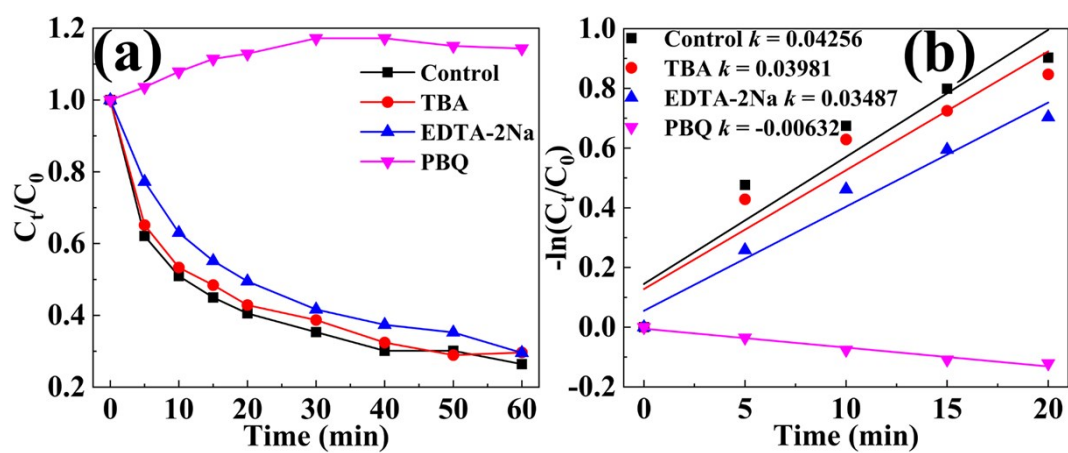


Fig. S14. ESR patterns of the PS/Vis system and the BiS-6/PS/Vis system at the different time points: (a) Dark, Light for (b) 2 min, (c) 5 min and (d) 10 min. ◆ corresponds to $\text{DMPO} \cdot \text{OH}$ and ● corresponds to $\text{DMPO} \cdot \text{SO}_4^-$.



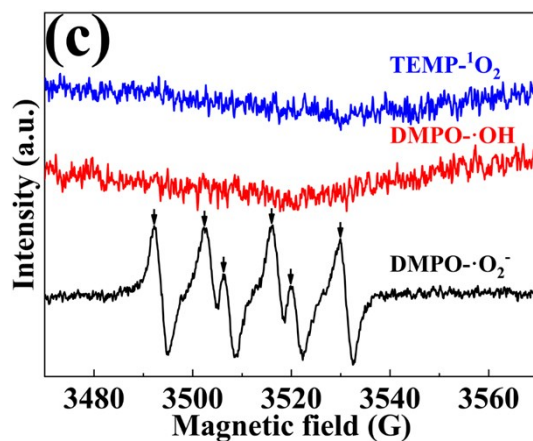


Fig. S15. (a) Active species trapping experiments for the degradation of TC-HCl in the presence of BiS-6 under visible light irradiation, (b) Comparison of the apparent reaction rate constant (k), (c) ESR patterns of BiS-6.

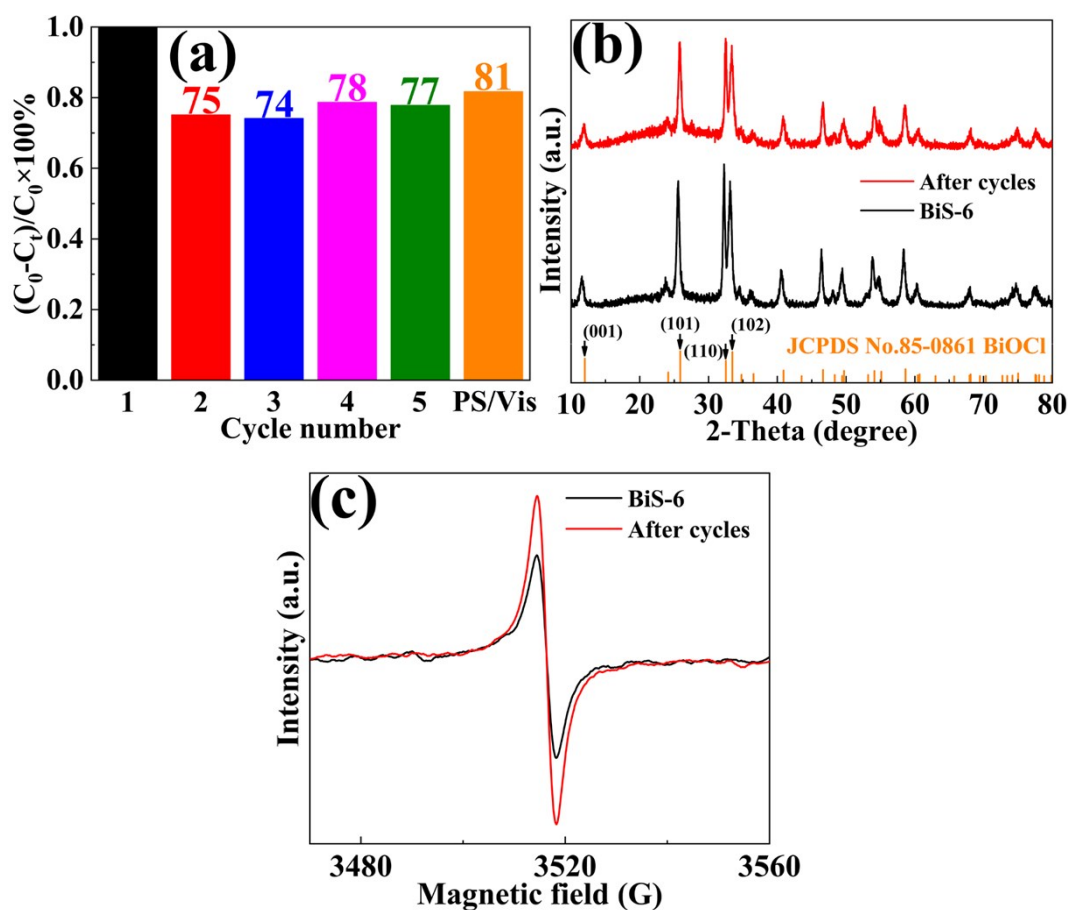


Fig. S16. (a) The recycle stability of BiS-6 for the degradation of dinotefuran in the system of adding PS and visible light, (b) XRD patterns of BiS-6 after five cycles, (c) ESR patterns of BiS-6 after five cycles.

Table. S1. Specific area, pore volume and pore size of the as-prepared samples.

Sample	S_{BET} (m ² /g)	Pore volume (cm ³ /g)	Pore size (nm)
BiOCl	5.7327	0.026418	18.43281
BiS-10	6.6671	0.025346	15.20673
BiS-6	8.4261	0.033876	16.08162
BiS-2	10.3659	0.036276	13.99838
Bi ₂ S ₃	20.3263	0.042741	8.41103