Balanced generation of holes and superoxide radicals on
Bi25CoO40 sillenite photocatalysts for rapidly synergetic
degradation of quinolone antibiotics

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S1. Experimental Section

S1.1. Bandgap calculation

The energy levels of the CBM and VBM for nanosheets were estimated according to the flat band potentials. According to the reported literature [1], the band positions were obtained via the following equations:

\[
E_{CB} = E_{fb} + E_{(Ag/AgCl)} - E_0 \\
E_{VB} = E_{CB} + E_g
\]  

(1)

(2)

where \(E_{fb}\) is the flat band potential of the nanosheet; \(E_{CB}\), \(E_{VB}\) and \(E_g\) are the energy levels of CBM, VBM, and the bandgap energy of nanosheet, respectively; and \(E_{(Ag/AgCl)}\) is the standard Ag/AgCl electrode (\(E=0.210\) V vs. NHE). \(E_0\) is the difference between the flat-band potential and conduction band for nanosheets.

S1.2. Fluorescence decay spectrum

The PL decay spectra were measured by using a Fluorescence lifetime spectrometer (Lifespec ll, Edinburgh) equipped with a pulse laser (EPL375). The signals were recorded by using the time-correlated single photon counting (TCSPC) method. The PL decay curves were fitted on software (F980) provided by the instrument, and various \(\tau\) values are tested to obtain a good fitness. The decay time of the photogenerated carriers is represented as \(\bar{\tau}\), which can be calculated by the following equation:

\[
\bar{\tau} = \frac{B_1 \% \times \tau_1^2 + B_2 \% \times \tau_2^2 + B_3 \% \times \tau_3^2}{B_1 \% \times \tau_1 + B_2 \% \times \tau_2 + B_3 \% \times \tau_3}
\]  

(3)

Where \(B_1\) and \(B_2\) and \(B_3\) represent the amplitudes of the fast and slow components, \(\tau_i\)
and \( \tau_2 \) and \( \tau_3 \) represent the time constants. The fitting parameters used for our curves are listed in Table S2.

**S1.3. Quantitative method for degradation intermediates**

The P1 and P2 intermediates in the degradation process are quantified using internal standard methods reported in the literature [2].

\[
\frac{I_u}{I_s} = \left( \frac{A_u}{A_s} \right) \times \left( \frac{C_u}{C_s} \right)
\]

where \( I_u \) and \( I_s \) are the measured baseline-corrected ion intensities of the analyte and the internal standard from a MS spectrum, \( C_u \) and \( C_s \) are the unknown concentration of the analyte and the known concentration of the added internal standard. \( A_u \) and \( A_s \) are the response factors of the analyte and standard, respectively, under experimental conditions, which is influenced by the instrument and the analyte of interest. In our case, the CIP molecules with similar structure fragments to P1 and P2 (m/z=113.9, the ionization efficiency for the fragments are assumed to be the same) are selected as the internal standards and the analyte and its selected standard may have identical response factors (i.e., \( A_u/A_s = 1 \)).

**S1.4. Calculation of the contribution of active species**

The contribution of each active species was calculated by Equation (4)-(6) and the first-order Reaction rate constant [3,4].

\[
R_{h^+} = \frac{K_h +}{K} = \frac{K - K_{FA}}{K}
\]

\[
R_{O^2-} = \frac{K_{O^2-}}{K} = \frac{K - K_{PBQ}}{K}
\]
\[ R_{OH} = \frac{K_{OH}}{K} = \frac{K - K_{IPA}}{K} \]  \hfill (7)

R is the contribution of reaction species without quenching agent to the Reaction rate constant k of the reaction, \( K_i \) is the Reaction rate constant of the first order kinetic reaction of \( h^+, \cdot O_2^-, \cdot OH \) in the presence of FA, PBQ, and IPA.

S1.5. Photodeposition experiment

For the photo-deposition of Pt, \( H_2PtCl_6 \) is used as the metal precursor. 100mg of photocatalyst and a calculated amount of metal precursor (3wt%) are mixed in 50ml of ultrapure water, and then the suspension is irradiated with a 300W xenon lamp. 5ml of methanol is added as a hole sacrificial agent, and argon gas is passed through during the entire experiment. After 3 hours of irradiation, the precipitate is collected by centrifugation, washed, and dried.

For the photo-deposition of MnO\(_2\), MnSO\(_4\) is used as the Mn source. 100mg of photocatalyst and a calculated amount of MnSO\(_4\) (3wt%) are mixed in 50ml of ultrapure water, and then the suspension is irradiated with a 300W xenon lamp. NaIO\(_3\) is added as an electron sacrificial agent. After 3 hours of irradiation, the precipitate is collected by centrifugation, washed, and dried.

S1.6. Internal electric field calculation

Calculate the internal electric field using the following equation developed by Kanata et al [5-8].

\[ E = \left( -\frac{2V_s \rho}{\varepsilon \varepsilon_0} \right)^{1/2} \]  \hfill (8)

Where E is the internal electric field magnitude, \( V_s \) is the surface voltage, \( \rho \) is the
surface charge density, $\varepsilon$ is the low-frequency dielectric constant, and $\varepsilon_0$ is the permittivity of free space. The above equation reveals that the internal electric field magnitude is mainly determined by the surface voltage and the charge density because $\varepsilon$ and $\varepsilon_0$ are two constants.

**S1.7. DFT calculation**

The electronic structures of Bi$_{25}$CoO$_{40}$ were calculated on Material Studio with a CASTEP program package [9]. A 1 × 2 × 2 supercell of Bi$_{25}$CoO$_{40}$ was employed for the Density Functional Theory (DFT) calculation. Based on our XRD refinement results, Cr$^{3+}$, Co$^{3+}$, and Bi$^{5+}$ distribution with a ratio of 1 : 3 : 4 was applied to the tetrahedral site of our crystal model. The Generalized Gradient Approximation (GGA) with the parameterization of Perdew–Burke–Ernzerhof (PBE) was used for exchange-correlation functionals. A plane-wave basis with a kinetic energy cutoff of 380.0 eV and a Monkhorst-Pack grid with a 2×2×2 k-point mesh for the integration in the Brillouin zone were used. The geometry optimization convergence thresholds were set with a maximum force of 0.03 eV/Å; a maximum stress tolerance of 0.05 GPa; and a maximum atomic displacement of 0.001 Å. The electronic minimization parameter of the total energy/atom convergence tolerance was $1.0 \times 10^{-5}$ eV. The calculations were done with designed nonlocal norm-conserving pseudopotentials. For a better description of the d orbitals of transition metal, we also used a Hubbard U parameter for the 3d orbital of Co and Cr, which was set to 3 eV and 2.5 eV, respectively [10,11].
Scheme 1. Bi$_{25}$CoO$_{40}$ supercell (1×2×2) used for the DFT calculation.

S2. Figures and Tables

Fig. S1. The Raman spectra of the prepared Bi$_{25}$CoO$_{40}$ nanosheet and nanoparticle.

The existence form of residual Cr was explored through Raman testing, and the Raman spectrum in Fig.S1 displays peaks located in three regions of 50-200 cm$^{-1}$, 200-600 cm$^{-1}$, and 600-900 cm$^{-1}$, which can be attributed to the vibrations of Bi-O, [BiO$_5$E] octahedra (E represents lone electron pairs), and [MO$_4$] tetrahedra in sillenite, respectively [12]. For Bi-O and [BiO$_5$E] vibrations, Bi$_{25}$CoO$_{40}$ nanosheets exhibit negligible changes relative to nanoparticles, indicating that the octahedral position is not affected by residual Cr-species. However, a noteworthy change is the emergence of...
a new peak at ca. 820 cm$^{-1}$ for Bi$_{25}$CoO$_{40}$ nanosheets. This may be attributed to the symmetrical stretching pattern of Cr-O bonds within MO$_4$ tetrahedra, as reported in previous references [13,14], the cations embedded in the tetrahedron strongly affect the electron phonon coupling in sillenite, thereby altering the intensity of the Raman spectrum in the tetrahedron region. The Raman results indicate that Cr ions have entered the sillenite structure, mainly located at tetrahedral positions.

Fig. S2. SEM of prepared Bi$_{25}$CoO$_{40}$. 

![SEM of Bi$_{25}$CoO$_{40}$ nanosheets](image)
Fig. S3. XRD patterns of Bi$_{25}$CoO$_{40}$ nanoparticles and nanosheets.

XRD reveals distinct changes between nanoparticles and nanosheets. For Bi$_{25}$CoO$_{40}$ nanoparticles, the diffraction peak intensity for the (222) plane is 5425.6, and for the (400) plane, it is 477.6. Meanwhile, Bi$_{25}$CoO$_{40}$ nanosheets display a diffraction peak intensity of 5350.6 on the (222) plane and 1262.3 on the (400) plane. Therefore, the diffraction peak ratios between the (400) and (222) planes increase for Bi$_{25}$CoO$_{40}$ nanosheets relative to their particles. These findings suggest that the nanosheets exhibit growth predominantly along the (400) crystallographic direction.
**Fig. S4.** Tauc plot, XPS valence band spectrum, and Mott-Schottky of Bi$_{25}$CoO$_{40}$ nanosheet.

The Tauc plot shows that the band gap of Bi$_{25}$CoO$_{40}$ nanosheets is 1.42 eV. The XPS valence band spectra indicate that the difference between the Fermi levels and the valence band potentials is 1.96 eV. The Fermi levels are close to the flat band potentials that can be obtained by the Mott-Schottky measurements. The Mott-Schottky curve shows that the flat band potential is -0.30 eV vs. Ag/AgCl. Besides that, a positive slope of the curve indicates that the Bi$_{25}$CoO$_{40}$ nanosheets are n-type semiconductors. Therefore, the valence band is determined to be 1.86 eV for the Bi$_{25}$CoO$_{40}$ nanosheet. The conduction band edge is calculated according to the valence band edge and the bandgap, which are 0.44 eV for the Bi$_{25}$CoO$_{40}$ nanosheet.
Fig. S5. Photodegradation curves (a) and linear fitting for the concurrent photodegradation curves (b) of CIP degradation by different photocatalysts. (Cat.=1 g/L, CIP=10 ppm, Xe lamp λ > 300 nm).
Table S1. Performance comparison between our nanosheet photocatalyst and reported bismuth-based nanosheet photocatalysts.

<table>
<thead>
<tr>
<th>No.</th>
<th>Photocatalyst</th>
<th>Bandgap /eV</th>
<th>Degradation Performance</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bi$<em>{25}$CoO$</em>{40}$ Nanosheet</td>
<td>1.42 eV</td>
<td>10 ppm CIP, cat. 1 g / L,</td>
<td>This work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>K=0.328 min$^{-1}$, Xe lamp, full-spectrum</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Co-BiOCl/CQDs</td>
<td>3.28 eV</td>
<td>20 ppm CIP, cat.0.5 g / L,</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>K=0.00820 min$^{-1}$, Xe lamp, λ$&gt;420$ nm</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Zn-BiOCl</td>
<td>2.9 eV</td>
<td>10 ppm CIP, cat. 0.4 g / L,</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>K=0.0480 min$^{-1}$, Xe lamp, λ$&gt;420$ nm</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Vo-WO$_3$/Bi$_2$WO$_6$</td>
<td>/</td>
<td>10 ppm CIP, cat. 0.4 g / L,</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>K=0.0132 min$^{-1}$, Xe lamp, 700nm$&gt;λ&gt;420$ nm</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bi/Bi$_3$NbO$_7$</td>
<td>2.2 eV</td>
<td>10 ppm CIP, cat. 0.5 g / L,</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>K=0.0142 min$^{-1}$, Xe lamp, λ$&gt;400$ nm</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bi$_2$MoO$_6$</td>
<td>2.65 eV</td>
<td>10 ppm CIP, cat. 0.5 g / L,</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>K=0.024 min$^{-1}$, Xe lamp, λ$&gt;420$ nm</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bi$_4$O$_7$</td>
<td>1.18 eV</td>
<td>10 ppm CIP, cat. 1 g / L,</td>
<td>20</td>
</tr>
<tr>
<td>No.</td>
<td>Catalyst</td>
<td>E[ev]</td>
<td>Conditions</td>
<td>K [min(^{-1})]</td>
</tr>
<tr>
<td>-----</td>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td>8</td>
<td>Ag QDs/BiOBr</td>
<td>2.79</td>
<td>10 ppm CIP, cat. 0.5 g / L, Xe lamp, λ&gt;420nm</td>
<td>0.0215</td>
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<td>9</td>
<td>Bi(_4)O(_5)Br(_2)</td>
<td>2.33</td>
<td>10 ppm CIP, cat. 0.5 g / L, Xe lamp, λ&gt;400nm</td>
<td>0.00750</td>
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<tr>
<td>10</td>
<td>Bi(_2)O(_2)CO(_3)</td>
<td>2.95</td>
<td>10 ppm CIP, cat. 1 g / L, full-spectrum</td>
<td>0.0105</td>
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<tr>
<td>11</td>
<td>B-Bi(_3)O(_4)Cl</td>
<td>2.66</td>
<td>10 ppm CIP, cat. 0.5 g / L, Xe lamp, λ&gt;420nm</td>
<td>0.00998</td>
</tr>
<tr>
<td>12</td>
<td>AgI/Bi(_3)O(_4)Br</td>
<td>/</td>
<td>30 ppm CIP, cat. 0.2 g / L, Xe lamp, λ&gt;420nm</td>
<td>0.0223</td>
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<tr>
<td>13</td>
<td>Fe-HQLC/TiO(_2)</td>
<td>2.70</td>
<td>50 ppm CIP, cat. 1 g / L, Xe lamp, λ&gt;420nm</td>
<td>0.187</td>
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<tr>
<td>14</td>
<td>Ag(_{1.3})BrPFe</td>
<td>1.81</td>
<td>1 ppm CIP, cat. 0.17 g / L, Xe lamp, λ&gt;420nm</td>
<td>0.160</td>
</tr>
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</table>
AM1.5

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<tr>
<th>15</th>
<th>FeWO4/NC-800</th>
<th>2.46 eV</th>
<th>20 ppm CIP, cat. 0.08 g/L, K=0.0240 min⁻¹, Xe lamp, λ &gt; 420 nm</th>
</tr>
</thead>
</table>

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Fig. S6. Photodegradation of CIP on Bi$_{25}$CoO$_{40}$ nanoparticles derived after ball-milling the nanosheets (1400 rpm, 2 h). Photodegradation of CIP on Bi$_{25}$CoO$_{40}$ nanosheets is shown as controls. (Cat.=1 g/L, CIP=10 ppm, Xe lamp $\lambda > 300$ nm).
Fig. S7. Isothermal adsorption-desorption curves of prepared Bi$_{25}$CoO$_{40}$ nanosheets and Bi$_{25}$CoO$_{40}$ nanoparticles.
**Fig. S8.** The curve of $\text{Bi}_{25}\text{CoO}_{40}$ nanosheets and nanoparticles adsorbing CIP under dark conditions.
Fig. S9. Degradation curve of CIP under light irradiation without adding photocatalyst.
Fig. S10. The TOC removal rate of Bi$_{25}$CoO$_{40}$ nanosheet, Bi$_{25}$CoO$_{40}$ nanoparticle, and P25-TiO$_2$ for CIP degradation. (Cat.=1 g/L, CIP=10 ppm, Xe lamp $\lambda > 300$ nm).
Fig. S11. CIP photodegradation curves on $\text{Bi}_{25}\text{CoO}_{40}$ nanoparticle (a) and $\text{Bi}_{25}\text{CoO}_{40}$ nanosheet (b) at different pHs. The linear fitting for the concurrent photodegradation curves of CIP degradation on $\text{Bi}_{25}\text{CoO}_{40}$ nanoparticle (c) and $\text{Bi}_{25}\text{CoO}_{40}$ nanosheet (d) at different pHs. (Cat.=1 g/L, CIP=10 ppm, Xe lamp $\lambda > 300$ nm).
**Fig. S12.** The degradation rate of CIP degradation on the Bi$_{25}$CoO$_{40}$ nanoparticle and nanosheet at different pH.
**Fig. S13.** CIP photodegradation curves on Bi$_{25}$CoO$_{40}$ nanosheets (a) and Bi$_{25}$CoO$_{40}$ nanoparticles (b) at different cutoff filters. The linear fitting for the concurrent photodegradation curves of CIP degradation by Bi$_{25}$CoO$_{40}$ nanosheet (c) and Bi$_{25}$CoO$_{40}$ nanoparticle (d) at different cutoff filters. (Cat.=1 g/L, CIP=10 ppm).
Fig. S14. Photodegradation curves and linear fitting for the concurrent photodegradation curves of NFX(a), Tet(b), OFX(c), SDZ(d), BPA(e), 2,4-DCP(f), 4-CP(g), Phenol(h), MB(i), MO(j), RhB(k), PFOA(l) by Bi$_{25}$CoO$_{40}$ nanosheet and Bi$_{25}$CoO$_{40}$ nanoparticle. (Cat.=1g/L, Antibiotics=10 ppm, Phenols=5 ppm, MB=5 ppm, MO=10 ppm, RhB=15 ppm, Xe lamp $\lambda > 300$ nm).
Fig. S15. Stability of Bi$_{25}$CoO$_{40}$ nanosheets for the photodegradation of CIP.
Fig. S16. XRD (a) and Raman (b) spectra of Bi$_{25}$CoO$_{40}$ nanosheets photocatalyst before and after reaction. (c) TEM images of Bi$_{25}$CoO$_{40}$ nanosheet photocatalyst after the reaction.
Fig. S17. CIP photodegradation curves(a) and the linear fitting for the concurrent photodegradation curves(b) on Bi$_{25}$CoO$_{40}$ nanosheet at actual water. CIP photodegradation curves(c) and the linear fitting for the concurrent photodegradation curves(d) on Bi$_{25}$CoO$_{40}$ nanosheet at various ions. (Cat.=1 g/L, CIP=10 ppm, Xe lamp $\lambda > 300$ nm, Ca$^{2+}$(CaCl), Na$^+$ (NaCl), Mg$^{2+}$(MgCl), CO$_3^{2-}$(Na$_2$CO$_3$), SO$_4^{2-}$(Na$_2$SO$_4$), HPO$_4^{2-}$(Na$_3$PO$_4$)).
Fig. S18. Degradation curve (a) and degradation rate constant (b) of CIP in the presence of NOM (Humic acid, HA).
Fig. S19. HPLC chromatograms of the CIP degradation on Bi$_{25}$CoO$_{40}$ nanoparticle(a) and Bi$_{25}$CoO$_{40}$ nanosheet(b). P1 and P2 are the degradation intermediates. MS fragmentation analysis of the observed intermediate products in the UPLC-Q-TOF MS total ion current chromatogram during the CIP degradation in the Bi$_{25}$CoO$_{40}$ nanosheet.
**Fig. S20.** Active species capture during the CIP degradation on Bi$_{25}$CoO$_{40}$ nanosheet ((a) Photodegradation curves, (c) Linear fitting for the concurrent photodegradation curves) and Bi$_{25}$CoO$_{40}$ nanoparticle ((b) Photodegradation curves, (d) Linear fitting for the concurrent photodegradation curves). Control is the photocatalyst without any capture reagent addition; IPA is the capture reagent for hydroxide radicals; PBQ is the capture reagent for superoxide radicals. FA is the capture reagent for holes [29,30]. (Cat.=1g/L, CIP=10 ppm, IPA、PBQ、FA=1mmol, Xe lamp λ > 300 nm).

The addition of FA significantly reduces the activity of both Bi$_{25}$CoO$_{40}$ nanoparticles and Bi$_{25}$CoO$_{40}$ nanosheets, indicating the vital role of the holes in the degradation of CIP in both materials. Upon the introduction of PBQ, the activity of Bi$_{25}$CoO$_{40}$ nanoparticles slightly decreases, while the activity of Bi$_{25}$CoO$_{40}$ nanosheets
exhibits a more pronounced decline. This suggests that in the process of degrading CIP, the role of superoxide radicals in Bi$_{25}$CoO$_{40}$ nanosheets is more significant than in Bi$_{25}$CoO$_{40}$ nanoparticles. However, with the addition of IPA, there is no significant change in the activity of both Bi$_{25}$CoO$_{40}$ nanoparticles and Bi$_{25}$CoO$_{40}$ nanosheets, indicating that hydroxyl radicals essentially do not play a substantial role in the degradation of CIP.
Table S2. Fitting parameters for transient PL spectra.

<table>
<thead>
<tr>
<th>Sample</th>
<th>$\tau_1$ / ns</th>
<th>$\tau_2$ / ns</th>
<th>$\tau_3$ / ns</th>
<th>$B_1%$</th>
<th>$B_2%$</th>
<th>$B_3%$</th>
<th>$\tau$ / ns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi$<em>{25}$CoO$</em>{40}$ Nanoparticle</td>
<td>0.0629</td>
<td>0.9027</td>
<td>4.3639</td>
<td>30.11</td>
<td>33.42</td>
<td>36.47</td>
<td>1.91</td>
</tr>
<tr>
<td>Bi$<em>{25}$CoO$</em>{40}$ Nanosheet</td>
<td>0.0617</td>
<td>1.2703</td>
<td>6.5052</td>
<td>31.85</td>
<td>34.32</td>
<td>33.83</td>
<td>2.66</td>
</tr>
</tbody>
</table>
Table S3. Fitting parameters for EIS spectra.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Rs / Ω</th>
<th>$R_{ct}$ / KΩ</th>
<th>CPE / μF</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi$<em>{25}$CoO$</em>{40}$ Nanoparticle-Dark</td>
<td>31.48</td>
<td>19.86</td>
<td>127.65</td>
<td>0.803</td>
</tr>
<tr>
<td>Bi$<em>{25}$CoO$</em>{40}$ Nanoparticle-Light</td>
<td>30.29</td>
<td>15.23</td>
<td>133.78</td>
<td>0.799</td>
</tr>
<tr>
<td>Bi$<em>{25}$CoO$</em>{40}$ Nanosheet-Dark</td>
<td>17.15</td>
<td>8.87</td>
<td>119.61</td>
<td>0.837</td>
</tr>
<tr>
<td>Bi$<em>{25}$CoO$</em>{40}$ Nanosheet-Light</td>
<td>21.06</td>
<td>6.03</td>
<td>144.20</td>
<td>0.827</td>
</tr>
</tbody>
</table>
Fig. S21. The transient photocurrent density of Bi$_{25}$Co$_{40}$ nanosheet(a), Bi$_{25}$Co$_{40}$ nanoparticle (b), (c) The open circuit potentials of Bi$_{25}$Co$_{40}$ nanosheet and Bi$_{25}$Co$_{40}$ nanoparticle, (d) The illustration shows the internal electric field strength of Bi$_{25}$Co$_{40}$ nanoparticle and Bi$_{25}$Co$_{40}$ nanosheet (assuming that the internal electric field strength of Bi$_{25}$Co$_{40}$ nanoparticle is "1")

In order to evaluate the internal electric field of Bi$_{25}$Co$_{40}$ nanoparticle and Bi$_{25}$Co$_{40}$ nanosheet, we measured photo-generated charge density by the transient photocurrent density and surface voltages by open circuit potentials (OCP), which are shown in Fig. S21a, b and Fig. S21c, respectively. According to Le Formal and Grätzel et al [31], the internal electric field is proportional to the number of charges accumulated at the surface, by integrating the measured transient photocurrent density minus the steady-state values of photocurrent with respect to time. The results show
that the photo-generated charge density of the Bi\textsubscript{25}CoO\textsubscript{40} nanosheets and Bi\textsubscript{25}CoO\textsubscript{40} nanoparticles are 18.1 μC/cm\textsuperscript{2}, 6.70 μC/cm\textsuperscript{2} respectively. Fig. S21c shows the OCP of the Bi\textsubscript{25}CoO\textsubscript{40} nanosheet and Bi\textsubscript{25}CoO\textsubscript{40} nanoparticle and their values are 0.061V, and 0.016V respectively. It can be found that the internal electric field intensity of the Bi\textsubscript{25}CoO\textsubscript{40} nanosheet is 3.19 times as high as that of the Bi\textsubscript{25}CoO\textsubscript{40} nanoparticle.
References


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