Electronic Supplementary Information

CuS-Bi$_2$S$_3$ Hierarchical Architectures: Controlled Synthesis and Enhanced Visible-Light Photocatalytic Performance for Dye Degradation

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Figure S1. XRD patterns of PT-3h, PT-6h, PT-18h, ST-6h and SS-6h.
Figure S2. SEM images of (a)(b) TU-3h, (c)(d) TU-6h and (e)(f) TU-18h

Figure S3. TEM and HRTEM images of composite samples prepared using (a)(b) TU (thiourea) and (c)(d) ST (sodium thiosulfate) as sulfur sources
Figure S4. Possible growth mechanism for the CuS-Bi₂S₃ composites using TU (thiourea), SS (sodium sulphide), ST (sodium thiosulfate) and PT (potassium thiocyanate) as sulfur sources.

Figure S5. UV-vis absorption spectra of PT-3h, PT-6h, PT-18h, ST-6h, and TU-6h
Figure S6. $hν(\varepsilon hν)^2$ plot of CuS, Bi$_2$S$_3$ and their UV-vis absorption spectra (inset)

Figure S7. Photocatalytic degradation of Rh-B ($2\times10^{-5}$ mol/L) over TU-3h, TU-6h and TU-18h
Figure S8. UV-vis absorption of crystal violet at different irradiation time over (a) PT-6h, (b) TU-6h and (c) Bi$_2$S$_3$

Table S1. Degradation rate constants for Rh-B and CV on the as prepared samples.

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<thead>
<tr>
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<th>k (min$^{-1}$)</th>
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<tbody>
<tr>
<td></td>
<td>TU-6h</td>
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<tr>
<td>Rh-B</td>
<td>0.0388</td>
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<tr>
<td>CV</td>
<td>0.0398</td>
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Figure S9. UV-vis absorption of Rh-B and crystal violet (mixed solution) at different irradiation time over PT-6h.

Figure S10. Band gap structures of CuS and Bi$_2$S$_3$ and the possible process for the separation of charge carriers.