Supplementary Materials

Controllable Hydrothermal Synthesis and Photocatalytic Performance of Bi$_2$MoO$_6$ Nano/microstructures

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Part I: Calculations

1. Relationship between electron concentration \((n)\) and Fermi level \((E_F)\) in semiconductors

\[
n = N_c \exp \left( - \frac{E_C - E_F}{kT} \right) \quad (S1)
\]

\[
E_C - E_F = E_g - VBM \quad (S2)
\]

where \(k, T\) are the Boltzmann constant and temperature, \(E_C, E_g\) and \(N_c\) are conduction band level, band gap and effective state density of conduction band, respectively. According to Equation S1 and S2, \(n\) becomes smaller as VBM becomes smaller.

References

1. S. M. Sze, *Physics of Semiconductor Devices*, 2nd ed (Wiley, New York, 1981).
2. E. A. Kraut, R. W. Grant, J. R. Waldrop, S. P. Eowalczyk, *Phys. Rev. Lett.* 1980, 44, 1620.
Part II: Supplementary Figures

**Figure S1.** N 1s (a) and Br 3d (b) spectra of the BMO-CTAB, respectively.

**Figure S2.** UV-visible spectra of rhodamine B (RhB) solution with time over BMO-TCD under visible light.

**Figure S3.** UV-visible spectra of rhodamine B (RhB) solution with time over BMO-GLU under visible light.
Figure S4. UV-visible spectra of rhodamine B (RhB) solution with time over BMO-SDS-1 under visible light.

Figure S5. UV-visible spectra of rhodamine B (RhB) solution with time over BMO-SDS-2 under visible light.

Figure S6. UV-visible spectra of rhodamine B (RhB) solution with time over BMO under visible light.
### Part III: Table

Table S1 The atomic percentage of each element of the BMO-CTAB sample, measured by XPS.

| Element  | Bi   | Mo  | O   | N   | Br  |
|----------|------|-----|-----|-----|-----|
| Atomic percentage (%) | 12.09 | 5.28 | 34.06 | 18.25 | 3.99 |