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

Tao Ji 1, Enna Ha 1, Mingzhou Wu 1, Xin Hu 1, Jie Wang 2, Yangang Sun 2*, Shijie Li 3*, and Junqing Hu 1,*

1 College of Health Science and Environmental Engineering, Shenzhen Technology University, Shenzhen 518118, China; jitao@sztu.edu.cn (T.J.); haenna@sztu.edu.cn (E.H.); wumingzhou@sztu.edu.cn (M.W.); huxin@sztu.edu.cn (X.H.)
2 College of Chemistry and Chemical Engineering, Shanghai University of Engineering Science, Shanghai 201620, China; wj18317152083@163.com
3 Institute of Innovation & Application, Zhejiang Ocean University, Zhoushan 316022, China
* Correspondence: syg021@sues.edu.cn (Y.S.); lishijie@zjou.edu.cn (S.L.); hujunqing@sztu.edu.cn (J.H.)
Part I: Calculations

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

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

\[
E_C - E_F = E_g - VBM \tag{S2}
\]

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

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

<table>
<thead>
<tr>
<th>Element</th>
<th>Bi</th>
<th>Mo</th>
<th>O</th>
<th>N</th>
<th>Br</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atomic percentage (%)</td>
<td>12.09</td>
<td>5.28</td>
<td>34.06</td>
<td>18.25</td>
<td>3.99</td>
</tr>
</tbody>
</table>