

## Supplementary Information

An all solid state photo-rechargeable battery based on  $\text{Cs}_3\text{Bi}_2\text{I}_9$

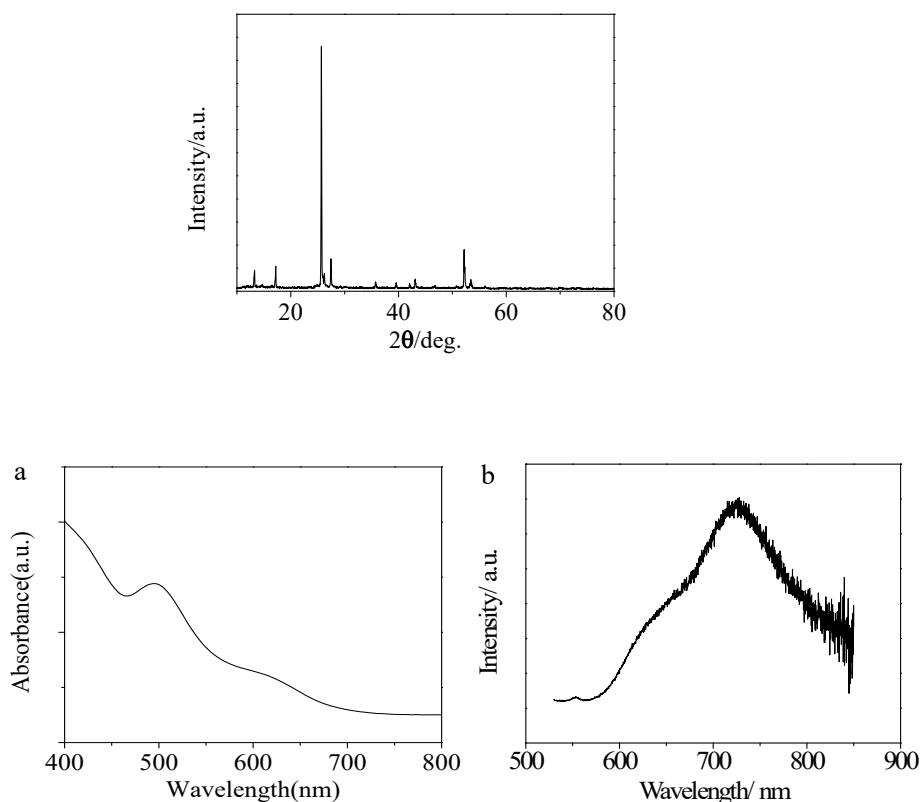
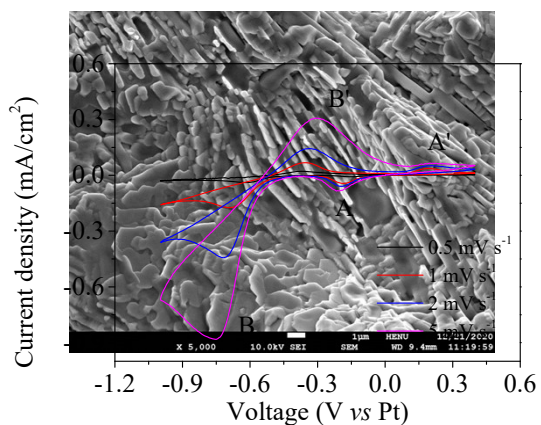


Fig. S1 XRD of  $\text{Cs}_3\text{Bi}_2\text{I}_9$  prepared on FTO/ $\text{TiO}_2$ .

Fig. S2 UV-Vis (a) and PL (b) spectra of  $\text{Cs}_3\text{Bi}_2\text{I}_9$  prepared on FTO/ $\text{TiO}_2$ .

Fig. S3 Surface topography of  $\text{Cs}_3\text{Bi}_2\text{I}_9$  prepared on FTO/ $\text{TiO}_2$ .

Fig. S4 Cyclic voltammety curve of the FTO/ $\text{TiO}_2$ / $\text{Cs}_3\text{Bi}_2\text{I}_9$ /Pt/FTO cells at different scan rate



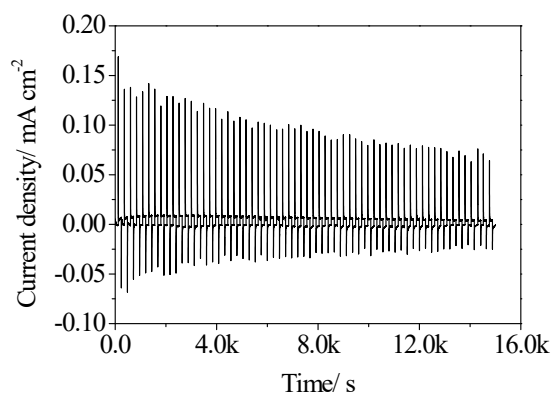
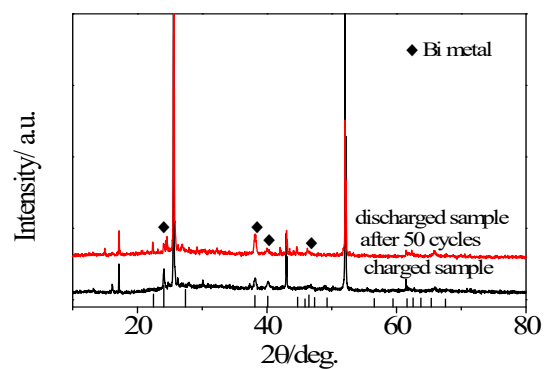


Fig. S5 XRD of FTO/TiO<sub>2</sub>/Cs<sub>3</sub>Bi<sub>2</sub>I<sub>9</sub> at charging state and discharging state after 50 cycles.

Fig. S6 Cyclic stability of FTO/TiO<sub>2</sub>/Cs<sub>3</sub>Bi<sub>2</sub>I<sub>9</sub>/Pt/FTO cells during photo charge and dark discharge. Light source: 1 Sun of simulated solar illumination by a Xe lamp with AM 1.5G filter (100 mW/cm<sup>2</sup>).

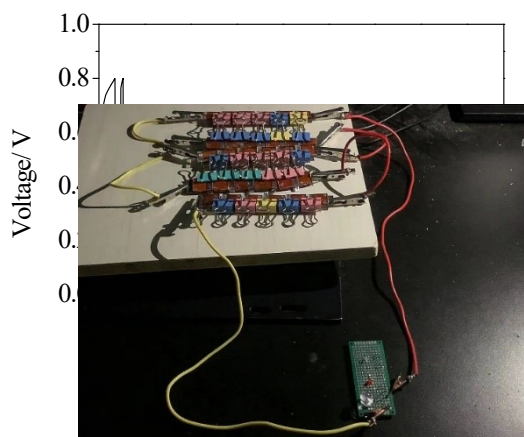
Fig. S7 Effects of illumination on the discharge of FTO/TiO<sub>2</sub>/Cs<sub>3</sub>Bi<sub>2</sub>I<sub>9</sub>/Pt/FTO cells

Fig. S8 Photograph of thirty cells connected in series to power a LED after photo charge.

#### Description of Additional Supplementary Files

File name: Supplementary Movie 1

Description: Demonstration of FTO/TiO<sub>2</sub>/Cs<sub>3</sub>Bi<sub>2</sub>I<sub>9</sub>/Pt/FTO cells for lighting a LED lamp after photo charged for 2 min.



File name: Supplementary Movie 2

Description: Demonstration of FTO/TiO<sub>2</sub>/Cs<sub>3</sub>Bi<sub>2</sub>I<sub>9</sub>/Pt/FTO cells for lighting a LED lamp after photo charged for 10 min.

File name: Supplementary Movie 2

Description: Demonstration of FTO/TiO<sub>2</sub>/ Cs<sub>3</sub>Bi<sub>2</sub>I<sub>9</sub>/Pt/FTO cells for lighting a LED lamp after photo charged for 15 min.

File name: Supplementary Movie 4

Description: Demonstration of FTO/TiO<sub>2</sub>/ Cs<sub>3</sub>Bi<sub>2</sub>I<sub>9</sub>/Pt/FTO cells for lighting a LED lamp after photo charged for 20 min.