Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary Information

Flaky Nano-Crystalline $SnSe_2$ Thin Films for Photoelectrochemical Current Generation

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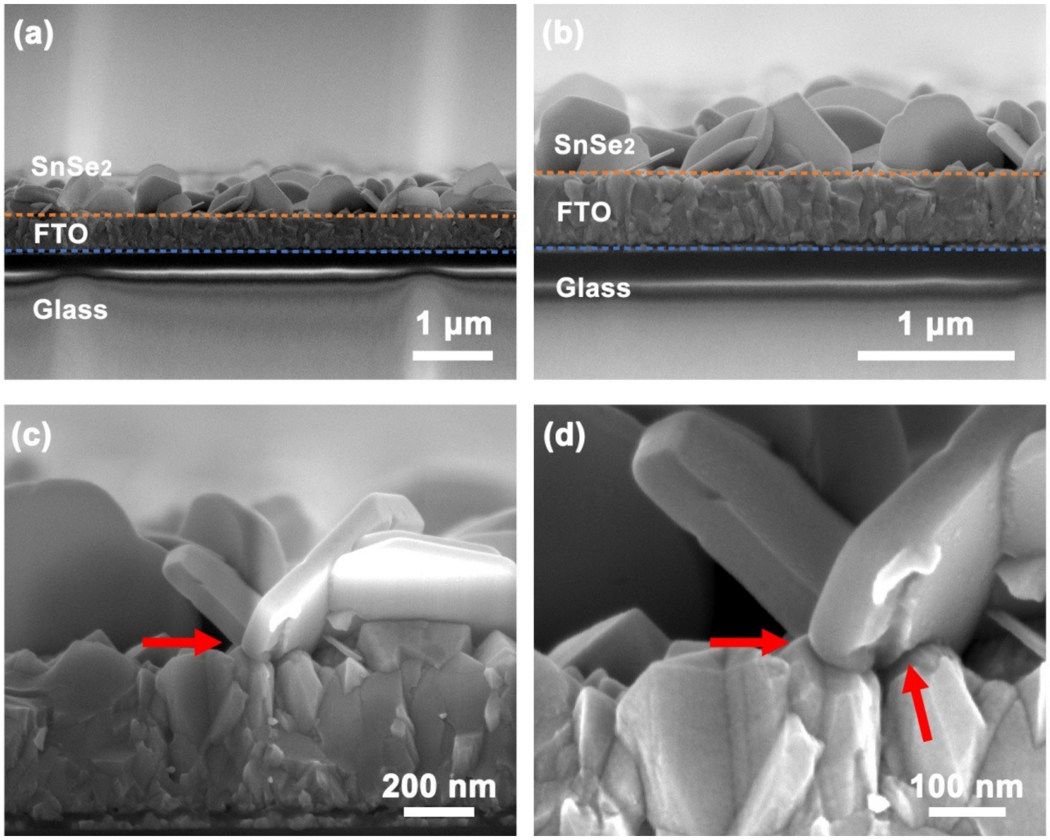

Figure S1. (a-d) SEM images of the cross section of $SnSe_2$ nanoflakes grown on FTO glass. (c, d) High-magnification SEM images showing the tilted $SnSe_2$ flakes and their connection with FTO glass.

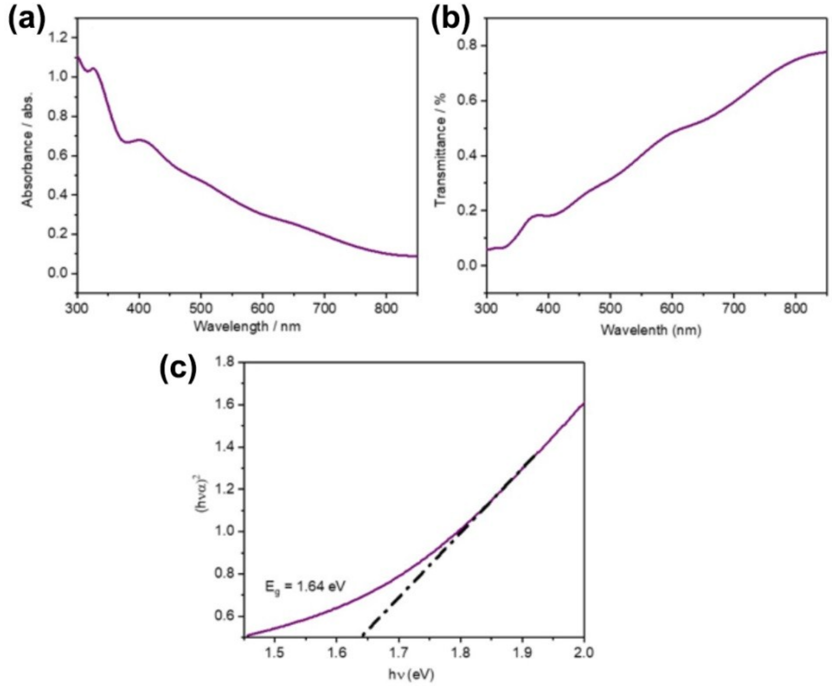

Figure S2. (a) UV-vis absorbance, (b) transmittance spectrum and (c) Tauc plot of flaky $SnSe_2$ on FTO substrate.

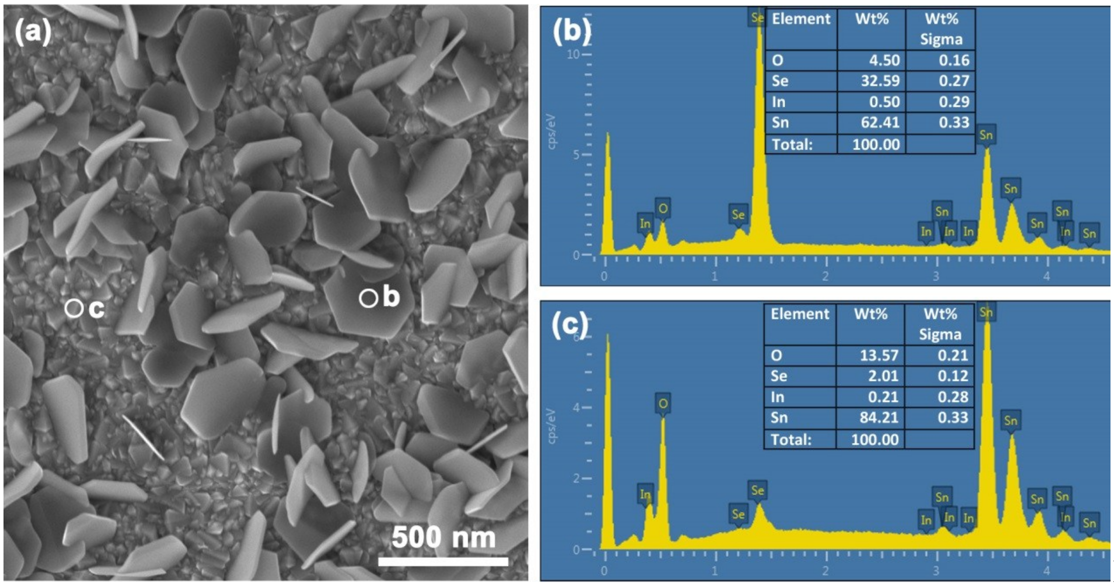

Figure S3. (a) A SEM image of as-grown $SnSe_2$ nanoflakes on FTO glass. (b, c) EDX spectra of a $SnSe_2$ flake and the FTO substrate.

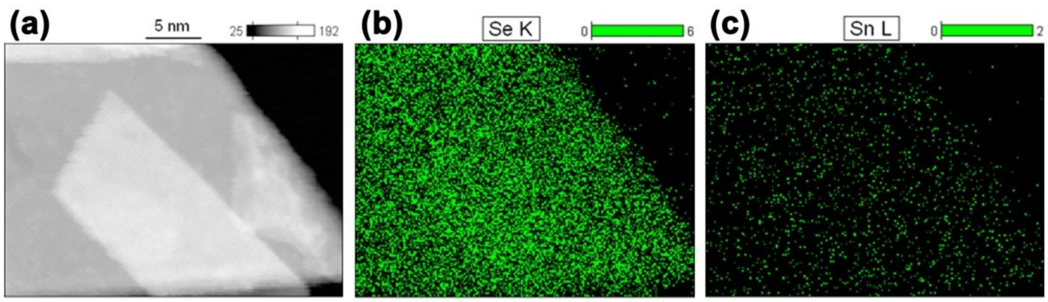

Figure S4. (a) Dark field TEM image of two stacked $SnSe_2$ nanoflakes. (b, c) Corresponding EDX maps of (b) Se and (c) Sn.

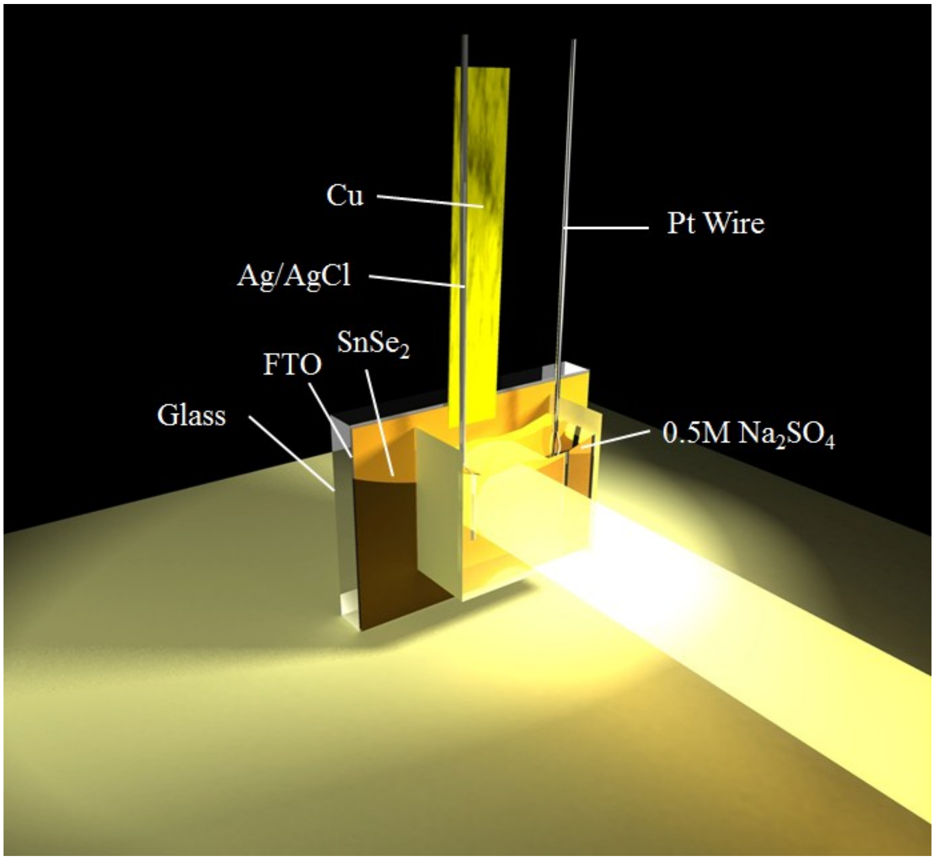

Figure S5. Schematic illustration of a PEC with $SnSe_2$/FTO electrode, Pt mesh and Ag/AgCl as working electrode, counter electrode and reference electrode, respectively.

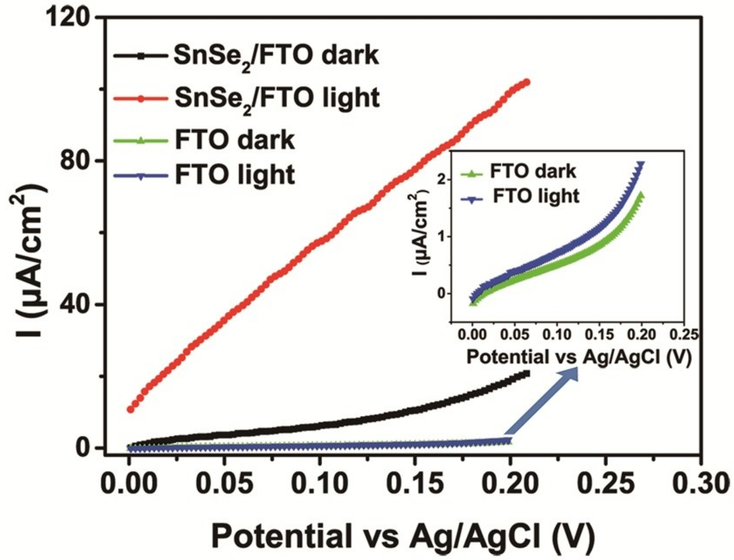

Figure S6. Linear voltammograms of $SnSe_2$/FTO and bare FTO in the dark and under illumination, excludes the photocurrent contribution from FTO.

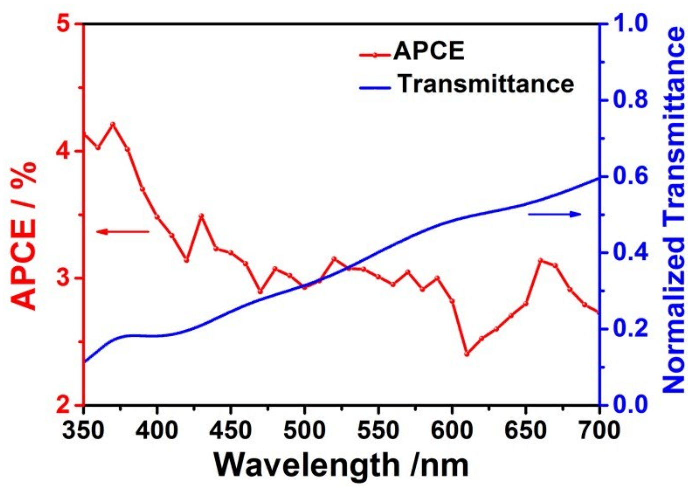

Figure S7. Plot of APCE spectra (red line) and transmittance spectra (blue line) versus wavelength at the potential of 0 V vs. Ag/AgCl electrode.

Dividing the IPCE by light harvesting efficiency, we can get the APCE efficiency (absorbed photon-to-current efficiencies), which is the internal efficiency value of the sample.

$$APCE = \frac{IPCE}{(1 - T(\%))}$$

Where T(%) is the transmittance. Here we ignore the effect of reflectance, since it is ignorable when compared with the absorbance.