

Supporting Information

For

**Interfacial Engineering Enabling Solution - Processed Cu: NiO_x/Sb₂Se₃/TiO₂/Pt Photocathode for
Highly Efficient Photoelectrochemical Water – Splitting**

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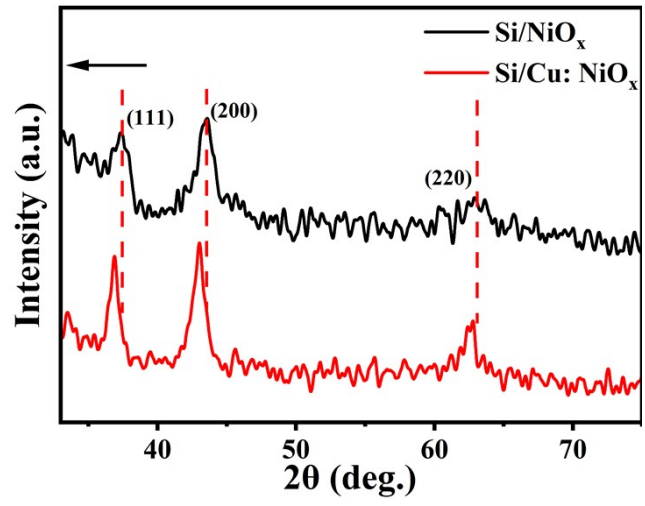


Fig. S1 XRD of Si/NiO_x (black) and Si/Cu: NiO_x (red).

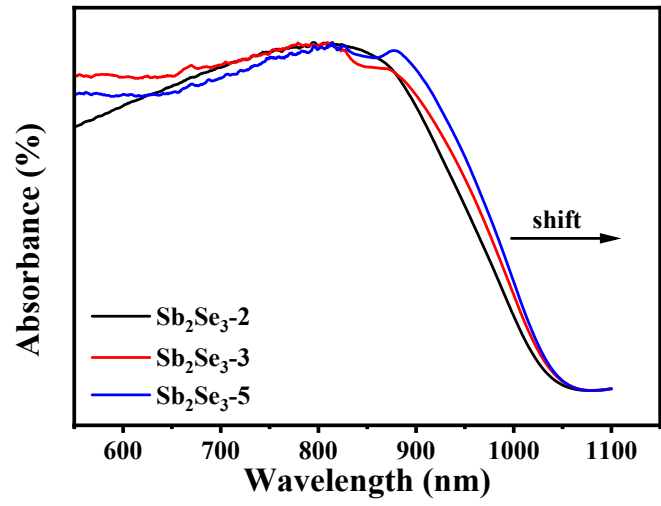


Fig. S2 UV-vis absorbance spectra for the three different spin coating times of Sb₂Se₃: Sb₂Se₃-2

(black), Sb₂Se₃-3 (red), and Sb₂Se₃-5 (blue).

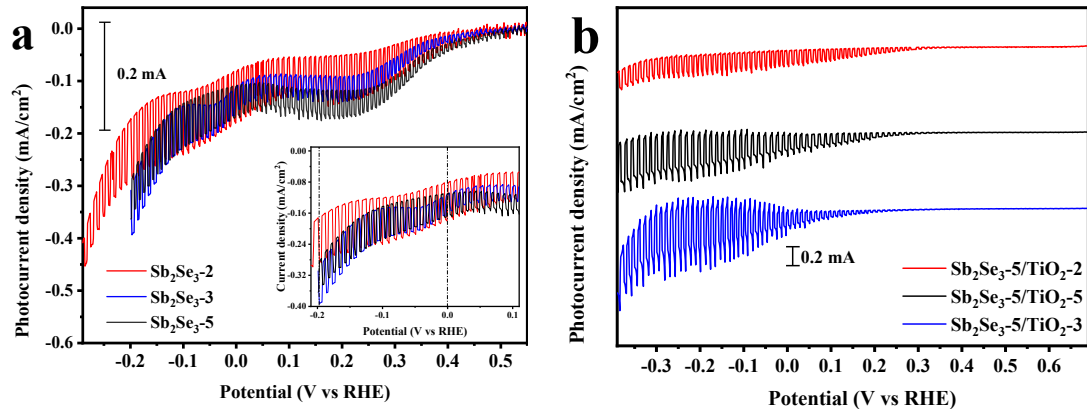


Fig. S3 LSV curves: (a) Spin-coating times of bare-Sb₂Se₃ NPs (The insertion depicts an enlarged curve) and (b) different TiO₂ spin-coating times.

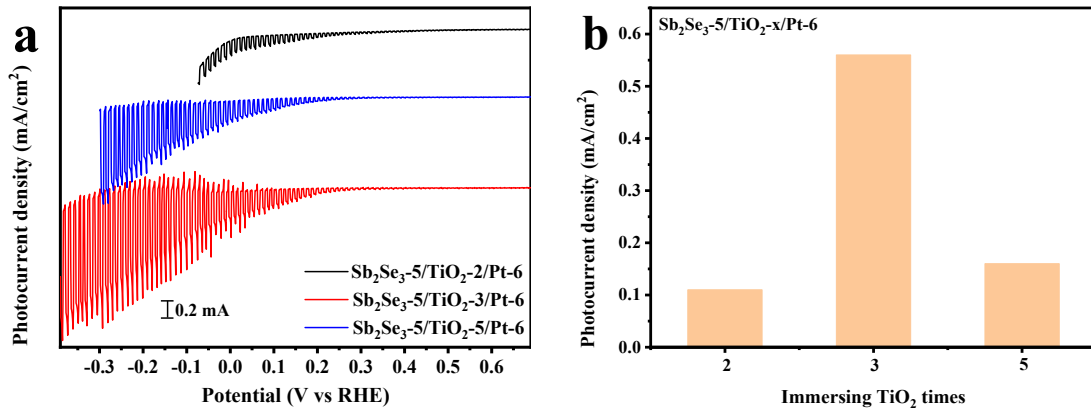


Fig. S4 (a) LSV curves and (b) the photocurrent under 0 V_{RHE} of Sb₂Se₃-5/TiO₂-x/Pt-6.

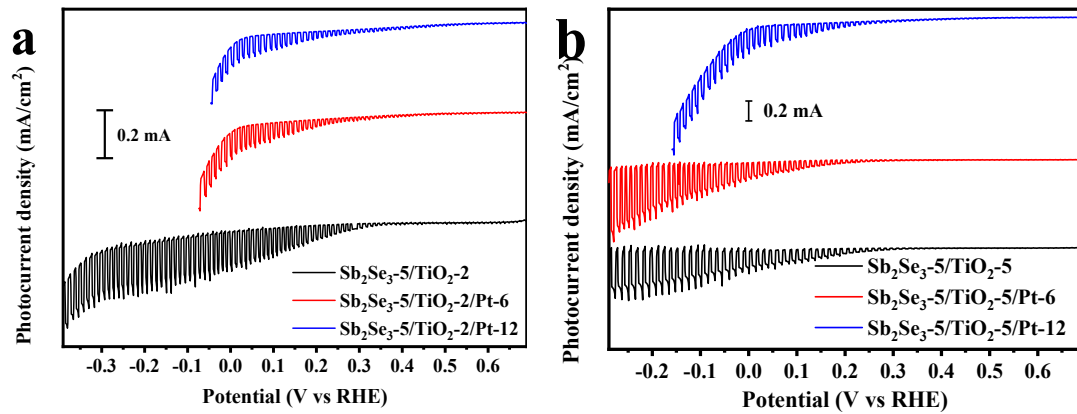


Fig. S5 LSV curves of Sb₂Se₃-based photocathodes with different TiO₂ NPs impregnation times: (a) 2 times and (b) 5 times.

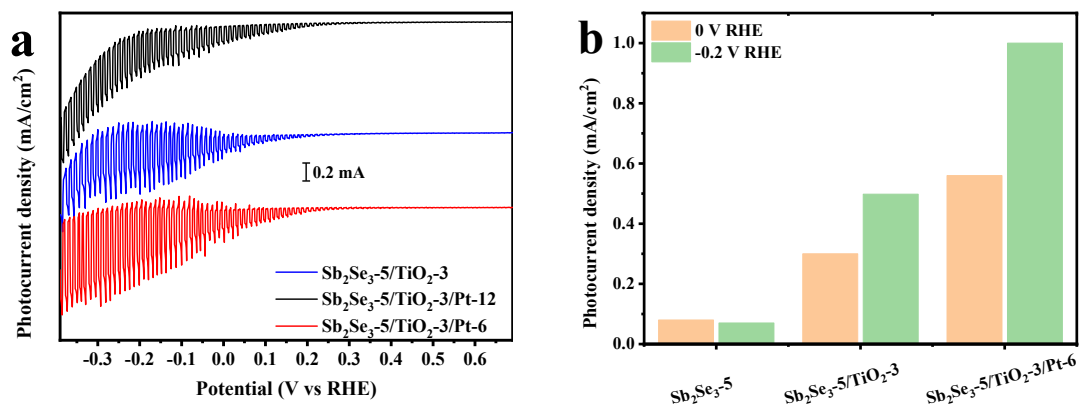


Fig. S6 (a) Different Pt impregnation times and (b) the comparison of photocurrent for Sb₂Se₃-5, Sb₂Se₃-5/TiO₂-3 and Sb₂Se₃-5/TiO₂-3/Pt-6.

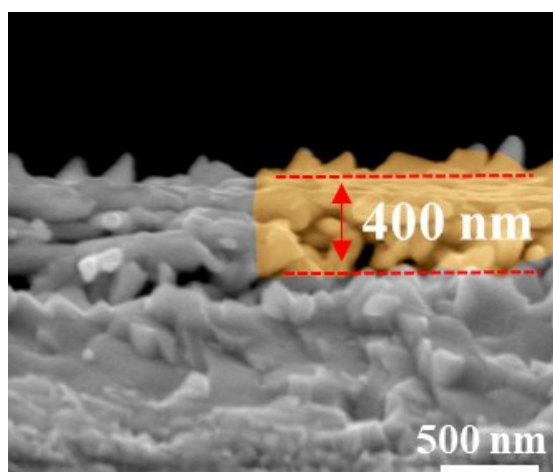


Fig. S7 The Cross-view SEM image of Sb₂Se₃-5/TiO₂-3/Pt-6.

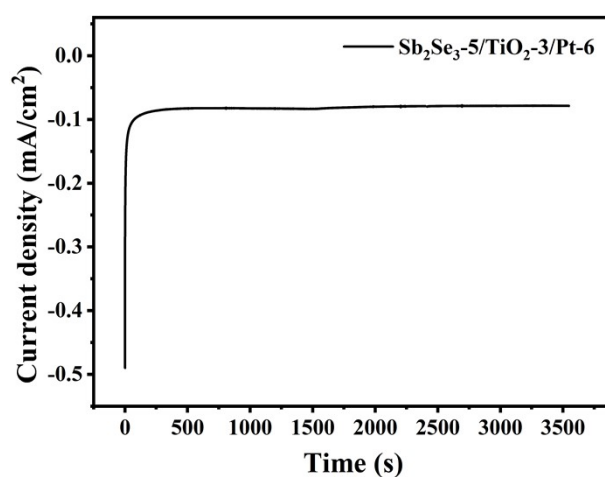


Fig. S8 Chronoamperometry stability measurement on the Sb₂Se₃-5/TiO₂-3/Pt-6 with a 0 V_{RHE} in an electrolyte with a pH 1 under AM 1.5G simulated sunlight.

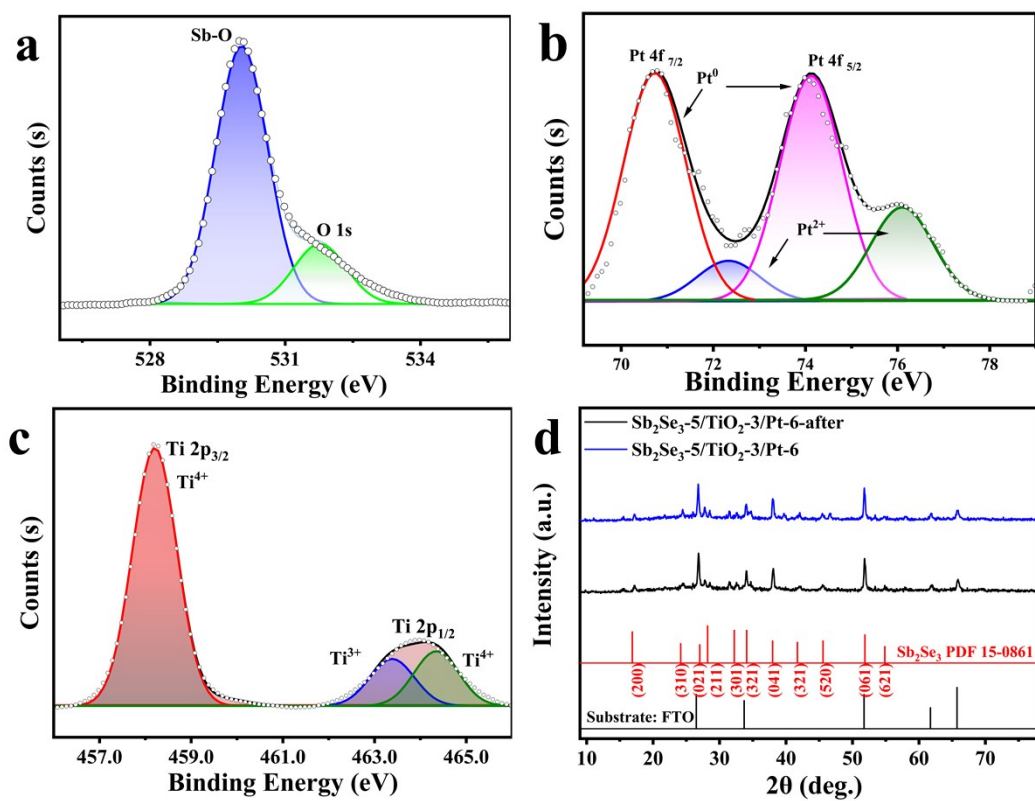


Fig. S9 XPS spectra of (a) Sb 3d, (b) Pt 4f, and (c) Ti 2p, and (d) XRD patterns of Sb₂Se₃-5/TiO₂-3/Pt-6 after chronoamperometry stability test.

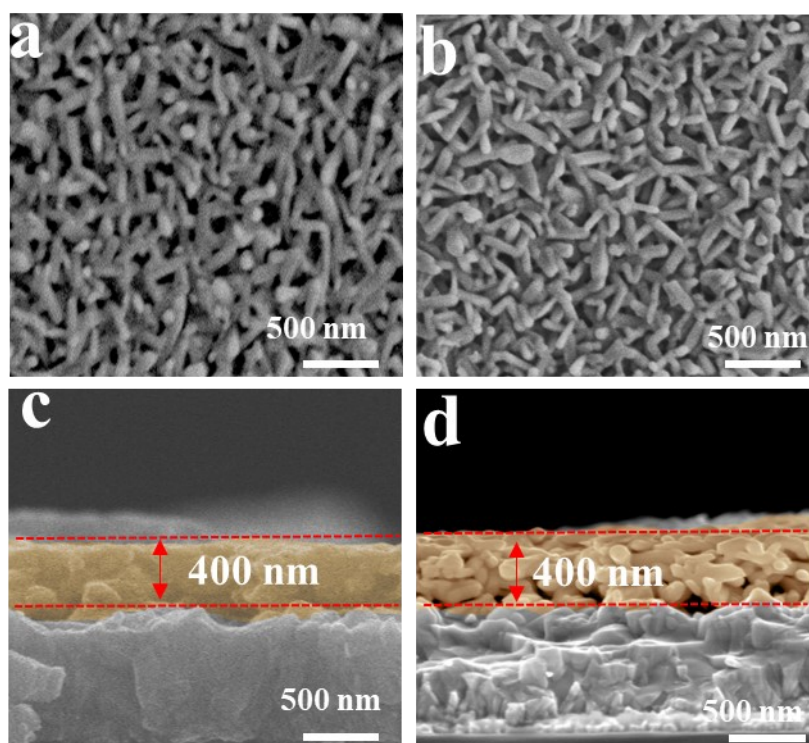


Fig. S10 (a-b) Top-view SEM image and (c-d) cross-view SEM images of Sb₂Se₃-5/TiO₂-3/Pt-6 before

(first row) and after (second row) chronoamperometry stability measurement.

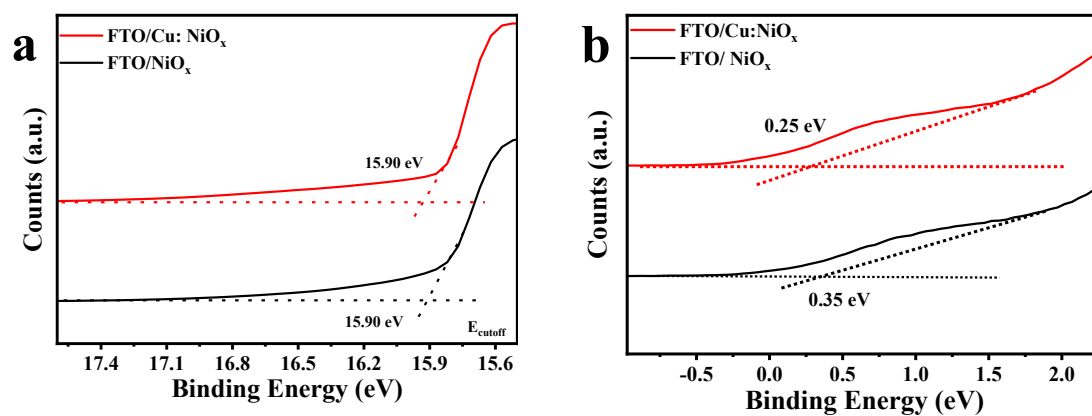


Fig. S11 The UPS spectra for FTO/ NiO_x and FTO/Cu: NiO_x, obtained using He I radiation at 21.21 eV

for determination: (a) E_{cutoff} and (b) E_{edge} .