

Supporting information for

# Stable Inverse Opal Structure of Cadmium Chalcogenide for Efficient Water Splitting

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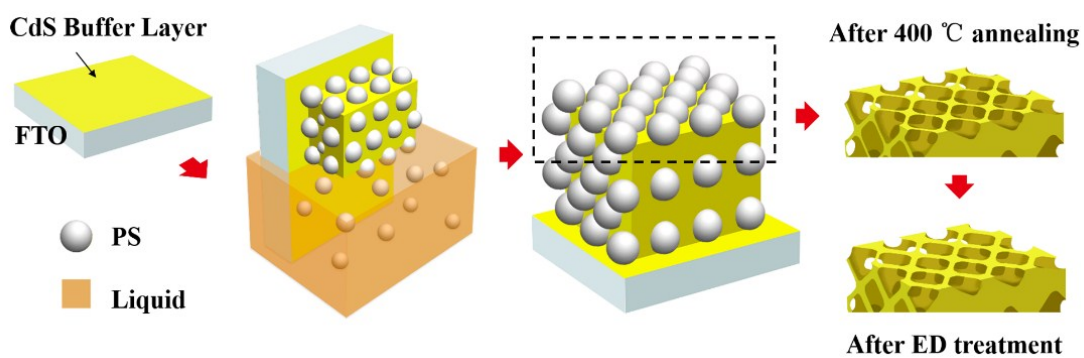
Xi-Wen Du\*

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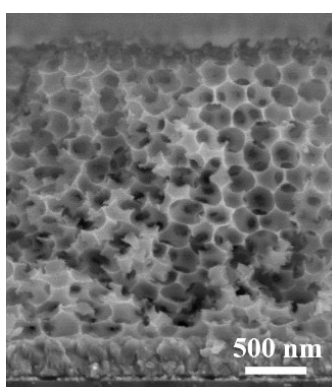
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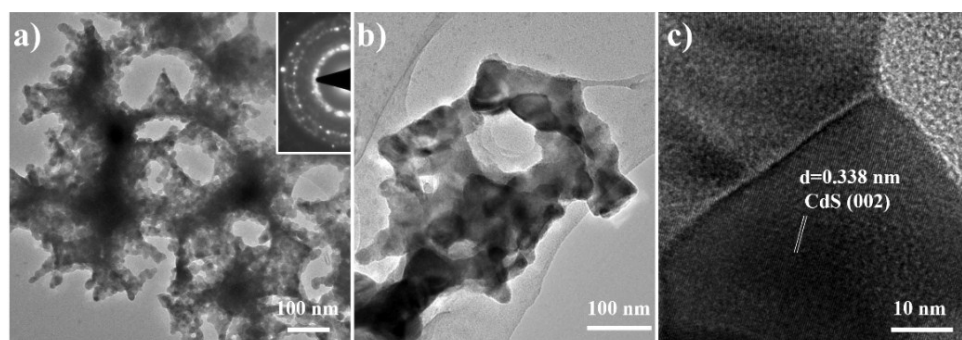
## Supplementary Figures



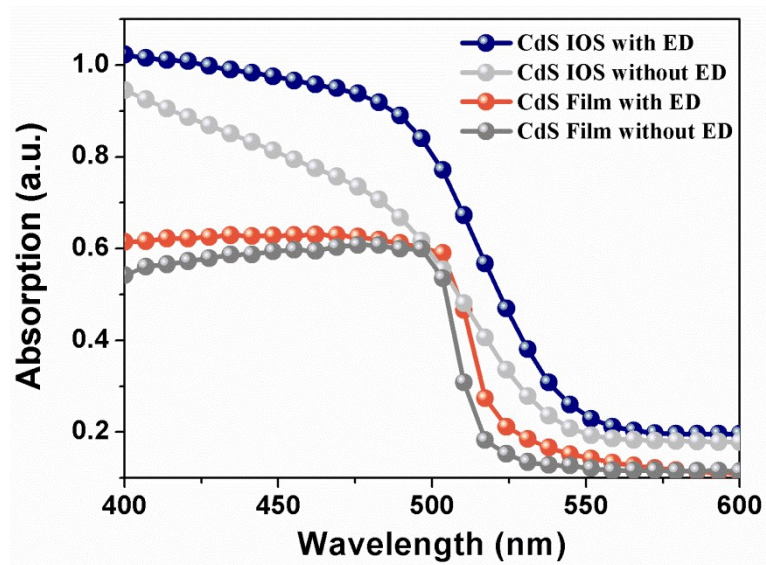
**Figure S1.** Schematic diagram on the fabrication of CdS IOS.



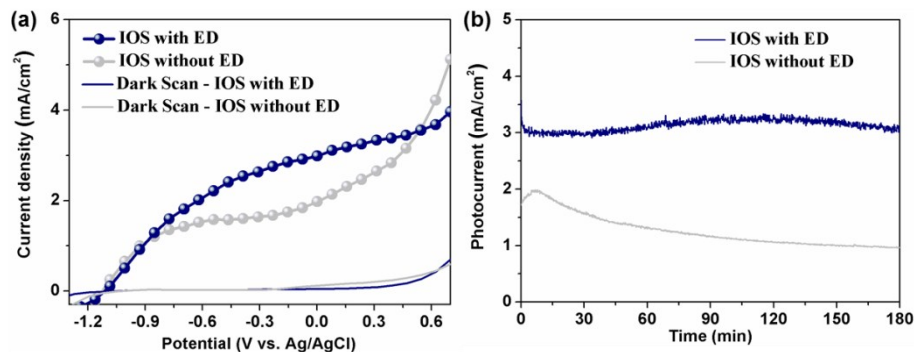
**Figure S2.** Side-view SEM image of the final CdS IOS.



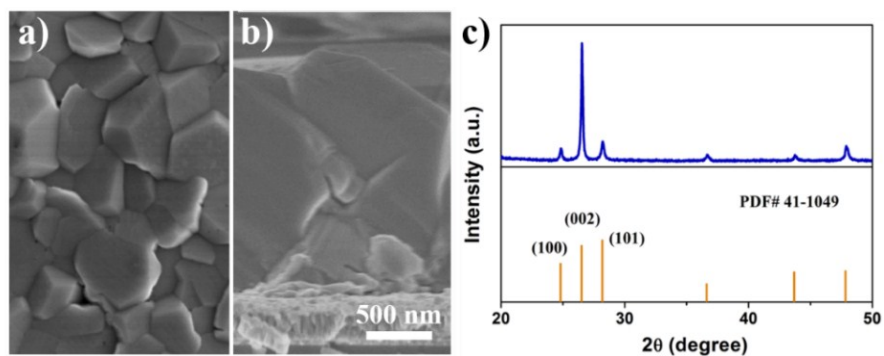
**Figure S3.** Characterizations of IOS. (a) low magnification and (b) high magnification TEM images, the insert of (a) is a SAED pattern, (c) HRTEM image.



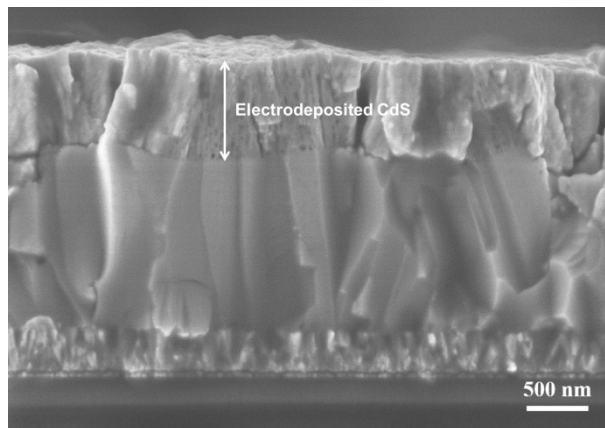
**Figure S4.** Absorbance spectra of IOS and film with and without ED processing.



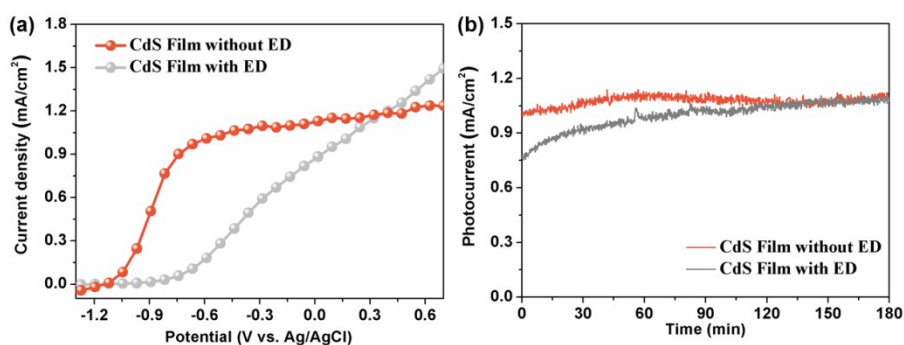
**Figure S5.** PEC response of original CdS IOS. (a) Linear sweep voltammograms measurements under 1 sun AM1.5 illumination and in the dark. (b) Photocurrent stability of the IOS photoanode at 0 V versus RHE under AM 1.5 illumination.



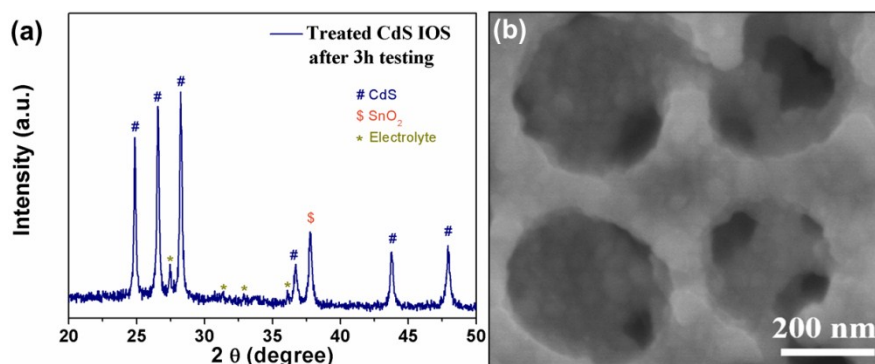
**Figure S6.** Characterizations of the CdS film. (a) the top-view and (b) side-view SEM images, (c) XRD pattern.



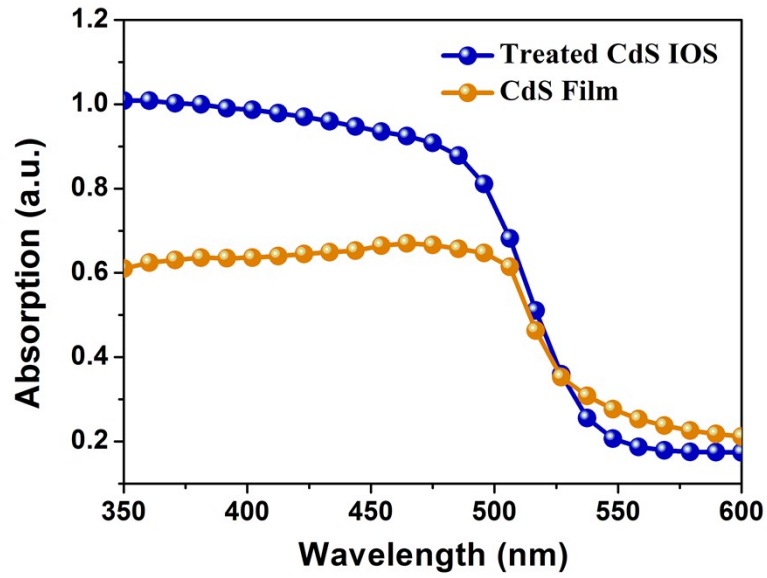
**Figure S7.** Cross-section SEM image of planar CdS film after ED and subsequent calcination.



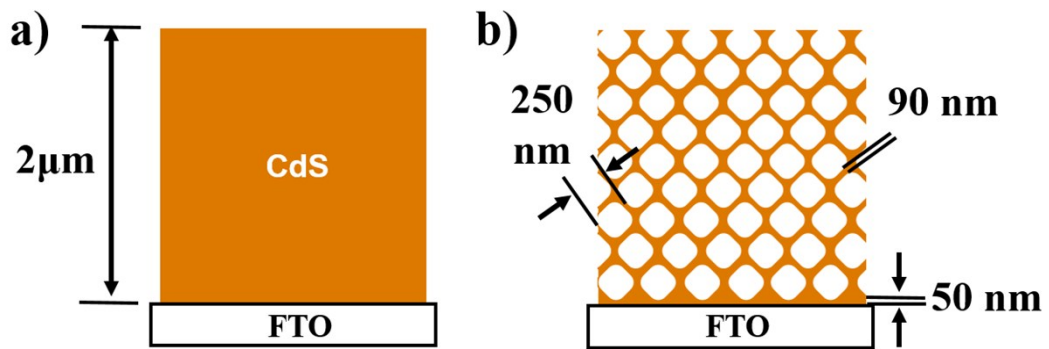
**Figure S8.** PEC response of original and treated CdS film. (a) Linear sweep voltammograms measurements under 1 sun AM1.5 illumination and in the dark. (b) Photocurrent stability and time evolution of the IOS photoanode at 0 V versus RHE under AM 1.5 illumination.



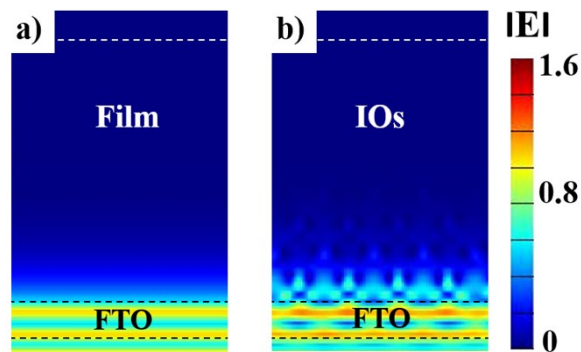
**Figure S9.** Characterizations of the treated CdS IOS after stability test. (a) XRD pattern, (b) high-resolution SEM image.



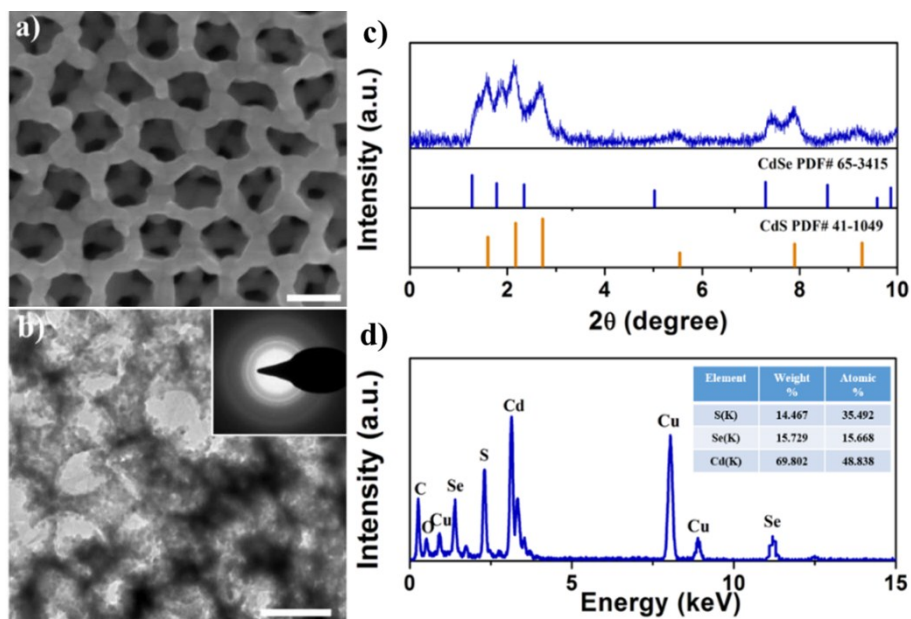
**Figure R10.** The absorbance spectra of treated CdS IOS and CdS film. The Y-axis is the absorbance intensity.



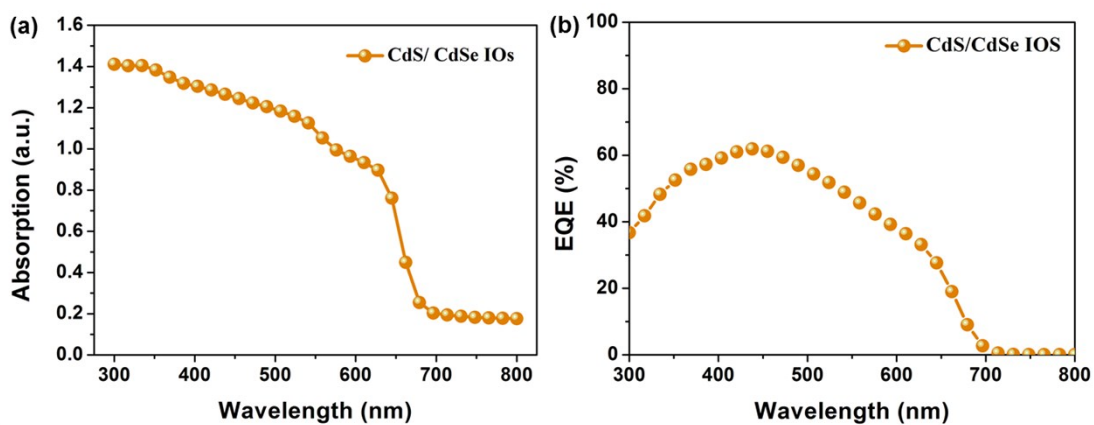
**Figure S11.** Structural models for FDTD simulation. (a) thin film, (b) IOS.



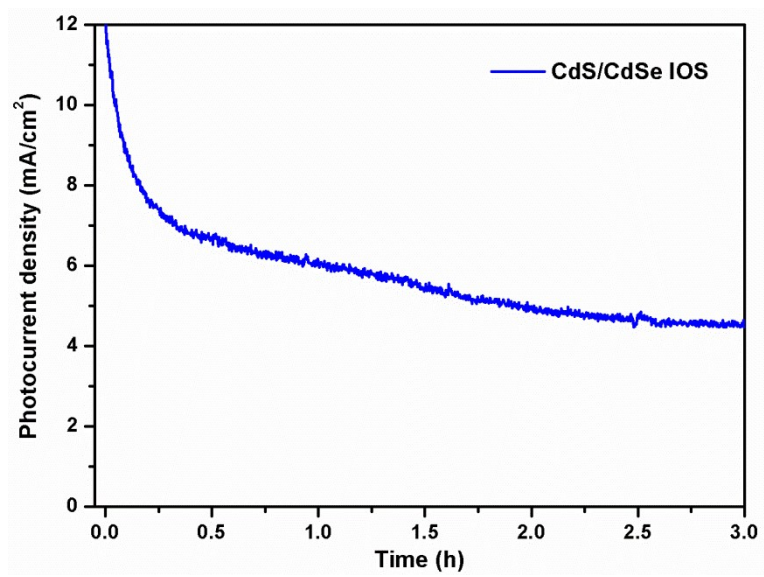
**Figure S12.** Simulated electromagnetic field distributions of (a) thin film, (b) IOS under the TE-polarized illumination at 500 nm from the FTO side.



**Figure S13.** Characterizations of the CdS/CdSe IOS. (a) top-view SEM image, (b) TEM image and corresponding SAED pattern (insert). Scale bar represents 200 nm, (c) XRD pattern, (d) EDS pattern.



**Figure S14.** (a) and (b) are absorption and IPEC spectra of CdS/CdSe IOS. The IPCE test was conducted under 1 sun AM 1.5 illumination, at 0 V vs Ag/AgCl reference electrode.



**Figure S15.** The photocurrent stability of CdS/CdSe IOS.