

# Effects of Mono- and Bifunctional Surface Ligands of Cu-In-Se Quantum Dots on Photoelectrochemical Hydrogen Production

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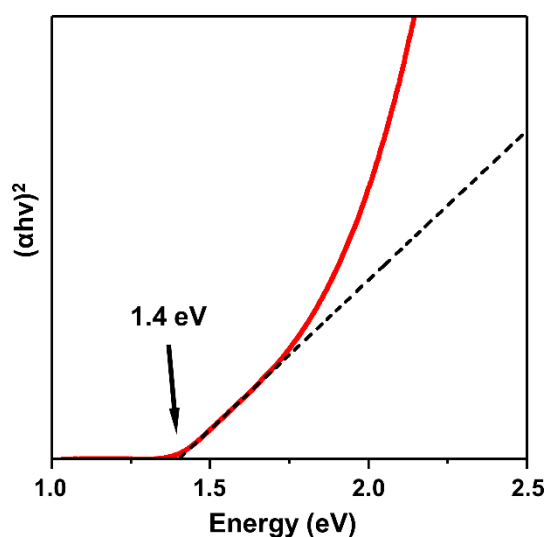
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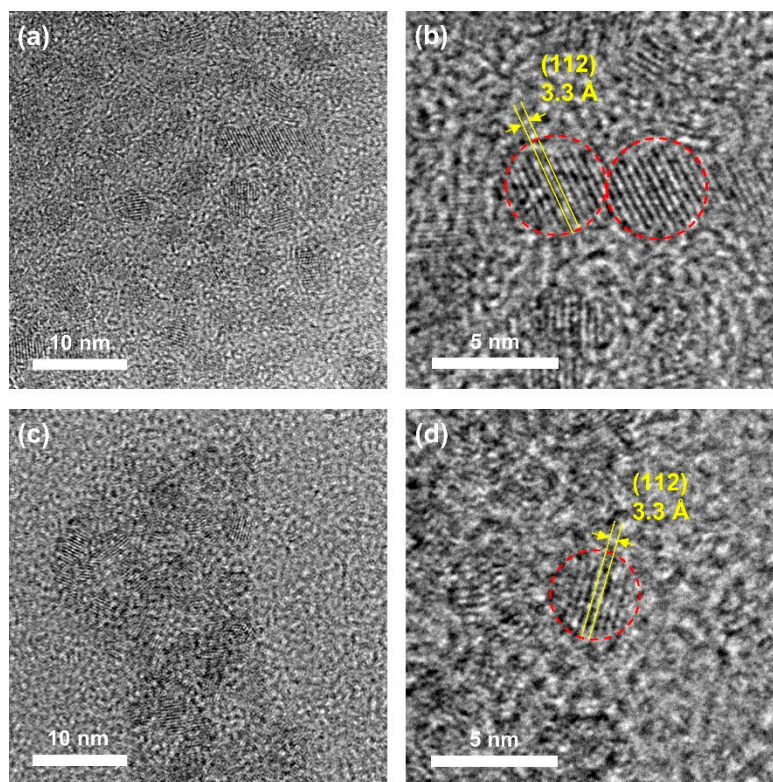
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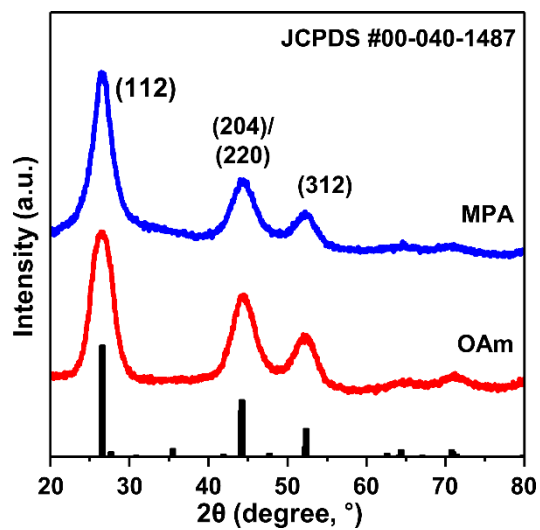
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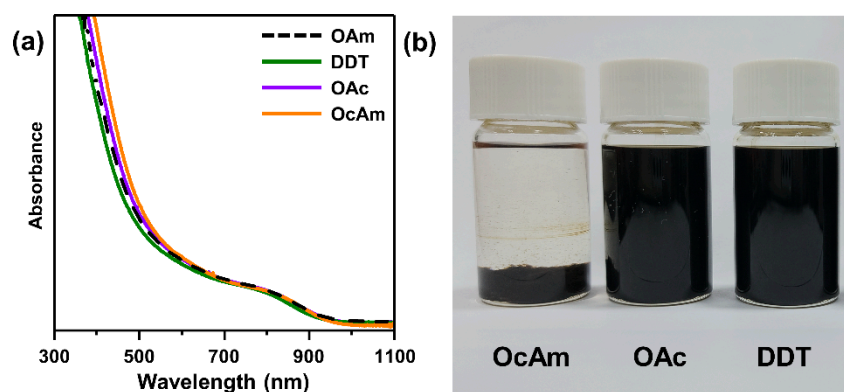
**Figure S1.** Tauc plot of CuInSe QDs. The plot was acquired from the absorption spectrum of CuInSe QDs to determine the bandgap energy.



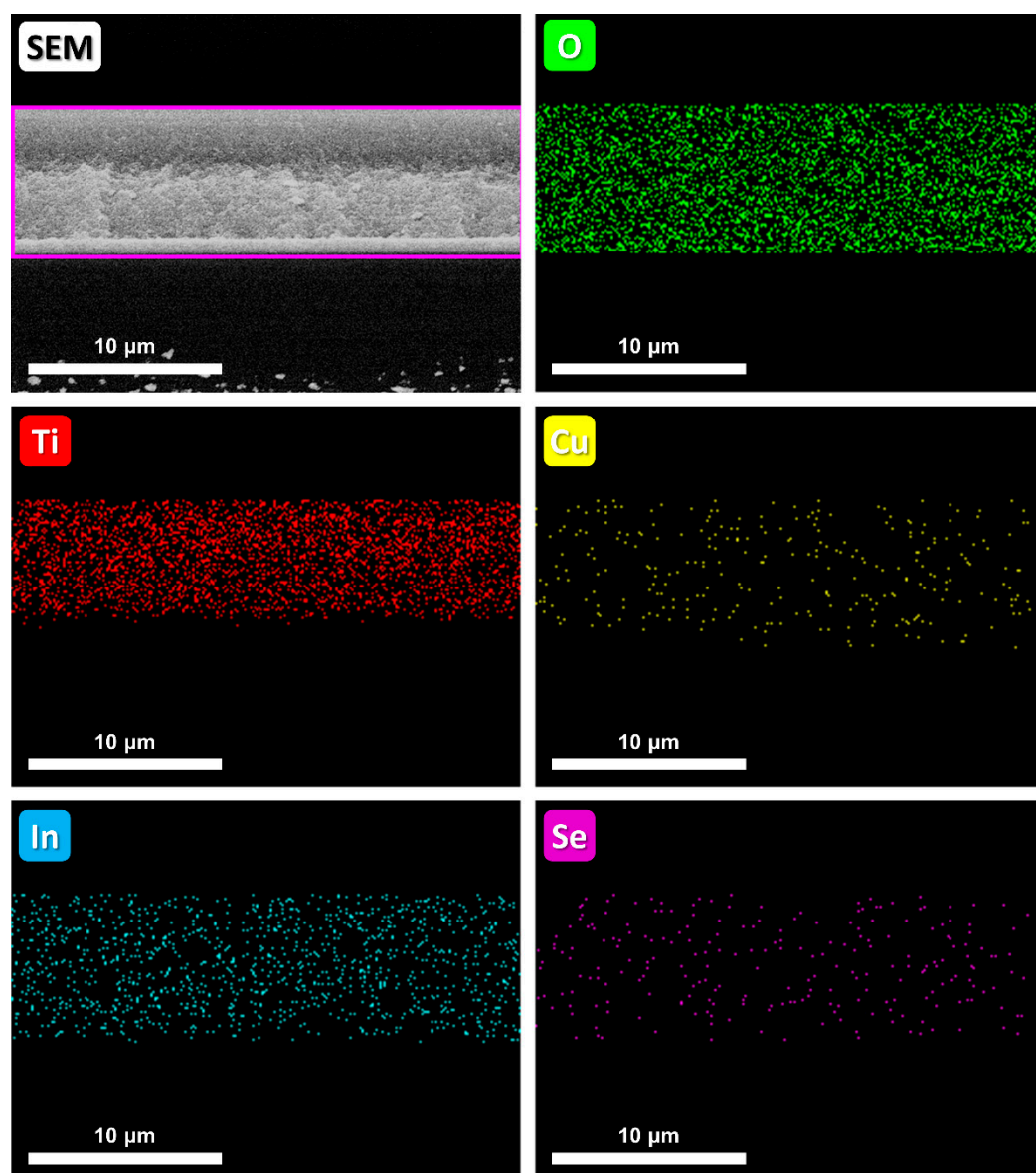
**Figure S2.** TEM analysis of CISe QDs. (a–b) OAm-passivated CISe QDs, and (c–d) MPA-passivated CISe QDs. The OAm- and MPA-passivated CISe QDs present the same size, shape, and crystal structure.



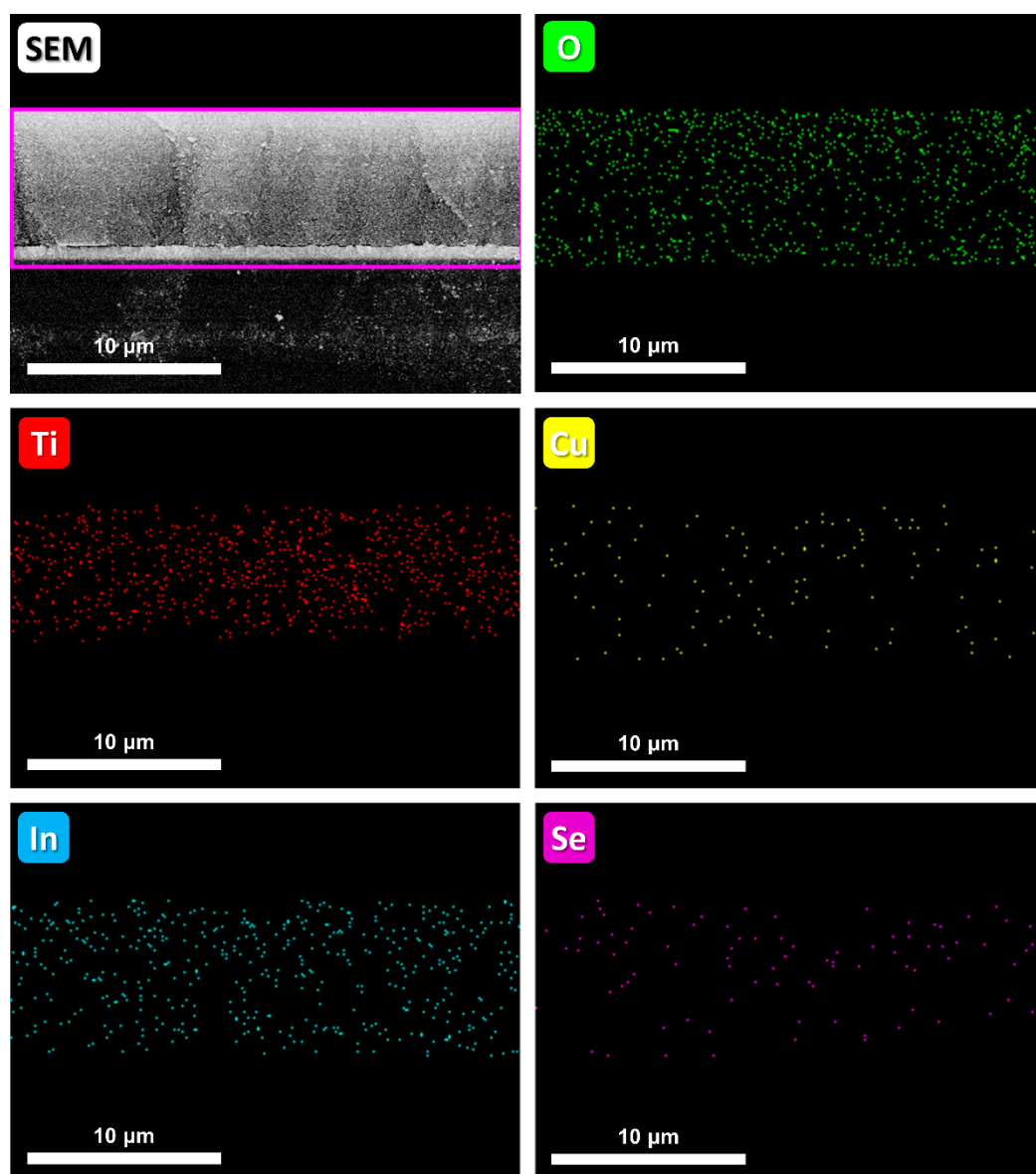
**Figure S3.** The XRD patterns of OAm- and MPA-passivated CISe QDs.



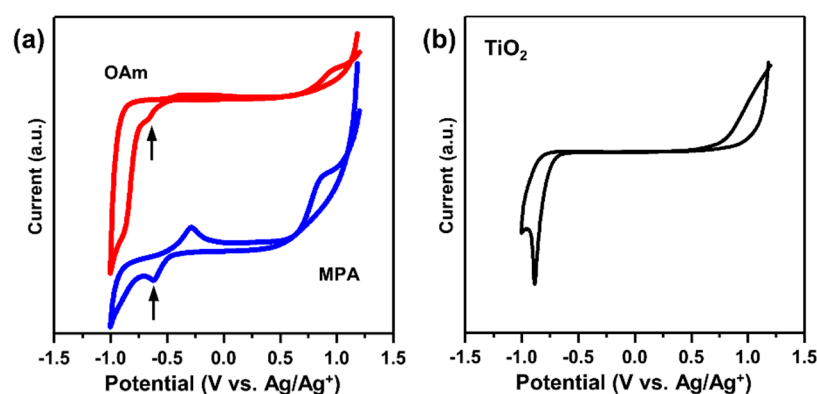
**Figure S4.** (a) Absorption spectra and (b) photographs showing the colloidal solution of OcAm-, DDT-, and OAc-passivated CISE QDs in dichloromethane.



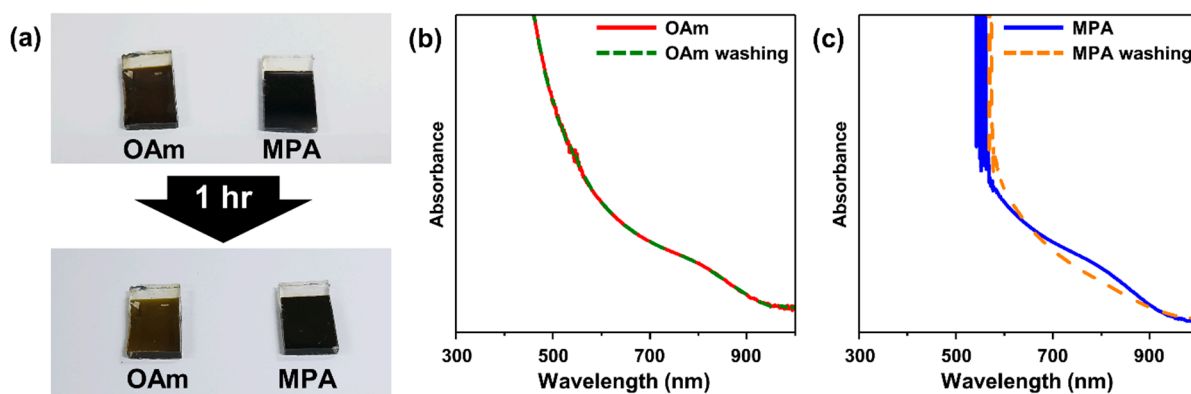
**Figure S5.** Cross-sectional SEM image and the corresponding energy-dispersive spectroscopy (EDS) elemental mapping of an OAm-QD-photoanode.



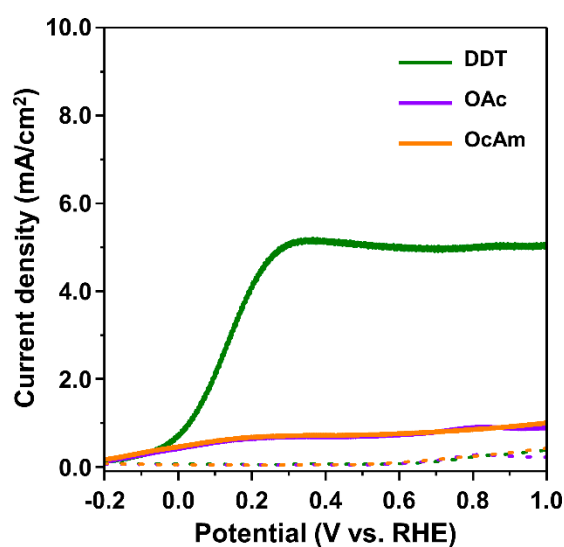
**Figure S6.** Cross-sectional SEM image and the corresponding EDS elemental mapping of an MPA-QD-photoanode.



**Figure S7.** (a) Cyclic voltammograms of OAm-QD-photoanodes and MPA-QD-photoanodes. The arrows indicate the first reduction peaks of CISE QDs, which is related to their conduction band minimum. (b) Cyclic voltammogram of bare TiO<sub>2</sub> photoanodes.



**Figure S8.** (a) Photographs and (b,c) absorption spectra comparing QD sensitized-TiO<sub>2</sub> films before and after the washing (each film was dipped into the original solvent for 1 h).



**Figure S9.** *J-V* curves of QD-photoanodes made by OcAm-, DDT-, and OAc-passivated CISE QDs. The data were collected under continuous one sun illumination.

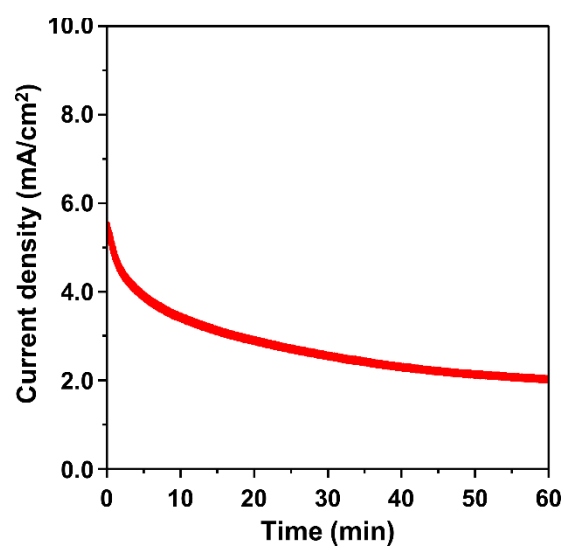


Figure S10.  $J$ - $t$  plot (at 0.6 V<sub>RHE</sub>) of the OAm-QD-photoanodes.