

Supporting Information

Highly Efficient Quantum Dot-Sensitized TiO₂ Solar Cells Based on Multilayered Semiconductors (ZnSe/CdS/CdSe)

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The calculation of the molar ratio (ZnSe : CdS : CdSe):

From EDX analysis as shown in Fig.2a, the atomic ratio of Zn : Cd : S : Se is found to be 42.6 : 77.4 : 28.1 : 91.7 for TiO₂/ZnSe/CdS/CdSe, so the molar ratio of each compound can be calculated as follows:

$$\text{Zn}+\text{Cd}=42.6+77.4=120 \text{ (ZnSe+CdS+CdSe)} \quad \text{S}+\text{Se}=28.1+91.7=119.8 \text{ (ZnSe+CdS+CdSe)}$$

The total molar amount of the three compounds can be designated as 120 (or 119.8)

$$\begin{aligned} \text{Zn} &= 42.6/120 = 35.5\% \text{ (ZnSe)}; & \text{Cd} &= 77.4/120 = 64.5\% \text{ (CdS+CdSe)}; \\ \text{Se} &= 91.7/119.8 = 76.5\% \text{ (ZnSe+CdSe)}; & \text{S} &= 28.1/119.8 = 23.5\% \text{ (CdS)} \end{aligned}$$

$$\text{ZnSe} = \text{Zn} = 35.5\%;$$

$$\text{CdS} = \text{S} = 23.5\%;$$

$$\text{CdSe} = 64.5\% - 23.5\% = 41\%.$$

So the molar ratio of ZnSe, CdS and CdSe is **35.5 : 23.5 : 41.0**.

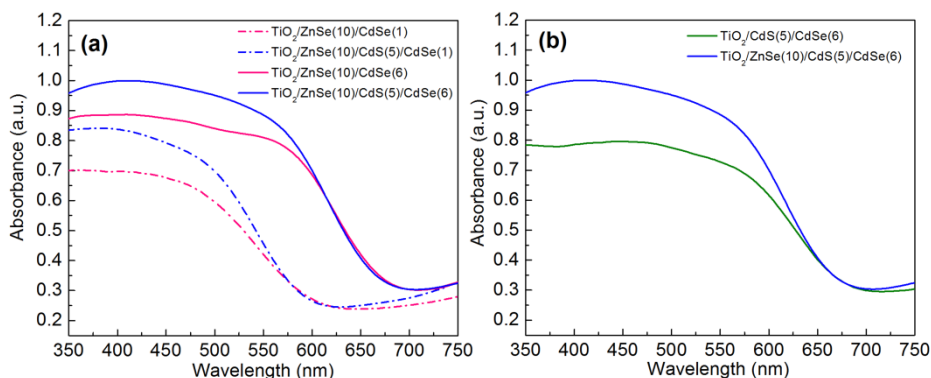


Figure S1. UV-vis absorption spectra of TiO₂/ZnSe/CdSe, TiO₂/CdS/CdSe, and TiO₂/ZnSe/CdS/CdSe photoelectrode.

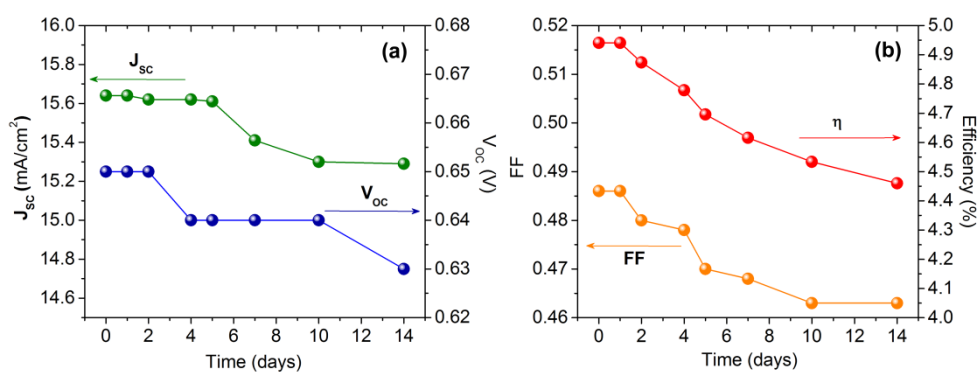


Figure S2. Temporal evolution of photovoltaic parameter values, J_{sc} , V_{oc} (a), and FF, η (b) for QDSSCs based on $\text{TiO}_2/\text{ZnSe}(10)/\text{CdS}(5)/\text{CdSe}(6)$ photoelectrode.

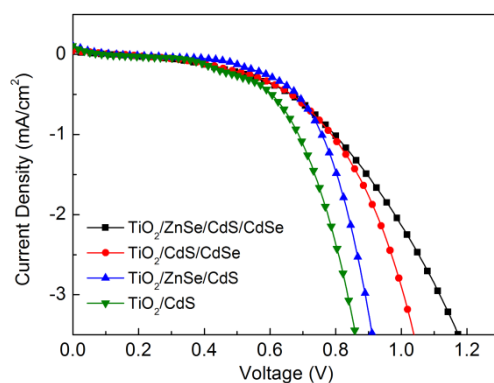


Figure S3. I–V characteristics measured under dark conditions of QDSSCs using various photoelectrode.

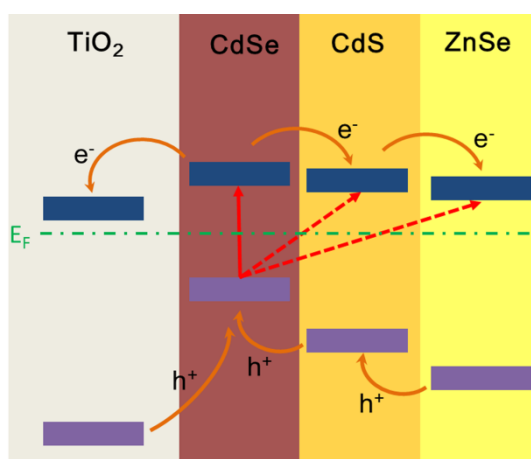


Figure S4. Transfer processes of the excited electrons and holes for $\text{TiO}_2/\text{CdSe}/\text{CdS}/\text{ZnSe}$ photoelectrode.

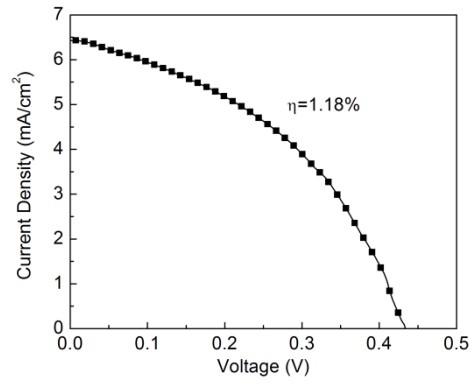


Figure S5. I–V characteristics of QDSSC using TiO₂/CdSe/CdS/ZnSe photoelectrode.