

Supporting Information

Three-dimensional TiO₂/ZnO Hybrid Array as Heterostructured Anode for Efficient Quantum Dot-sensitized Solar Cells

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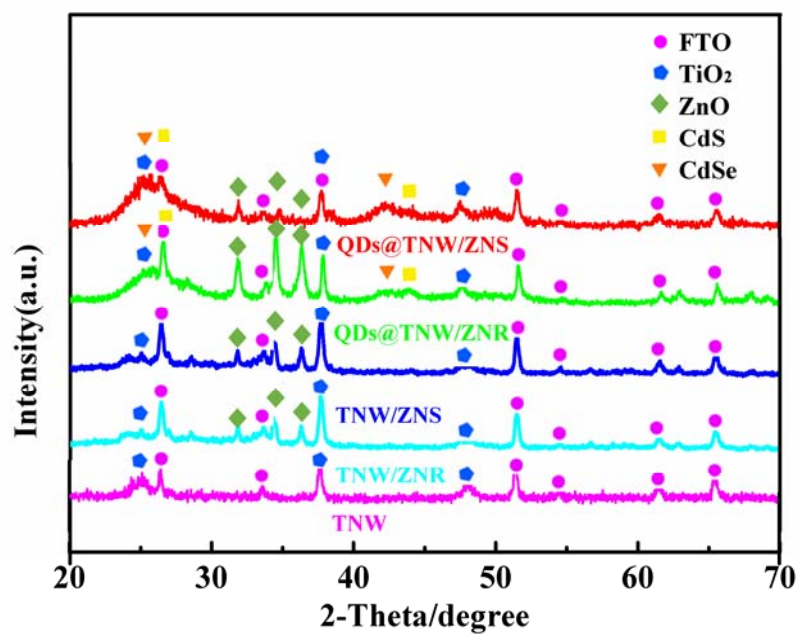


Figure S1. XRD patterns of TNW, TNW/ZNR, TNW/ZNS, QDs@TNW/ZNR and QDs@TNW/ZNS.

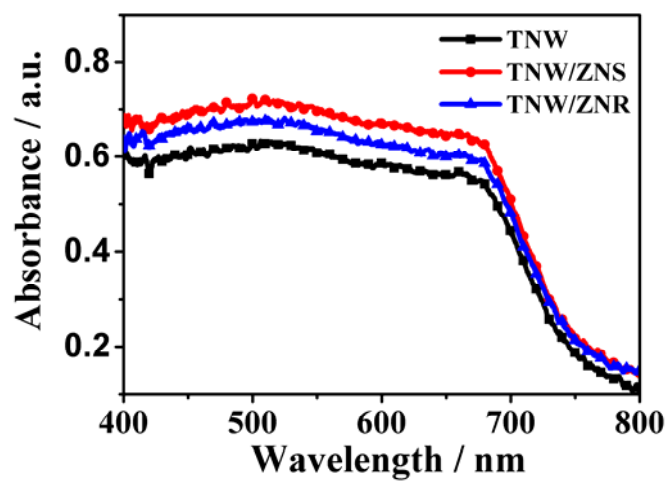


Figure S2. UV-vis absorption spectra of CdS/CdSe co-sensitized TNW, TNW/ZNS, TNW/ZNR based photoanodes.

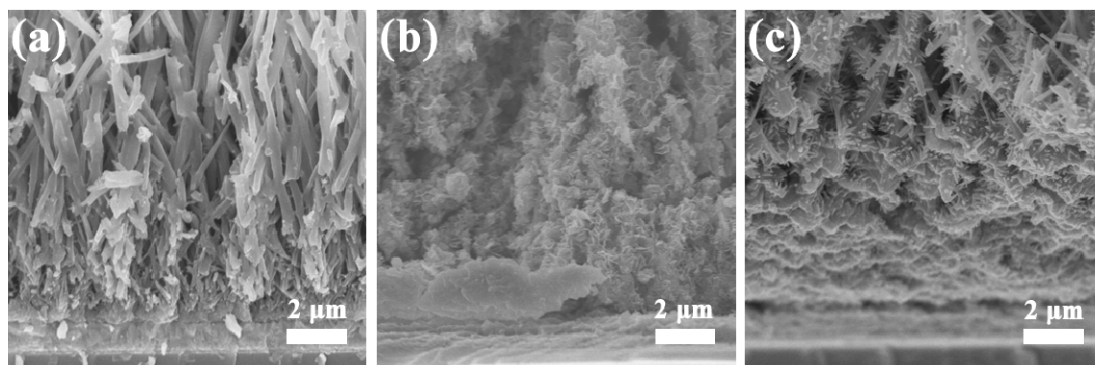


Figure S3. Cross-section SEM image showing the connection features of TNW arrays (a), TNW/ZNS hybrid arrays (b) and TNW/ZNR hybrid arrays (c).

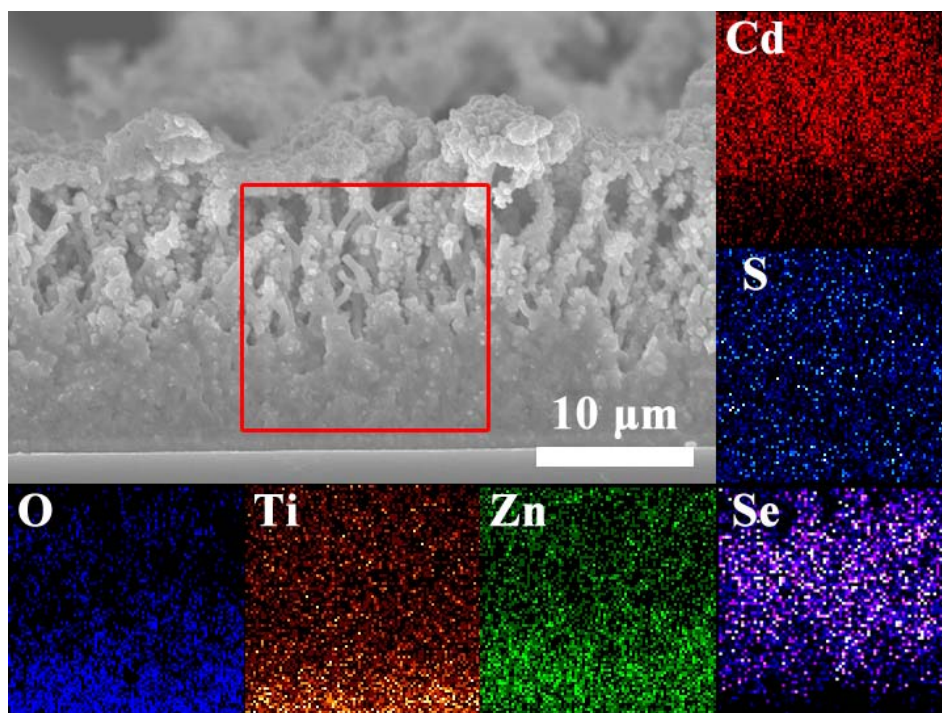


Figure S4. Cross-section FE-SEM image of TNW/ZNR arrays after electrodeposition of CdS–CdSe QDs and elemental mapping images by energy dispersive spectroscopy for the rectangular area indicated by a red square.

Table S1 Detailed simulative value of recombination resistance (R_2) and electron lifetime value (τ_r) from EIS spectra calculated by equivalent circuit as shown in Figure 6a and Figure 7b.

QDSSCs	R_s	R_1 (ohm)	R_2 (ohm)	τ_r (s)
TNW	14.46	161.4	198.9	0.0723
TNW/ZNR	11.56	144.8	140.6	0.0263
TNW/ZNS	11.00	146.7	178.1	0.0459
TNW/ZNS-Cu ₂ S CE	10.53	13.84	197.8	0.0767

Table S2 Reproducibility of photovoltaic parameters of QDSSCs based on TNW/ZNS photoelectrodes.

QDSSCs	$J_{SC}/\text{mA}\cdot\text{cm}^{-2}$	V_{OC}/mV	$\eta/\%$	FF
TNW	10.56 ± 0.38	530 ± 10	2.69 ± 0.06	0.45 ± 0.03
TNW/ZNR	12.30 ± 0.49	489 ± 6	3.12 ± 0.08	0.51 ± 0.02
TNW/ZNS	14.11 ± 0.33	498 ± 8	3.49 ± 0.08	0.50 ± 0.02

The average photovoltaic parameters of each sample are based on 5 cells.

Table S3 Detailed photovoltaic parameters of QDSSCs based on TNW and TNW/ZNS with/without surface passivation steps.

QDSSCs	$J_{SC}/\text{mA}\cdot\text{cm}^{-2}$	V_{OC}/mV	$\eta/\%$	FF
TNW without passivation steps	10.53	497	2.35	0.45
TNW/ZNS without passivation steps	12.88	462	2.92	0.49
TNW with passivation steps	10.82	539	2.75	0.47
TNW/ZNS with passivation steps	14.23	504	3.57	0.50

Table S4 Detailed photovoltaic parameters of QDSSCs based on TNW/ZNS with different reacting time.

QDSSCs	$J_{SC}/\text{mA}\cdot\text{cm}^{-2}$	V_{OC}/mV	$\eta/\%$	FF
TNW/ZNS-3h	14.23	504	3.57	0.50
TNW/ZNS-6h	14.17	487	3.45	0.50
TNW/ZNS-9h	13.20	462	2.92	0.48