

TiO₂ Passivation Layer on ZnO Hollow Microspheres for Quantum Dots Sensitized Solar Cells with Improved Light Harvesting and Electron Collection

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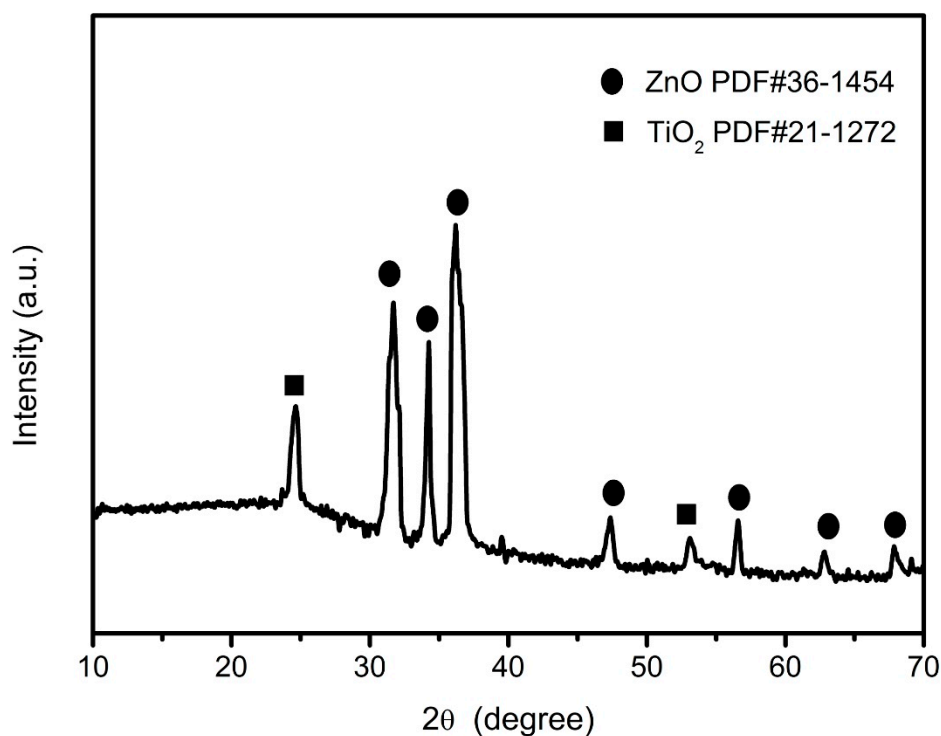


Figure S1. The XRD pattern of ZnO HMS passivated with TiO₂ layer.

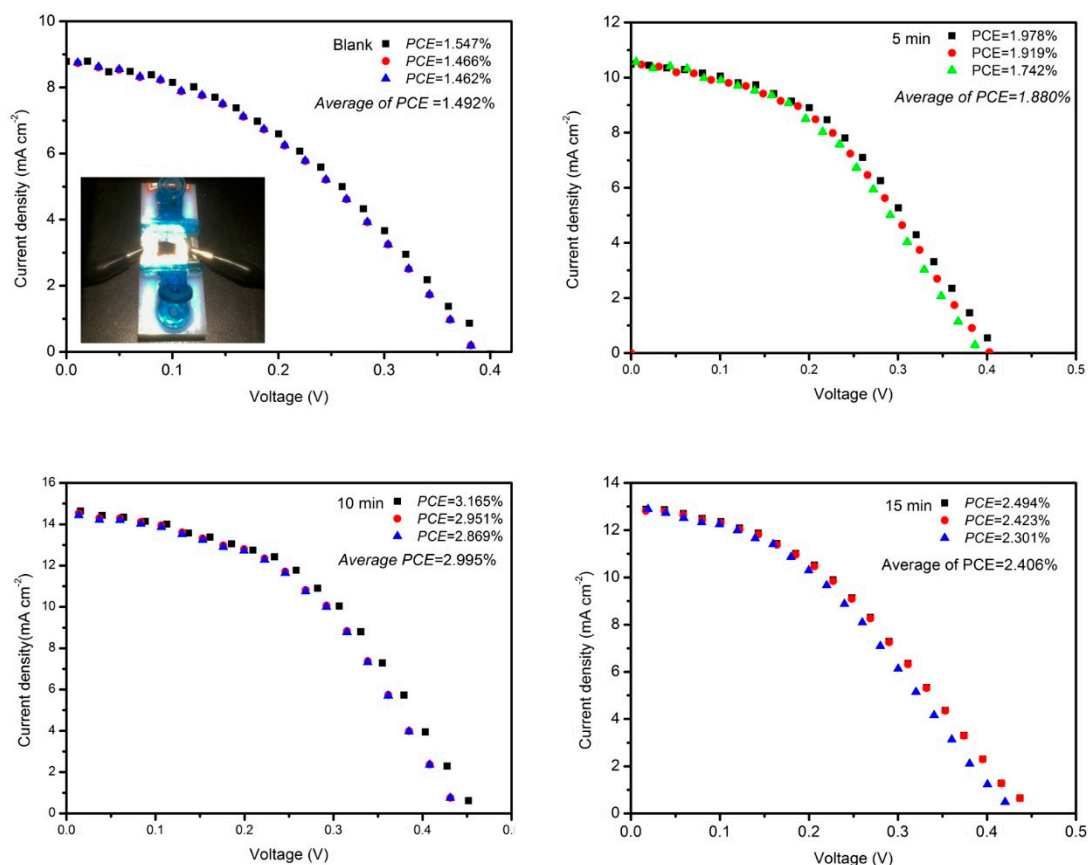


Figure S2. (a-d) J - V curves CdSe/CdS QDSSCs based on ZnO HMS passivated with TiO₂ by immersing in TiCl₄ aqueous solution for 0 min (blank), 5 min (5-min), 10 min (10-min) and 15 min (15-min), each solar cell have been repeatedly tested three times; the inset is a photograph of assembled solar cell in an open way for J - V test.

Table S1. Average photovoltaic performance and standard deviation extracted from J - V curves of QDSSCs based on ZnO HMS passivated with TiO₂ by immersing in TiCl₄ aqueous solution for 0 min (blank).

V_{oc} (V)	Average V_{oc} (V)	J_{sc} (mA cm ⁻²)	Average J_{oc} (mA cm ⁻²)	FF	Average FF	PCE (%)	Average PCE (%)	Standard Deviation of PCE
0.40		8.79		0.44		1.547		
0.39	0.393	8.72	8.750	0.43	0.433	1.462	1.492	0.048
0.39		8.74		0.43		1.466		

Table S2. Average photovoltaic performance and standard deviation extracted from J - V curves of QDSSCs based on ZnO HMS passivated with TiO₂ by immersing in TiCl₄ aqueous solution for 5 min.

V_{oc} (V)	<i>Average</i> V_{oc} (V)	J_{sc} (mA cm^{-2})	<i>Average</i> J_{oc} (mA cm^{-2})	FF	<i>Average</i> FF	PCE (%)	<i>Average</i> PCE (%)	<i>Standard</i> <i>Deviation</i> <i>of PCE</i>
0.41		10.49		0.46		1.978		
0.40	0.40	10.43	10.440	0.46	0.450	1.919	1.880	0.123
0.39		10.39		0.43		1.742		

Table S3. Average photovoltaic performance and standard deviation extracted from J - V curves of QDSSCs based on ZnO HMS passivated with TiO_2 by immersing in TiCl_4 aqueous solution for 10 min.

V_{oc} (V)	<i>Average</i> V_{oc} (V)	J_{sc} (mA cm^{-2})	<i>Average</i> J_{oc} (mA cm^{-2})	FF	<i>Average</i> FF	PCE (%)	<i>Average</i> PCE (%)	<i>Standard</i> <i>Deviation</i> <i>of PCE</i>
0.46		14.64		0.47		3.165		
0.44	0.447	14.58	14.570	0.46	0.460	2.951	2.995	0.483
0.44		14.49		0.45		2.869		

Table S4. Average photovoltaic performance and standard deviation extracted from J - V curves of QDSSCs based on ZnO HMS passivated with TiO_2 by immersing in TiCl_4 aqueous solution for 15 min.

V_{oc} (V)	<i>Average</i> V_{oc} (V)	J_{sc} (mA cm^{-2})	<i>Average</i> J_{oc} (mA cm^{-2})	FF	<i>Average</i> FF	PCE (%)	<i>Average</i> PCE (%)	<i>Standard</i> <i>Deviation</i> <i>of PCE</i>
0.45		12.89		0.43		2.494		
0.45	0.443	12.82	12.827	0.42	0.423	2.423	2.406	0.098
0.43		12.77		0.42		2.301		