Supplementary Information

The Functions of Self-assembled Ultrafine TiO_2 Nanocrystals for High Efficient Dye-Sensitized Solar Cells

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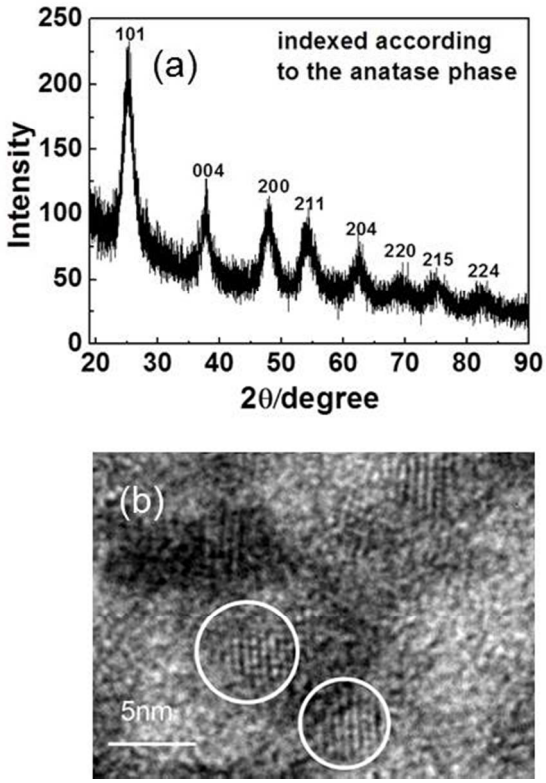

Figure S1 (a) X-ray Diffraction (XRD) ray and (b) field-emission transmission electron microscopy (FE-TEM) images of ultrafine TiO_2 nanocrystals.

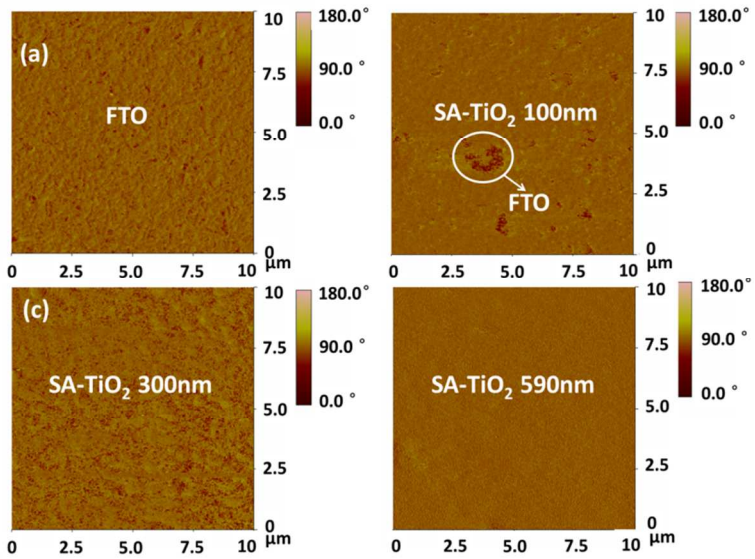

Figure S2 AFM phase images of (a) FTO, (b) SA-TiO_2 100nm film on FTO, (c) SA-TiO_2

300nm film on FTO, (d) SA-TiO_2 590nm film on FTO.

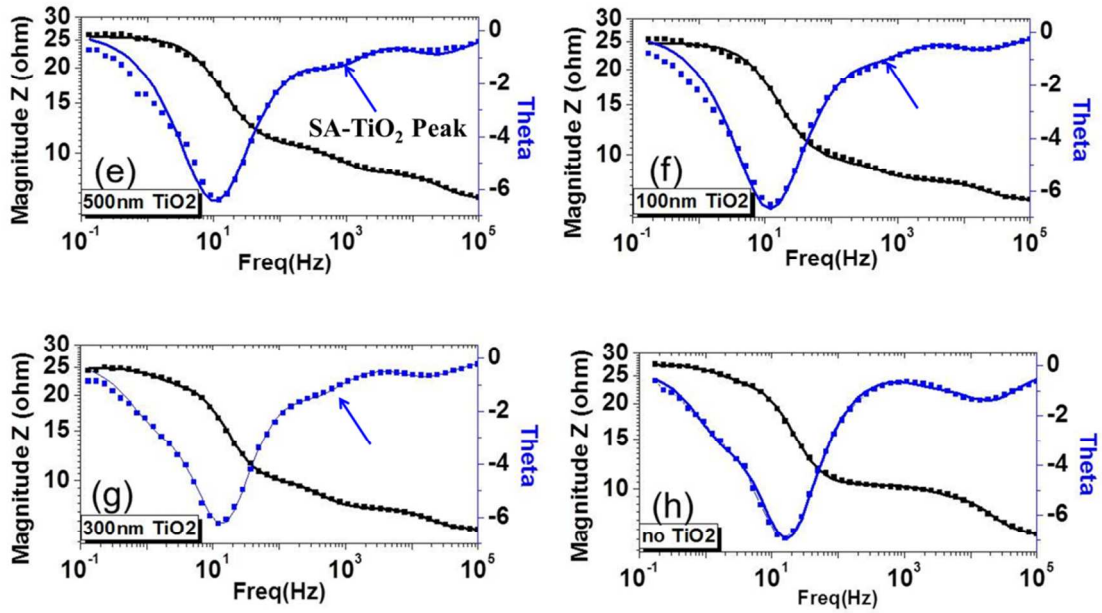

Figure S3 The Bode plot of DSSCs with different thicknesses of SA-TiO_2 film.

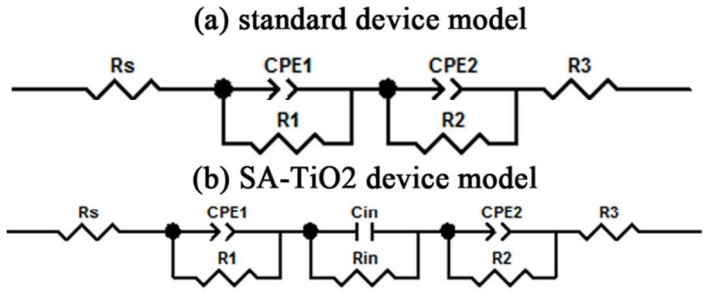

Figure S4 The equivalent circuit of (a) DSSC standard device, (b) DSSC device with SA-TiO_2 layer

Table S1. DSSC (without mask) performances with and without the optimized SA-TiO_2

	FTO	300 nm SA-TiO_2
Jsc / mA cm^{-2}	17.838	21.986
Voc / V	0.754	0.757
Fill Factor	0.727	0.714
Efficiency / %	9.787	11.872

Table S2. The equivalent circuit parameters

	Rs	**CPE1-T**	**CPE1-P**	**R1**	**R_{in}**	**C_{in}**	**CPE2-T**	**CPE2-P**	**R2**	**R3**
Bare FTO	3.675	2.80E-05	0.81671	3.705			0.001199	0.90494	17.1	3.013
100 nm SA-TiO_2	3.846	7.55E-06	0.98677	1.208	1.486	0.000218	0.001423	0.89919	15.36	3.043
300 nm SA-TiO_2	3.481	8.77E-06	0.97782	1.244	1.55	2.06E-04	0.001553	0.89072	14.89	3.413
590 nm SA-TiO_2	3.081	5.23E-06	0.97383	1.666	1.961	1.11E-04	0.00158	0.89128	15.29	3.76