Supporting Information

Contents

Figure S1. Pore size distribution of SiO_2 and SiO_2-TiO_2 aerogel particles obtained from N_2 adsorption-desorption measurement, illustrating the change of the pore size in aerogel with the deposition of TiO_2 nanoparticles deposited on SiO_2 template.

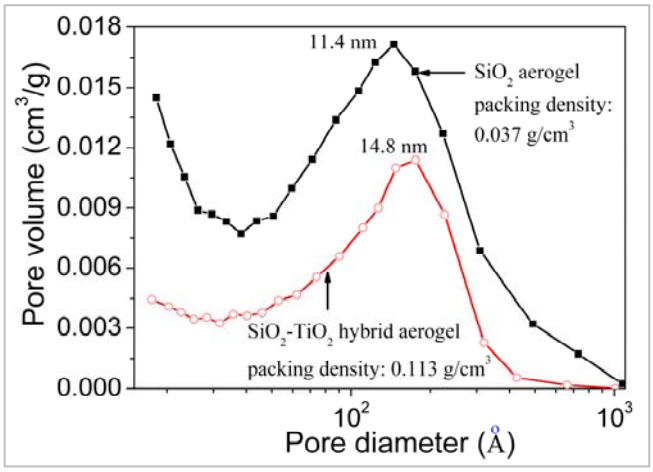

Figure S2. Pore size distribution of pure TiO_2 photoanode and SiO_2-TiO_2 aerogel photoanode obtained from N_2 adsorption-desorption measurement.

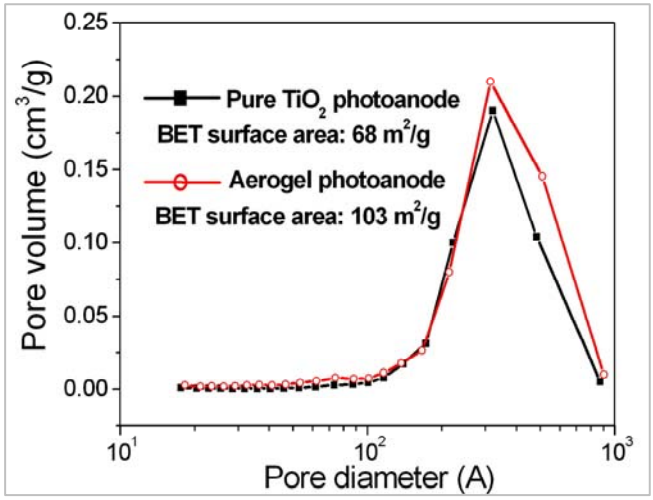

Figure S3. SEM image of aerogel based photoanode film with high percentage of SiO_2-TiO_2 aerogel incorporated in the slurry of hydrothermal TiO_2 nanoparticles (ATP value: 30%), illustrating that the large-size aerogel particles may induce large amount of cracks in the film and deteriorate the overall film quality.

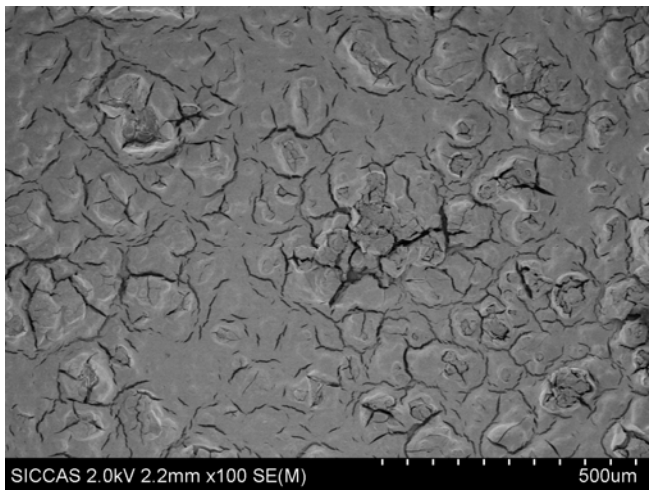

Figure S4. Typical J-V curves of DSC based on pure TiO_2, SiO_2 aerogel and SiO_2-TiO_2 hybrid aerogel-modified photoanodes.

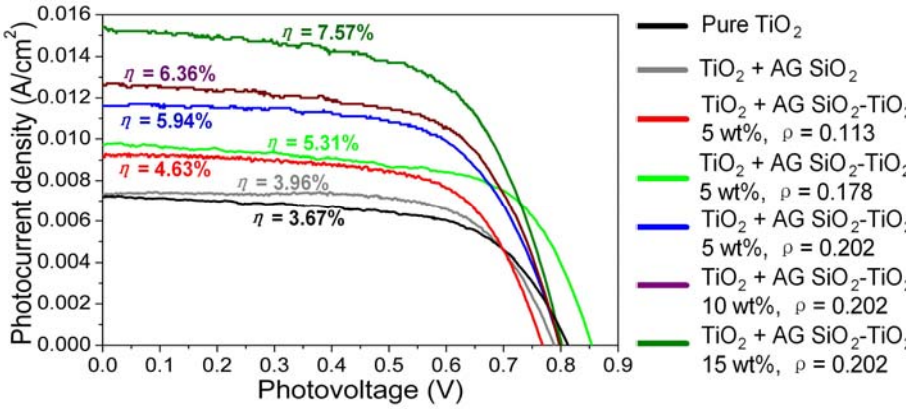

Figure S5. a) Electrochemical impedance spectra (left) of DSCs based on pure TiO_2 and aerogel based photoanodes, illustrating that the aerogel based cell has the similar recombination frequency with the pure TiO_2 cell. b) Equivalent circuit used for the calculation of EIS parameters.

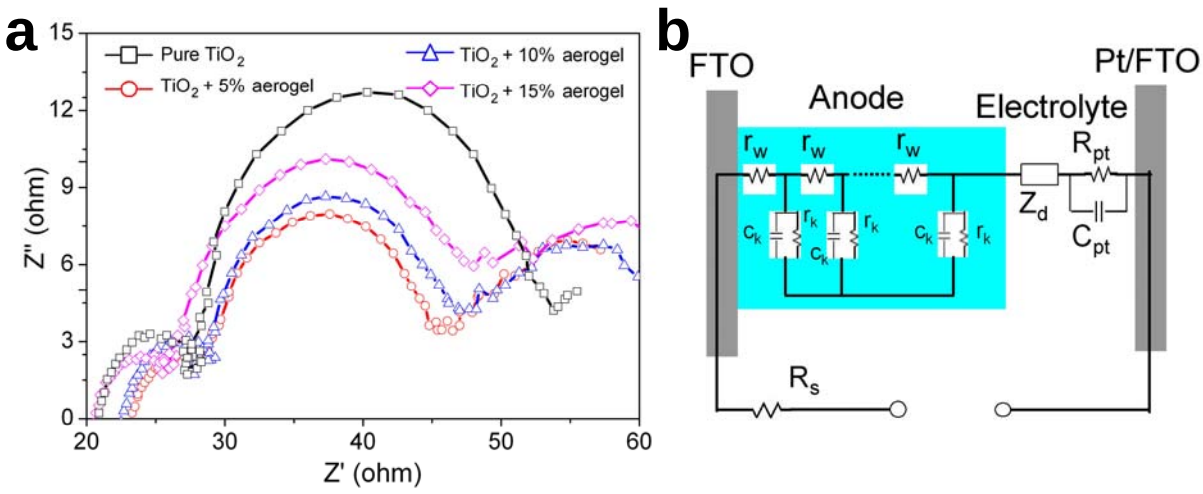

Figure S6. Open-circuit voltage decay (OCVD) curves of DSCs based on pure TiO_2 and aerogel based photoanodes, illustrating that aerogel photoanodes have much faster recombination between electron and the electrolyte than pure TiO_2 photoanode.

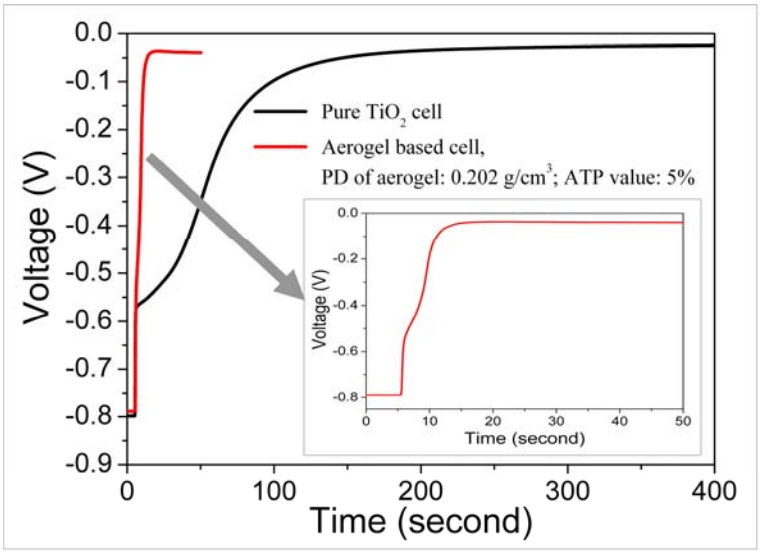

Figure S7. External quantum efficiency of DSCs based on pure TiO_2 and aerogel based photoanodes, illustrating that aerogel photoanodes have much higher light-harvesting capacity than pure TiO_2 photoanode.

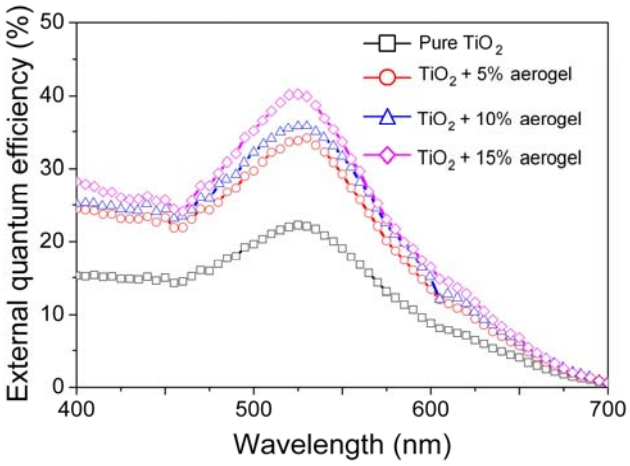

Table S1. EIS parameters obtained by fitting the Byquist plots with the equivalent circuit in Figure S5b for DSCs based on pure TiO_2 and aerogel based photoanodes.

Electrode	R_w (Ω)	R_k (Ω)	k_{eff} (s^{-1})	τ_{eff} (ms)	D_{eff} ($cm^2/s \times 10^{-4}$)
Pure TiO_2	5.15	130.80	25.7	39	8.93
TiO_2 + 5% aerogel [a]	4.10	78.89	25.7	39	5.46
TiO_2 + 10% aerogel	4.35	84.46	25.7	39	5.30
TiO_2 + 15% aerogel	4.78	111.30	21.23	47	5.98

[a] Packing density of SiO_2-TiO_2 hybrid aerogel: 0.202 g/cm^3.