Supporting Information

A Strategy to Reduce the Angular Dependence of a Dye-Sensitized Solar Cell by Coupling to a TiO₂ Nanotube Photonic Crystal

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Figure S1. FESEM images of (a) the cross-section of a reference TiO$_2$ NP photoanode, (b) the cross-section of the *smooth* TiO$_2$ NT structure used in the TiO$_2$ NT/NP photoanode, (c) the top of the TiO$_2$ NP layer, and (d) the top of the smooth TiO$_2$ NT PC layer.
Figure S2. The simulated reflectance spectra of TiO$_2$ NT PCs with different lattice constants, (a) 120 nm, (b) 150 nm, (c) 190 nm, (d) 230 nm, and (e) smooth TiO$_2$ NT, under varying incident angles from 0 to 60°.
**Figure S3.** Photos of the photoanodes based on 150-NT PC. (a) The photoanode in air is purple. (b) It changes to green after filling with ethanol. (c) It turns into dark purple when observed from a large angle.

**Figure S4.** The evolution of photocurrent-voltage curves of DSSCs based on (a) TiO$_2$ NT/TiO$_2$ NP photoanode and (b) TiO$_2$ NP photoanode, as the incident angle increases from 0 to 60° in a step of 5°.
Figure S5. (a) The power conversion efficiency, (b) normalized power conversion efficiency, and (c) efficiency enhancement (as compared to the reference DSSC under the same incident angle) of different types of DSSCs, as a function of the incident angle.
**Figure S6.** The evolutions of the (a) open circuit voltage ($V_{oc}$) and (b) fill fact (FF) of DSSCs based on different photoanodes with varying incident angle.

**Figure S7.** The simulated absorption spectra of TiO$_2$ NT coupled DSSC under various incident angles. For comparison, the absorption spectra of TiO$_2$ NP based DSSC is also showed as black dished line.