Supporting Information

A Strategy to Reduce the Angular Dependence of a Dye-Sensitized Solar Cell by Coupling to a TiO_2 Nanotube Photonic Crystal

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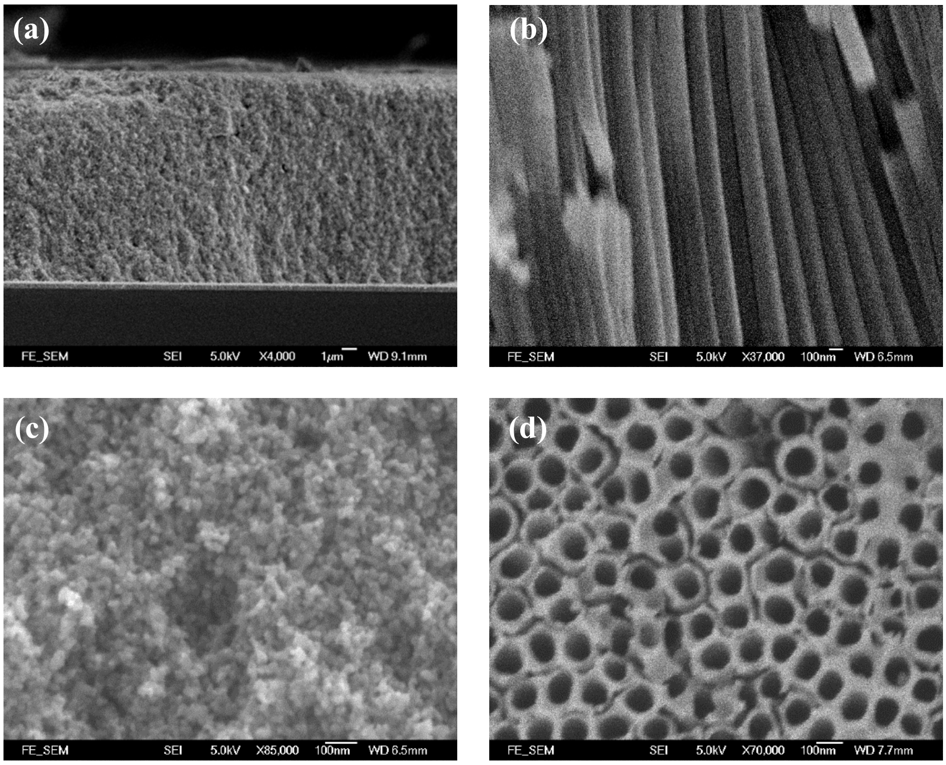

Figure S1. FESEM images of (a) the cross-section of a reference TiO_2 NP photoanode, (b) the cross-section of the *smooth* TiO_2 NT structure used in the TiO_2 NT/NP photoanode, (c) the top of the TiO_2 NP layer, and (d) the top of the smooth TiO_2 NT PC layer.

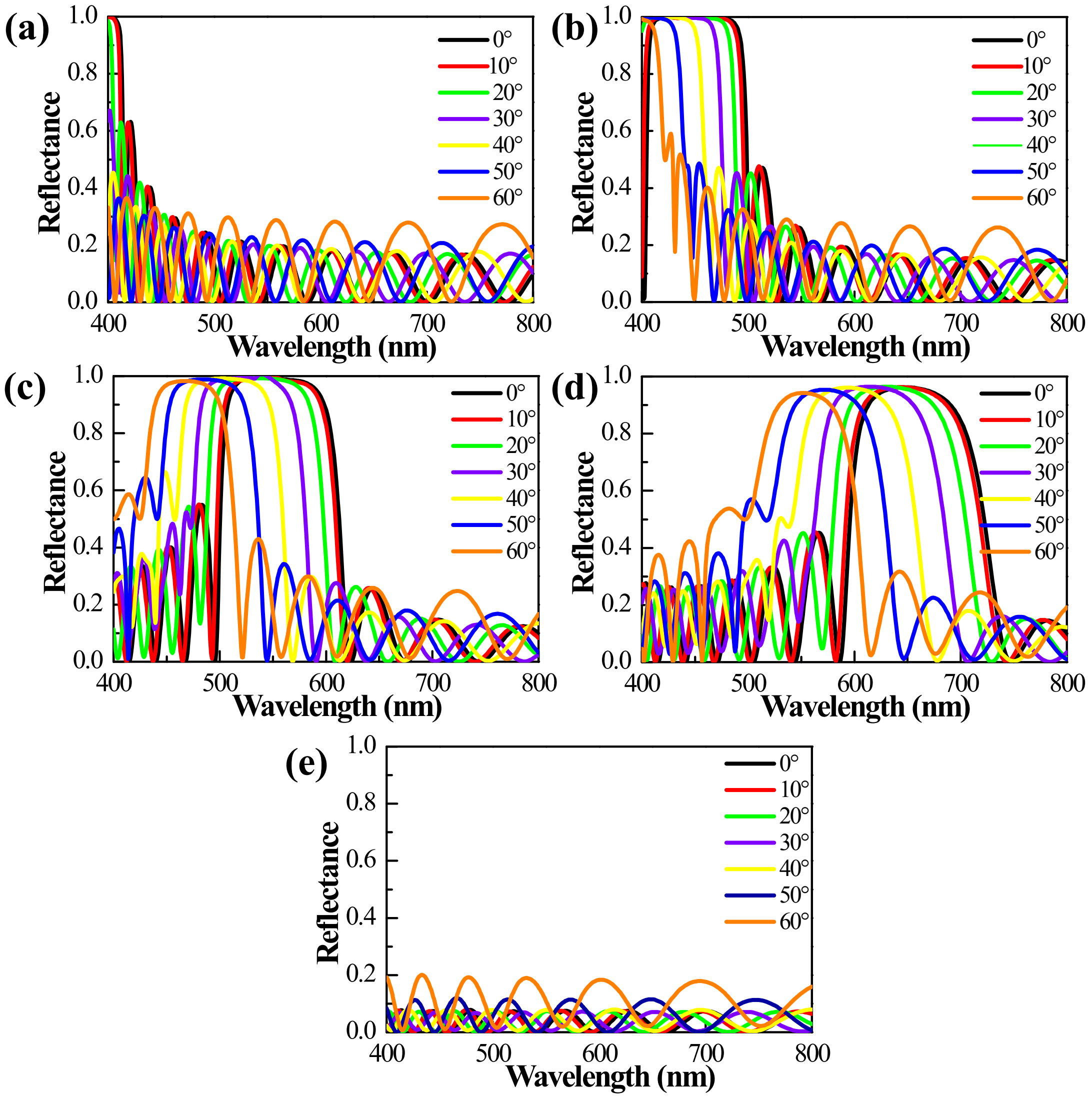

Figure S2. The simulated reflectance spectra of TiO_2 NT PCs with different lattice constants, (a) 120 nm, (b) 150 nm, (c) 190 nm, (d) 230 nm, and (e) smooth TiO_2 NT, under varying incident angles from 0 to 60°.

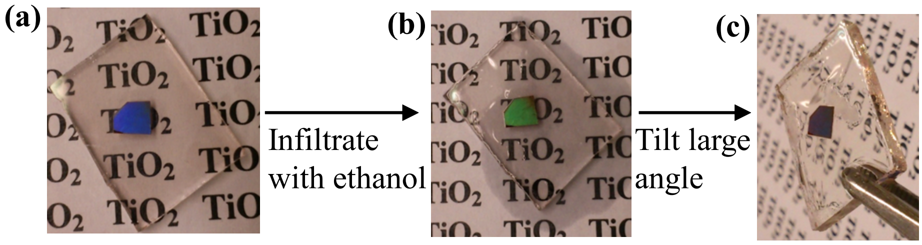

Figure S3. Photos of the photoanodes based on 150-NT PC. (a) The photoanode in air is purple. (b) It changes to green after filling with ethanol. (c) It turns into dark purple when observed from a large angle.

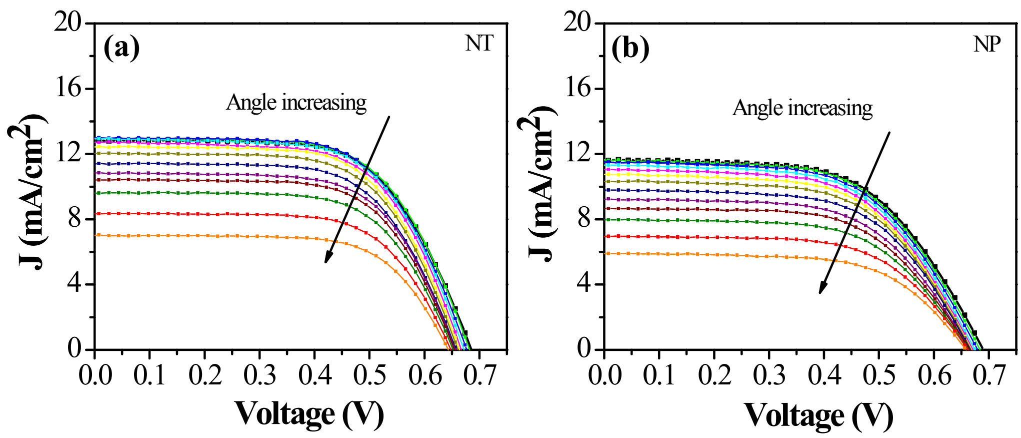

Figure S4. The evolution of photocurrent-voltage curves of DSSCs based on (a) TiO_2 NT/TiO_2 NP photoanode and (b) TiO_2 NP photoanode, as the incident angle increases from 0 to 60° in a step of 5°.

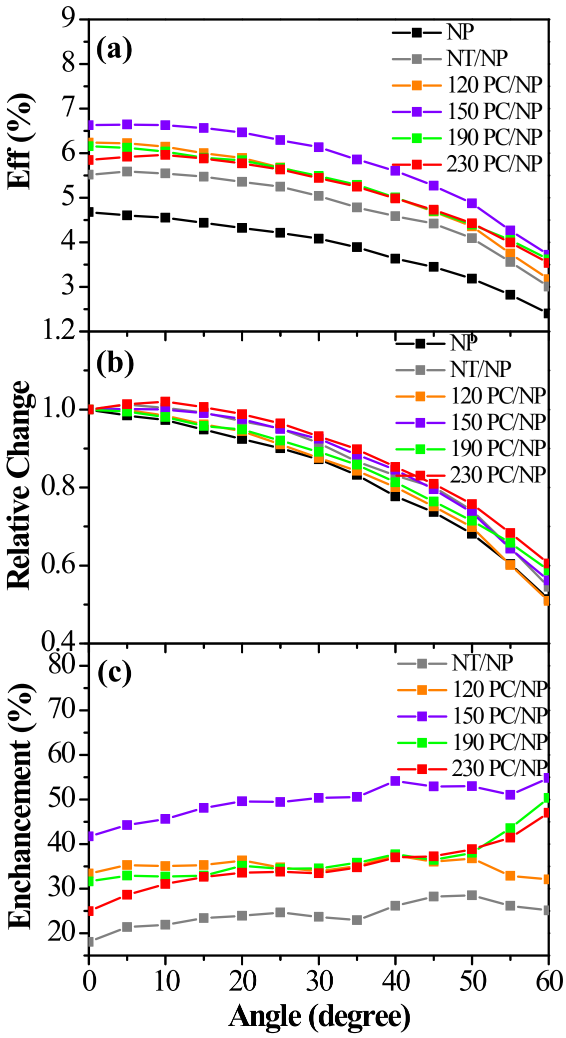

Figure S5. (a) The power conversion efficiency, (b) normalized power conversion efficiency, and (c) efficiency enhancement (as compared to the reference DSSC under the same incident angle) of different types of DSSCs, as a function of the incident angle.

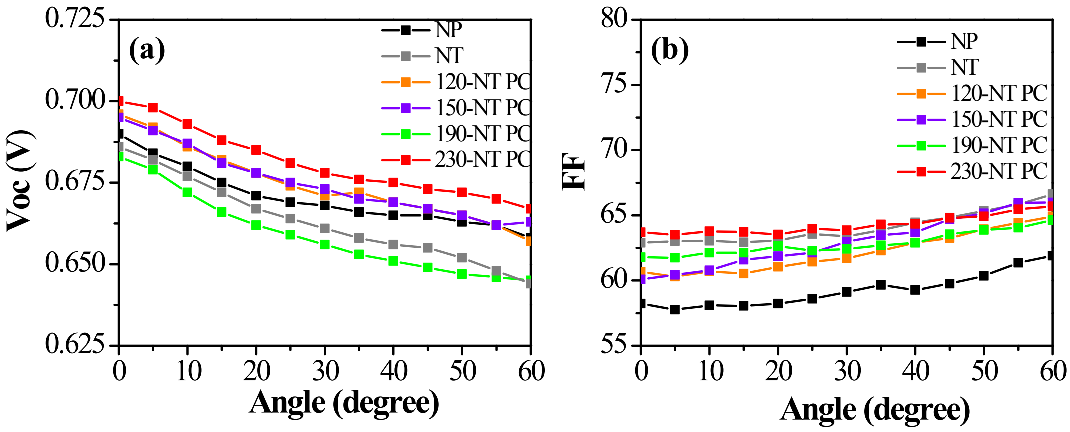

Figure S6. The evolutions of the (a) open circuit voltage (Voc) and (b) fill fact (FF) of DSSCs based on different photoanodes with varying incident angle.

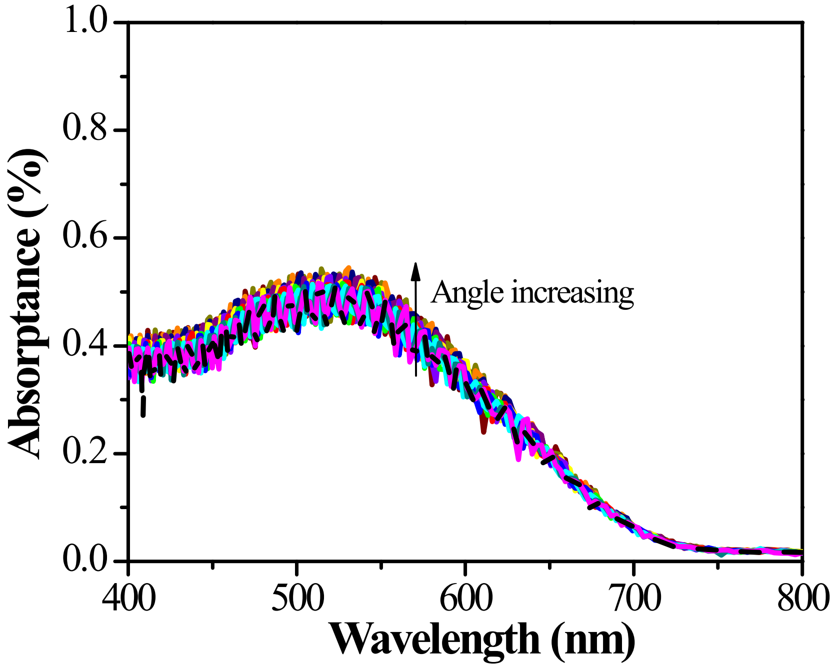

Figure S7. The simulated absorption spectra of TiO_2 NT coupled DSSC under various incident angles. For comparison, the absorption spectra of TiO_2 NP based DSSC is also showed as black dished line.