Supporting Information

Coaxial Multi-shelled TiO_2 Nanotube Arrays for Dye Sensitized Solar Cells

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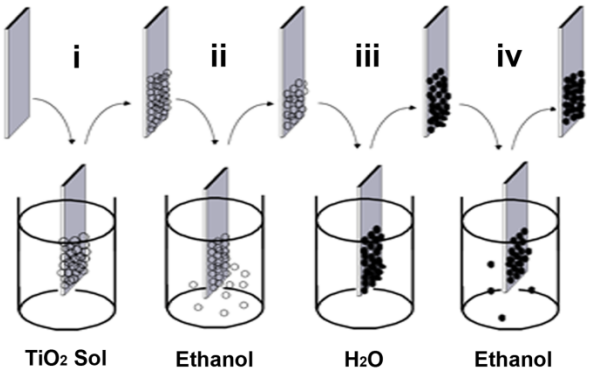

Figure S1. The schematic illustration for a cycle of LbL-AR procedure.

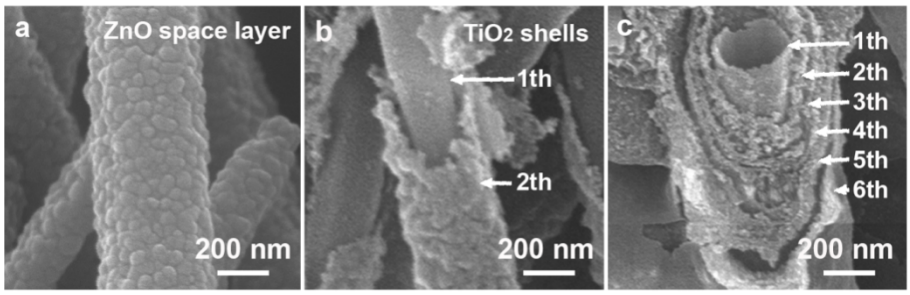

Figure S2. The high-magnification FESEM images of (a) ZnO space layer deposited over TiO_2 shells by SG technology, (b) double-shelled TiO_2 NT and (c) sextuple-shelled TiO_2 NTs.

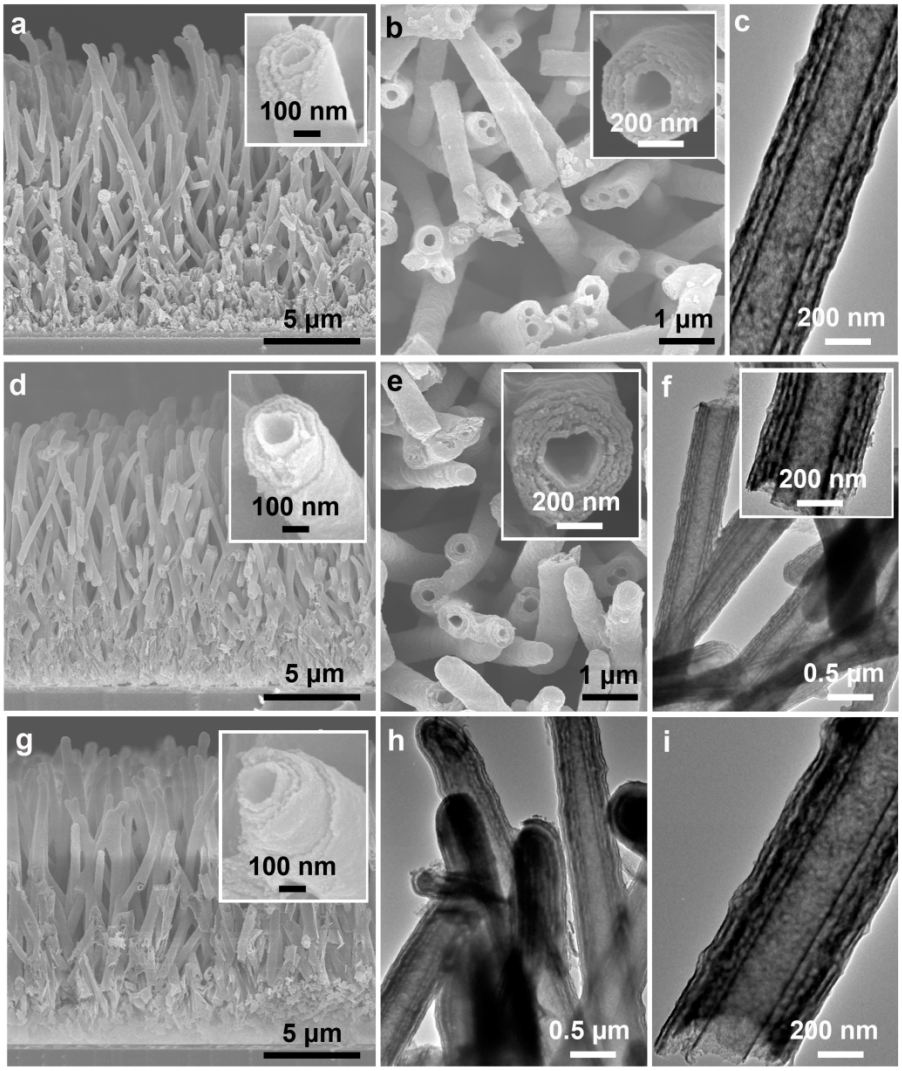

Figure S3. The typical FESEM and TEM images of multi-shelled TiO_2 NTAs with (a-c) quadruple, (d-f) quintuple- and (g-i) sextuple shells. Low-magnification side-view FESEM images of (a) quadruple, (d) quintuple and (g) sextuple-shelled TiO_2 NTAs. High-magnification top-view FESEM images of (b) quadruple- and (e) quintuple-shelled TiO_2 NTAs. Low-magnification TEM images of (f) quintuple- and (h) sextuple-shelled TiO_2 NTAs. High magnification TEM images of (c) quadruple- and (i) sextuple-shelled TiO_2 NTs.

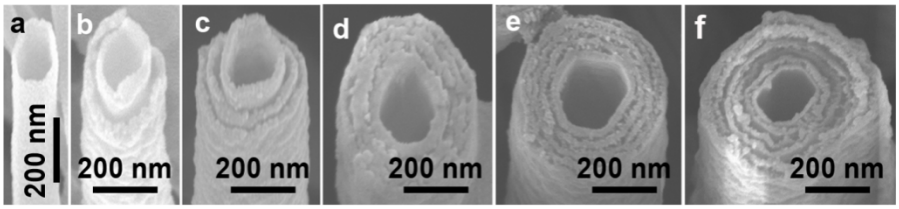

Figure S4. Typical high-magnification top-view FESEM images of breaken tip of multi-shelled TiO_2 NTs with different shell numbers. (a) Single-, (b) double-, (c) triple-, (d) quadruple-, (e) quintuple- and (f) sextuple-shelled TiO_2 NT.

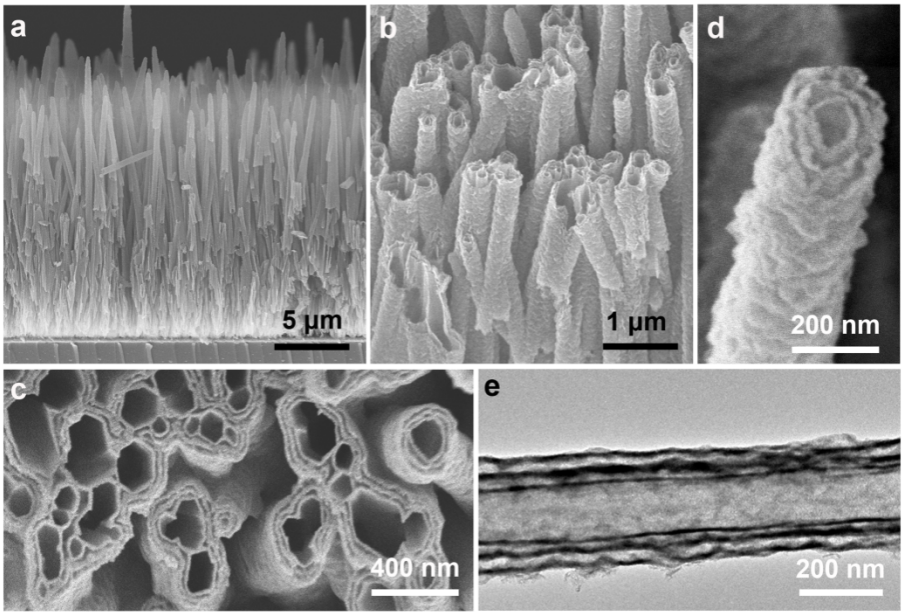

Figure S5. The typical characteristics of high-density triple-shelled TiO_2 NTAs. (a) low-, (b) middle magnification side-view FESEM images, (c) high magnification top-view FESEM image captured from broken edges of triple-shelled TiO_2 NTAs. (d) FESEM and (e) TEM images of an individual triple-shelled TiO_2 NT.

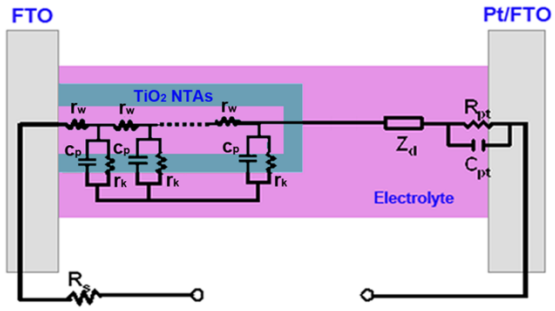

Figure S6. The equivalent circuit model of the multi-shelled TiO_2 NTAs DSSCs. The simulated electron transport parameters include the electron transport resistance ($R_w=r_wL$, r_w is component of the equivalent circuit, and L is the thickness of the multi-shelled TiO_2 NTAs photoanode), recombination resistance ($R_k=r_k/L$, r_k is component of the equivalent circuit), the capacitance of the electrical double layer ($C_p=c_pL$, c_p is component of the equivalent circuit), the electron collect efficiency ($\eta_{cc}=1- R_w/R_k$).