SUPPORTING INFORMATION

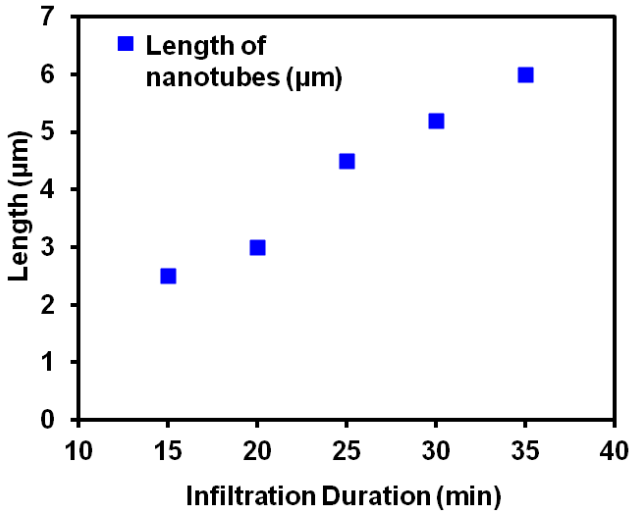

Figure S1. Effect of precursor infiltration duration on the length of TiO_2 nanotube arrays

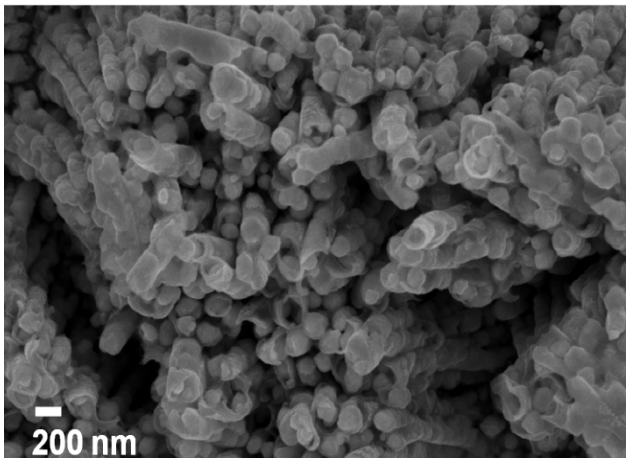

Figure S2. FESEM image of the Au-TiO_2 core-shell nanostructure after the Ag layer was removed.

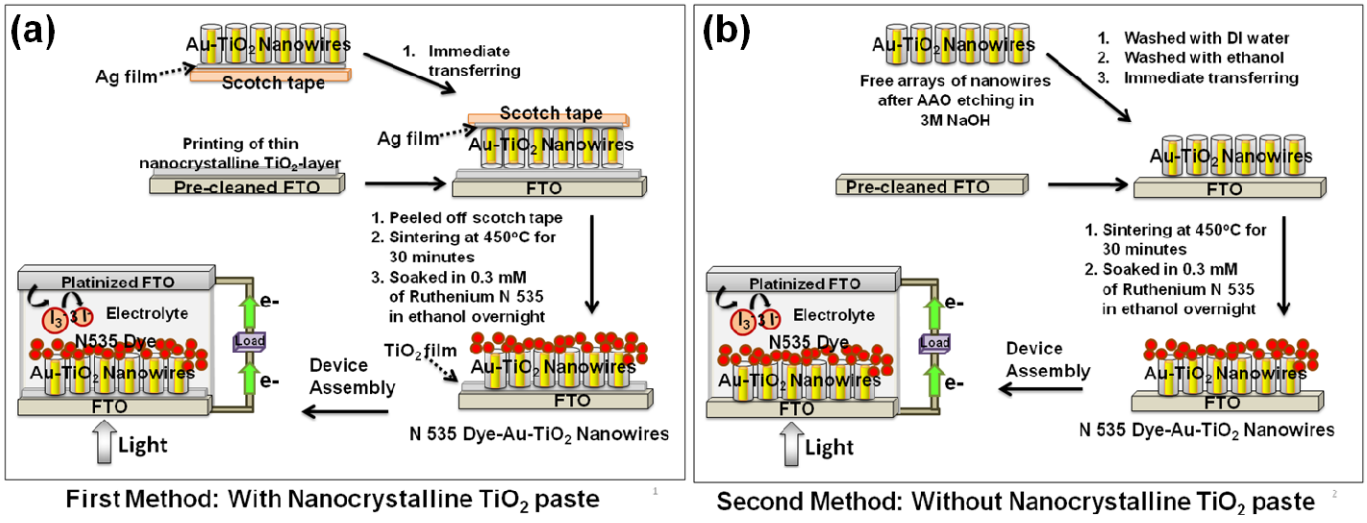

Figure S3. Schematic of first (a) and second (b) methods of transferring the Au-TiO_2 core-shell nanowires onto FTO and fabrication of device.

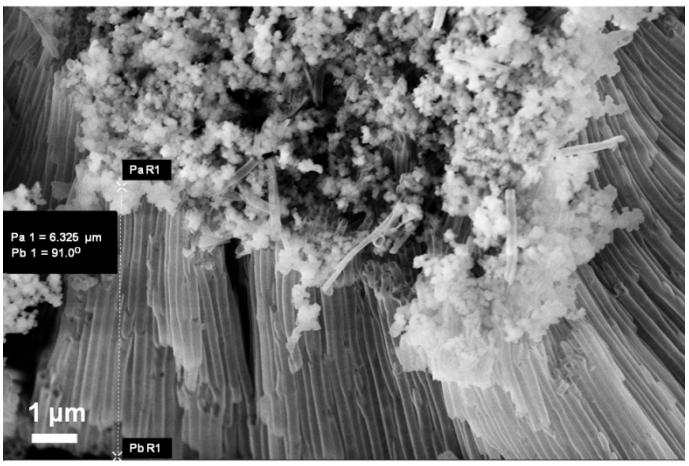

Figure S4. FESEM image of 6.325 µm long $TiCl_4$ treated TiO_2 nanotube arrays without TiO_2 nanoparticle bottom layer

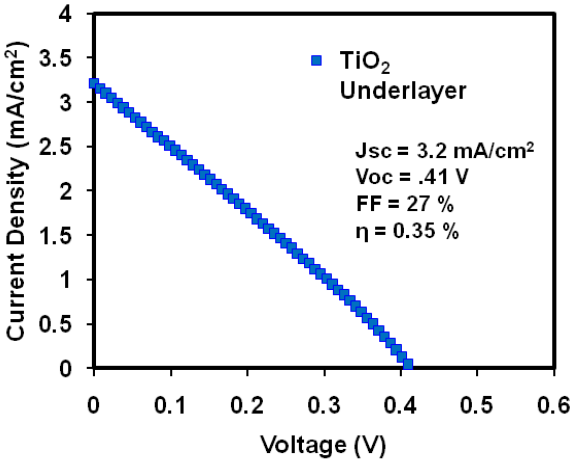

Figure S6. J-V curve and J-V curve parameters of underlayer TiO_2 nanoparticles film

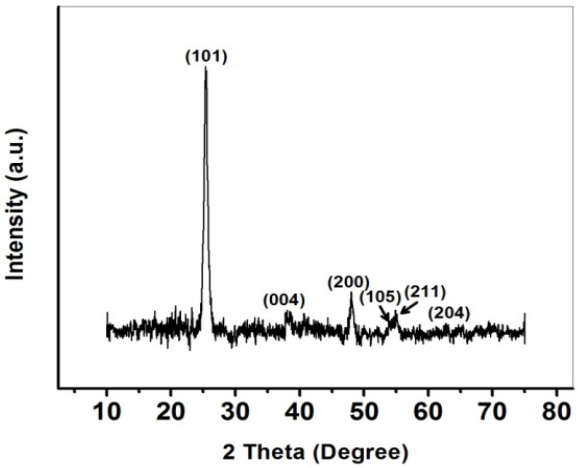

Figure S5. XRD pattern of TiO_2 nanotube array on a glass substrate after removal of the AAO membrane. Positions of anatase peaks are noted.

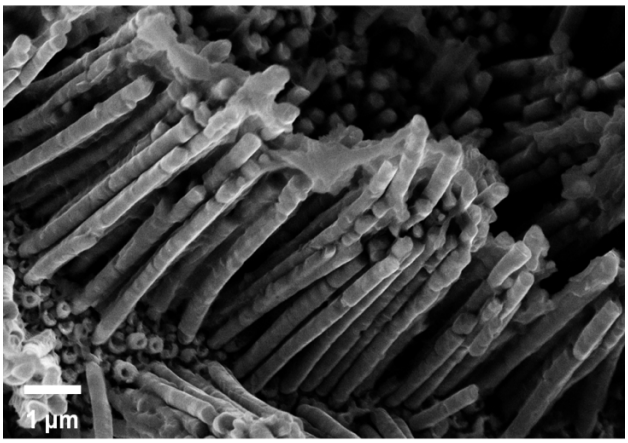

Figure S7. FESEM image of 6.0 µm long Au- TiO_2 core-shell nanowire arrays

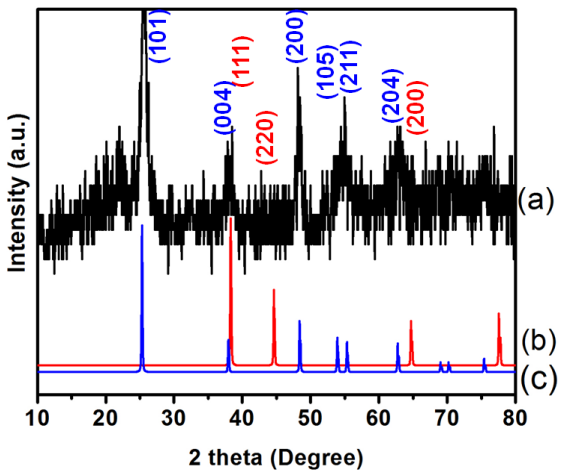

Figure S8. (a) XRD pattern of 6 μm long Au-TiO_2 nanowire array

and the calculated pattern of (b) Au (pdf # 00-001-1172, red) and (c)

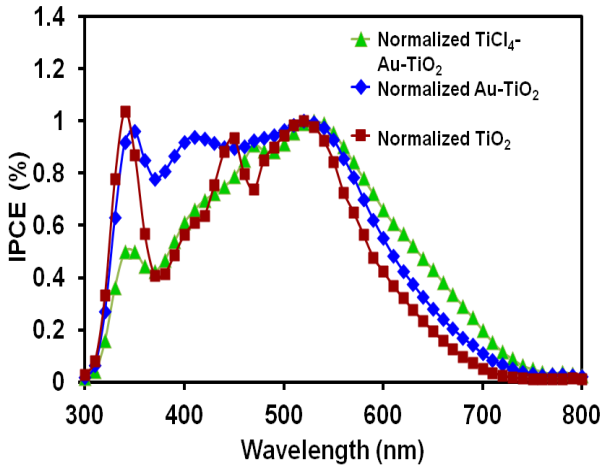

Figure S9. The normalized IPCE spectra of $TiCl_4$-Au-TiO_2 nanowire, Au-TiO_2 nanowire and TiO_2 nanotube

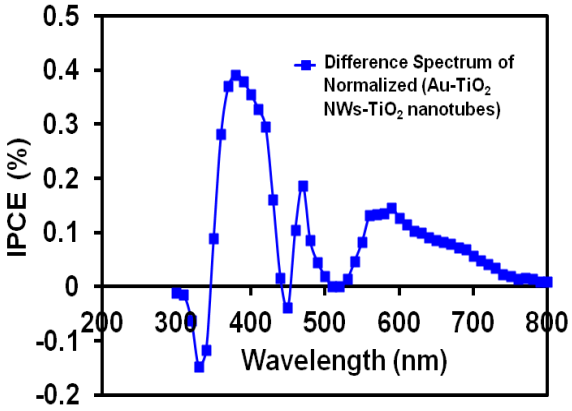

Figure S10. The difference IPCE spectrum of normalized Au-TiO_2 nanowire and the TiO_2 nanotube DSSC

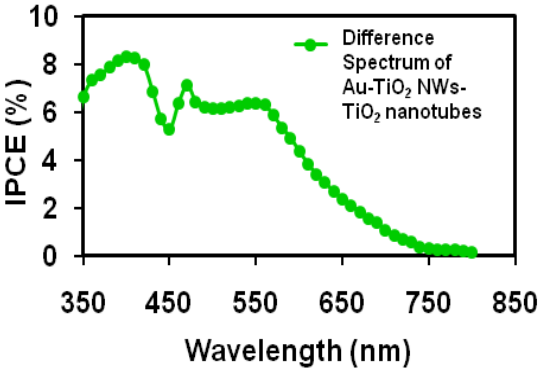

Figure S11. The difference in IPCE spectrum of the Au-TiO_2 core-shell DSSC and the TiO_2 nanotubes DSSC.