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Supporting information

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980 nm Laser Driven Photovoltaic Cells Based on Rare Earth Up-converting Phosphor for Biomedical Applications

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1 Surface morphologies of TiO_2 films

Scanning electron microscopy (SEM) image confirms that TiO_2 film is composed of a three-dimensional network of interconnected particles with the grain size between 10 and 20 nm. Film thickness is determined to be about 8 μm by using Talysurf CCI 3000 surface profiler.

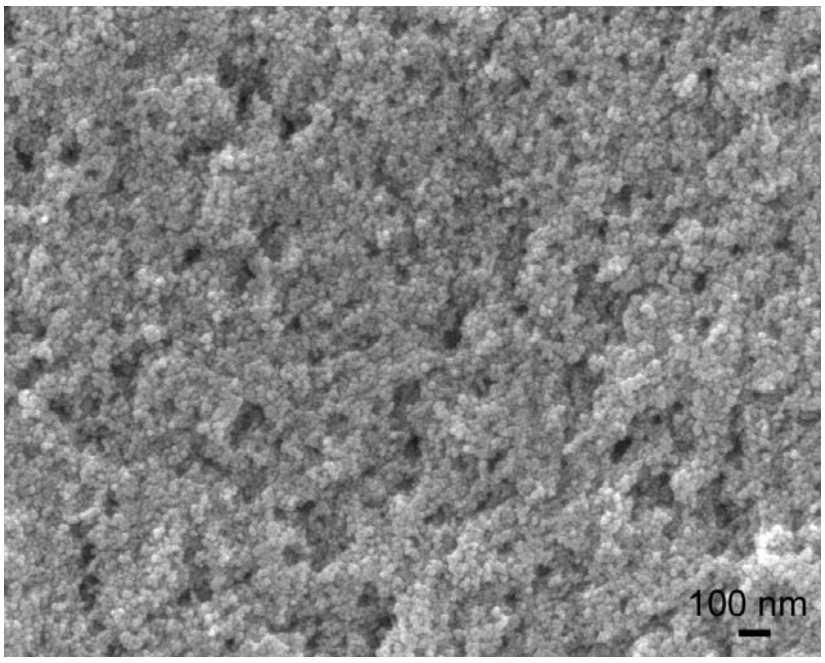

Fig. S1. Surface morphology of TiO_2 film.

2 Structure of N3 dye and absorption spectra of dye solution, dye-sensitized TiO_2 film and the liquid electrolyte.

Both absorption spectra of dye solution and dye-sensitized TiO_2 film indicate that they have photo-absorption in the wavelength range of 350-700 nm, confirming that they cannot absorb 980-nm laser but can absorb visible up-converting luminescence of $Na(Y_{1.5}Na_{0.5})F_6$:Yb,Er nanorods. Note that the liquid electrolytes used in our study have also no absorption in NIR wavelength range.

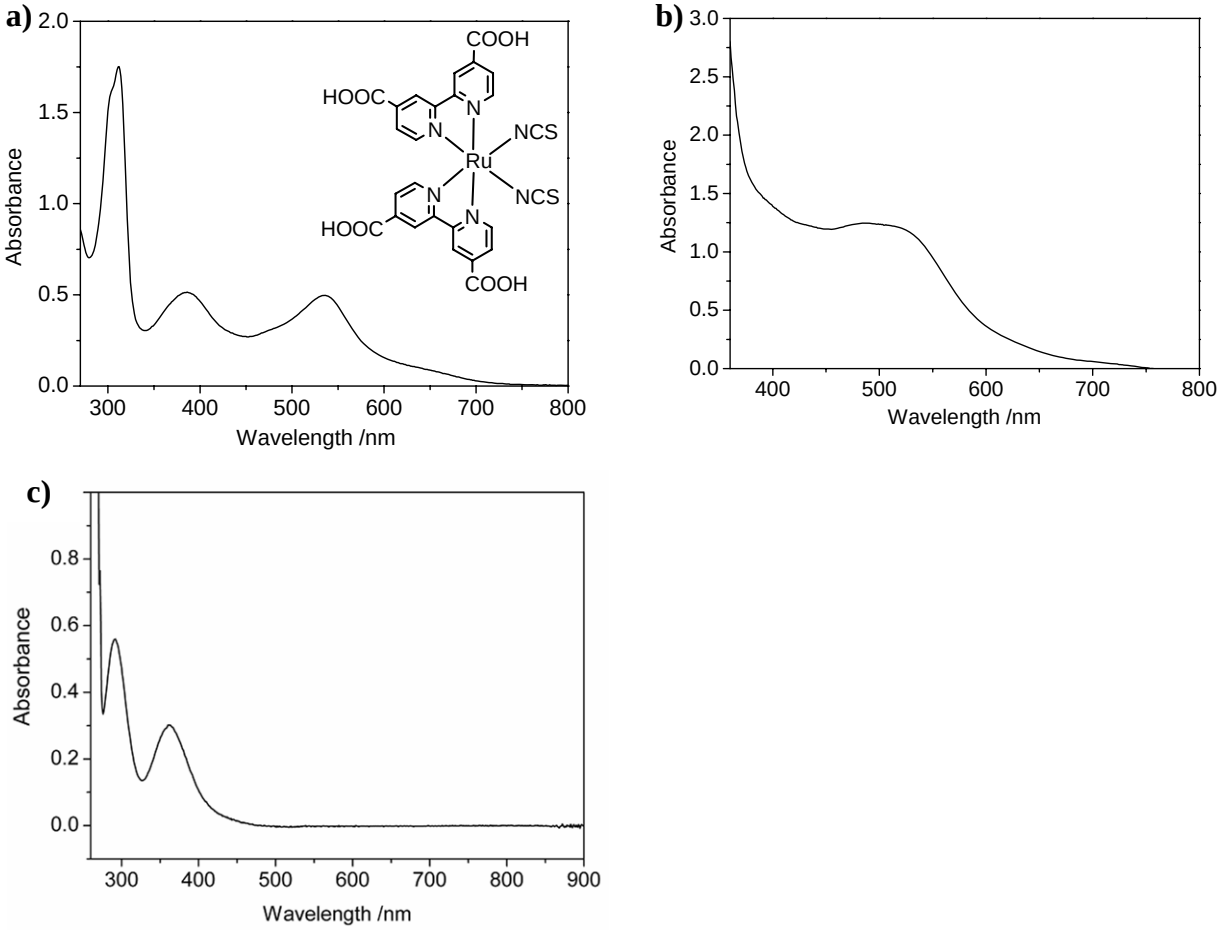

Fig. S2. **a**) UV–vis absorption spectrum of DMF solution containing 3.5×10^{-5} mol/L N3 dye and the inset showing its chemical structure. **b**) UV–vis absorption spectrum of typical dye-sensitized TiO_2 film. **c**) UV–vis absorption spectrum of the diluted electrolyte containing I^- and I_3^- ions.