Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Electronic Supplementary Information

Construction of 980-nm laser-driven dye-sensitized photovoltaic cell with excellent performance for powering nanobiodevices implanted under the skin

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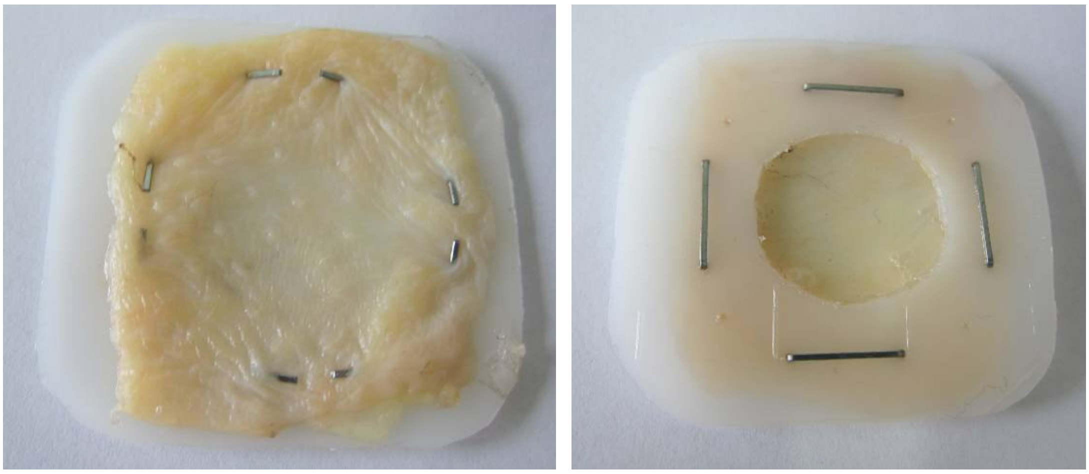


Fig. S1 Photos of the chicken skin on a plastic support.

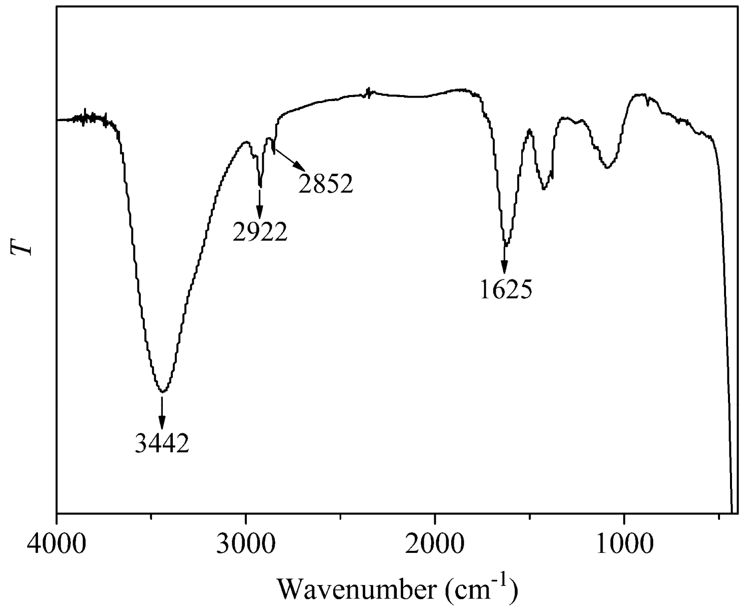


Fig. S2 The typical FT-IR spectrum of the $NaYF_4$:Yb/Er sample.

It should be noted that all $NaYF_4$:Yb,Er samples have similar FT-IR spectra, and the typical FT-IR spectrum exhibits a broad band at around 3442 cm^{-1}, corresponding to O-H stretching vibration from water molecule. The transmission bands at 2922 and 2852 cm^{-1} are respectively assigned to the asymmetric (ν_{as}) and symmetric (ν_s) stretching vibrations of methylene (CH_2) units in PVP and/or ethylene glycol. The bands at 1640 cm^{-1} should be related to a strong C=O adsorption from the lactam group in the side chains of PVP. Based on the above results, it is concluded that there are ethylene glycol and PVP ligands on the surface of $NaYF_4$:Yb,Er samples.

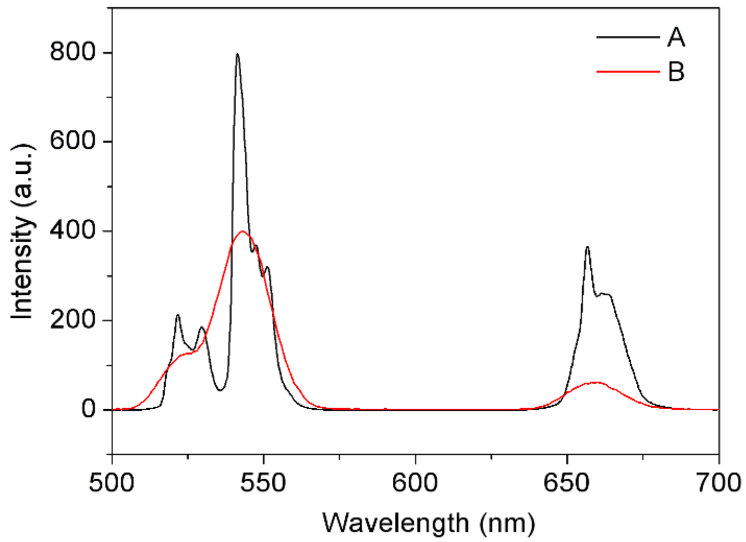


Fig. S3 Upconversion luminescence spectra of ethanol dispersion containing 0.2 mg/mL $NaYF_4$:Yb,Er nanorods under the irradiation of 980 nm laser. (A) the present $NaYF_4$:Yb,Er nanorods which were prepared in the EG/water solvent mixture (24 mL) with water volume (12 mL) by hydrothermal process at 180 °C for 24 h. (B) the previous $NaYF_4$:Yb,Er nanorods were prepared by a two-step method: hydrothermal synthesis of hydrophobic $Na(Y_{1.5}Na_{0.5})F_6$:Yb,Er nanorod capped with oleic acid and subsequent ligand (oleic acid) oxidation method according to our previous reports (*Adv. Funct. Mater.* **2009**, *19*, 3815; *J. Am. Chem. Soc.* **2008**, *130*, 3023.)

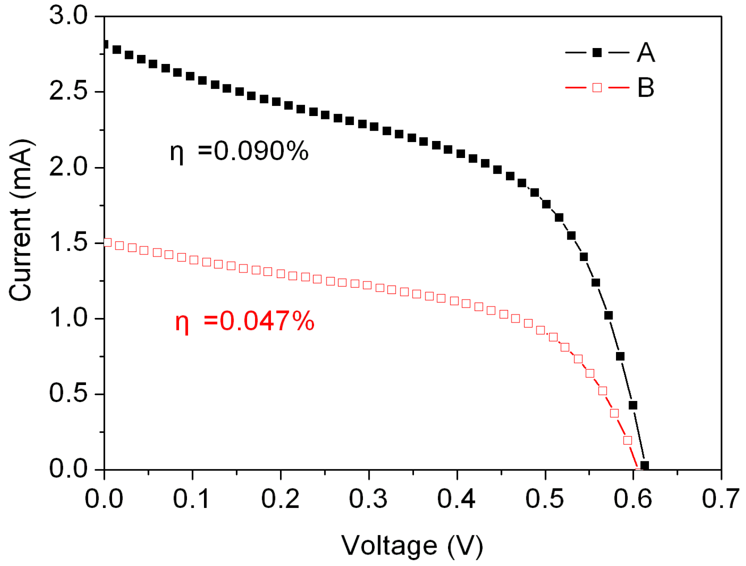
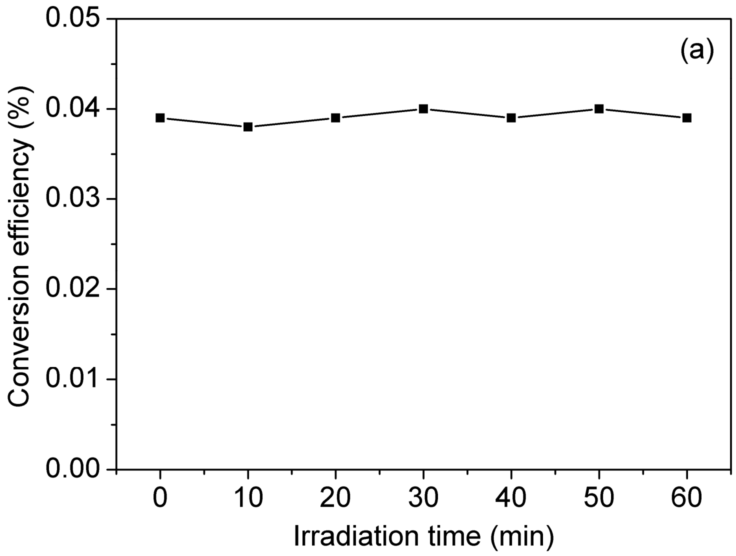


Fig. S4 Photocurrent–voltage characteristics of 980LD-PVCs with liquid electrolyte under the irradiation of a 980-nm laser with a power of 1W: (A) 980LD-PVCs with the present $NaYF_4$:Yb,Er nanorods which were prepared in the EG/water solvent mixture (24 mL) with water volume (12 mL) by hydrothermal process at 180 °C for 24 h; (B) 980LD-PVCs with $NaYF_4$:Yb,Er nanorods prepared by a two-step method (as demonstrated in our previous report. *Adv. Funct. Mater.* **2009**, *19*, 3815).



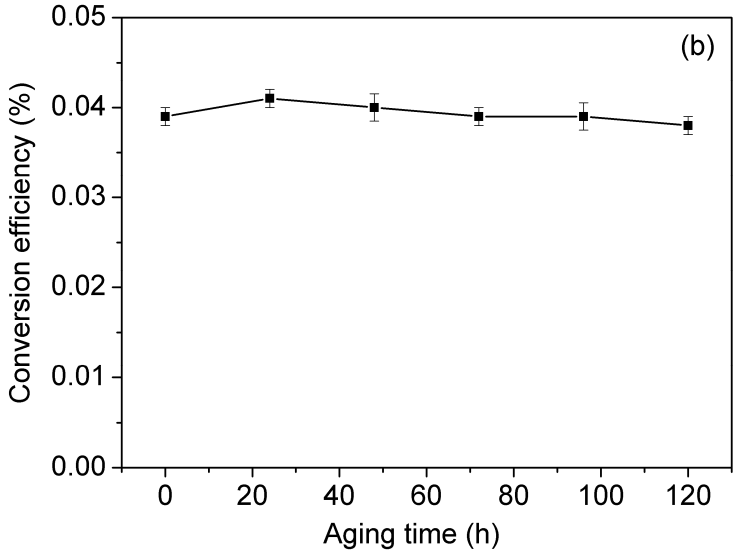


Fig. S5 The time-dependent change in the conversion efficiency of the present 980LD-PVC: (a) The 980LD-PVC was continuously irradiated by 980 nm laser for 60 min, and the conversion efficiency was measured once per 10 minutes. (b) The 980LD-PVC was stored at 60 °C for 0~ 120 hours for the aging test, and the conversion efficiency was measured once per 24 hours.