Electronic Supplementary Material (ESI) for *Chemical Communications*

Electronic Supplementary Information

Fabrication of opened-end high-aspect-ratio anodic TiO_2 nanotube film for photocatalytic and photoelectrocatalytic applications

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1. The X-ray diffraction (XRD) profiles of the annealed TiO_2 nanotube (TiNT) film and the sol-gel processed TiO_2 nanoparticles (NP-TiO_2) were recorded on an X'Pert spectrometer (Philips) using the Cu-Kα radiation (λ = 1.5406 Å). Both exhibit the characteristic peaks of the anatase phase (JCPDS #21-1272). The average crystalline sizes of the TiNT film and the NP-TiO_2 are 15.2 nm and 8.0 nm, respectively, as estimated according to the Scherrer equation based on (101) diffraction peak.

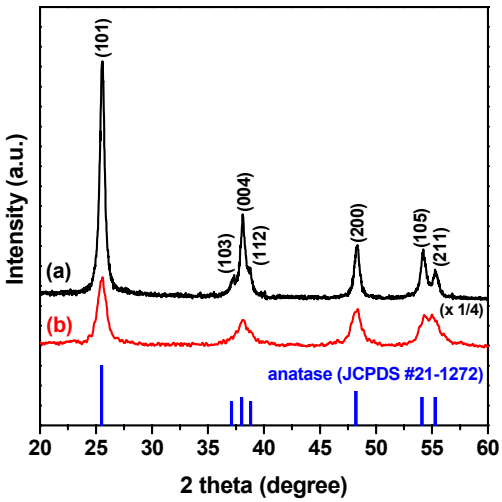

Figure S1. XRD profiles of (a) the annealed TiO_2 nanotube (TiNT) film and (b) the sol-gel processed TiO_2 nanoparticles (NP-TiO_2).

2. The Scanning Electron Microscopy (SEM) was taken on JEOL JSM-5400. Figure S2 is the SEM image of the side view of the TiNT/FTO electrode. It is clear that the thick TiNT film atop a thin layer of NP-TiO_2.

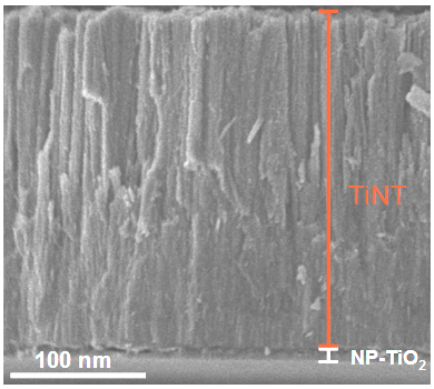

Figure S2. The SEM image of the side view of the TiNT/FTO electrode.

3. Photoelectrocatalytic water splitting by NP-TiO_2/FTO :

Figure S3 shows the current density obtained with a film containing exclusively TiO_2 nanoparticles. A maximum conversion efficiency of 0.36% was obtained that is about half of the efficiency obtained by using the opened-end TiNT/FTO electrode.

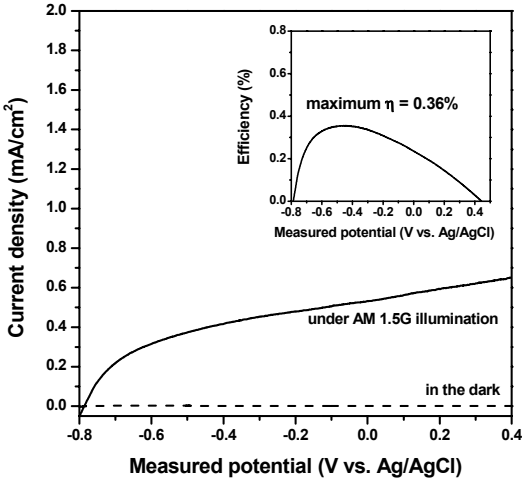

Figure S3. Current density-potential characteristics for water splitting using the NP-TiO_2/FTO electrode in the dark and under AM 1.5G illumination (the inset is the corresponding photoconversion efficiencies).