Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics

Supplementary Information

Electrochemical reduction induced self-doping of Ti^{3+} for efficient water splitting performance on TiO_2 based photoelectrodes

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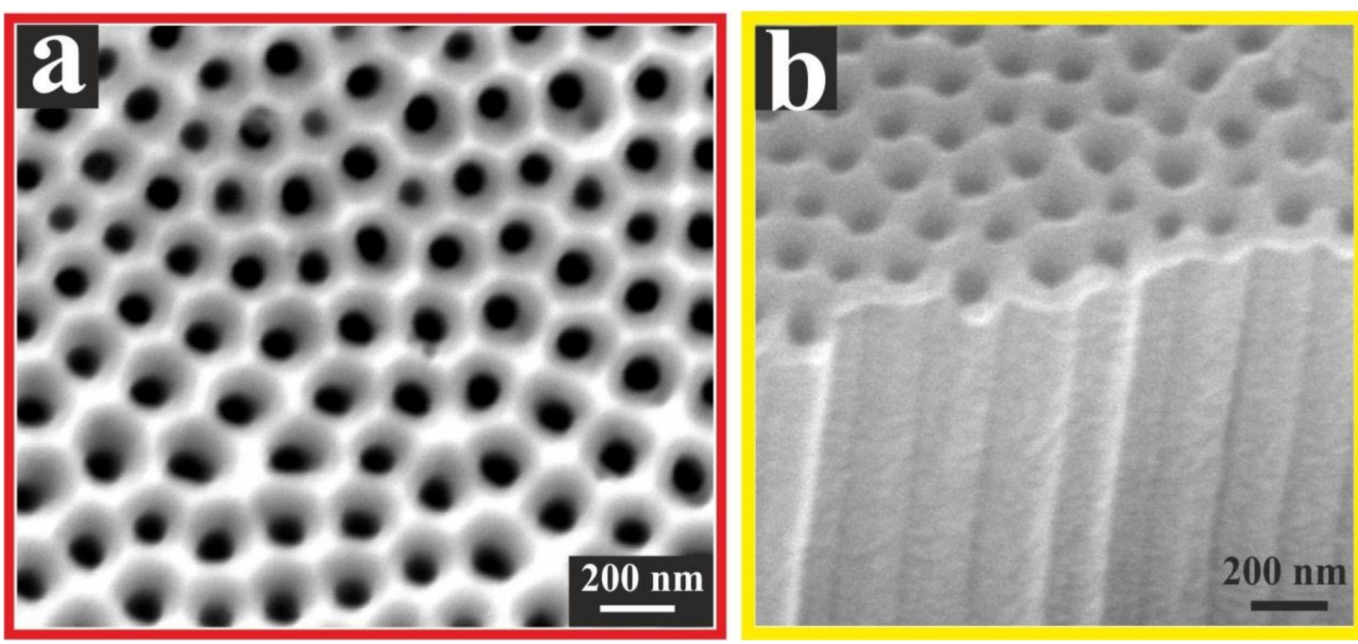

Fig. S1 SEM images of the TiO_2 NTs of (a) top view, and (b) cross-sectional view.

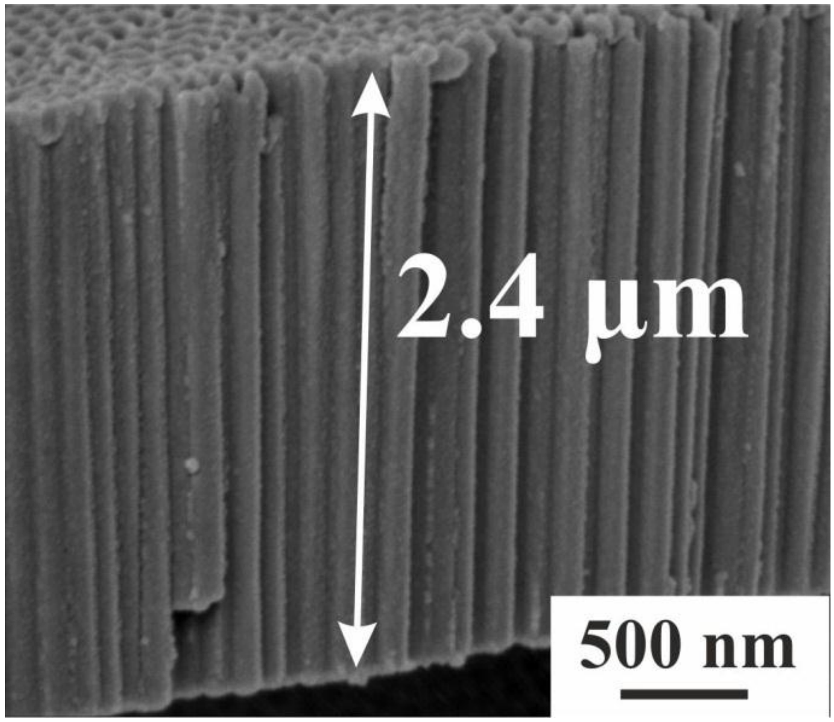

Fig. S2 Cross-sectional SEM image of the ECR-TiO_2 NTs.

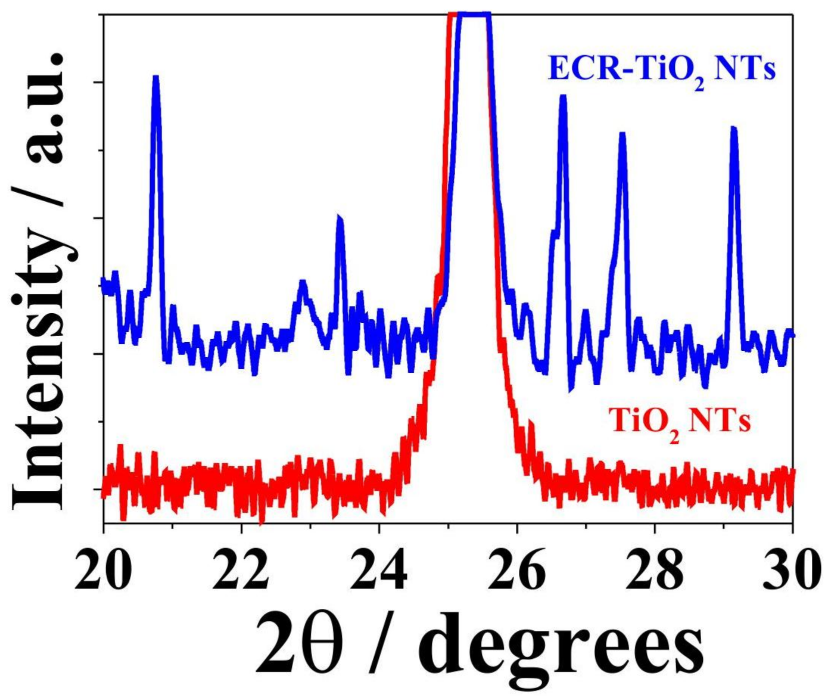

Fig. S3 XRD patterns of the TiO_2 NTs and ECR-TiO_2 NTs in magnification view in range of 20-30°.

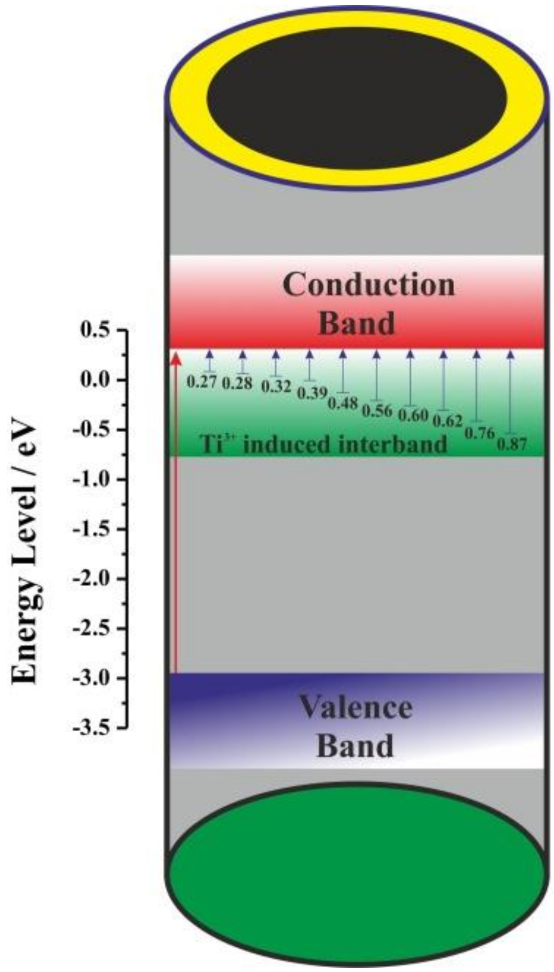

Fig. S4 Schematics of band energy level of Ti^{3+} self-doped ECR-TiO_2 NTs.

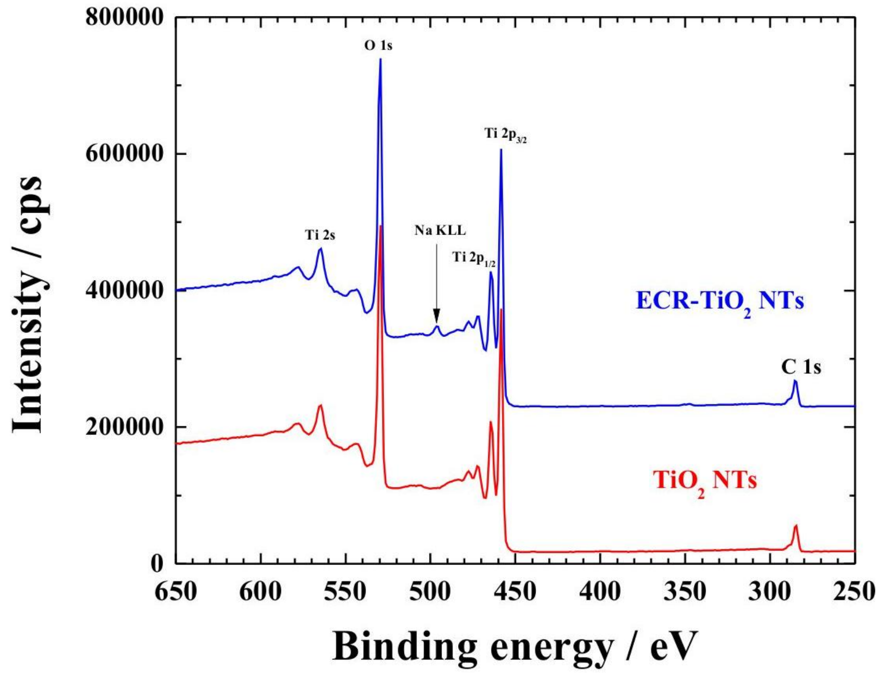

Fig. S5 XPS survey of the TiO_2 NTs and ECR-TiO_2 NTs.

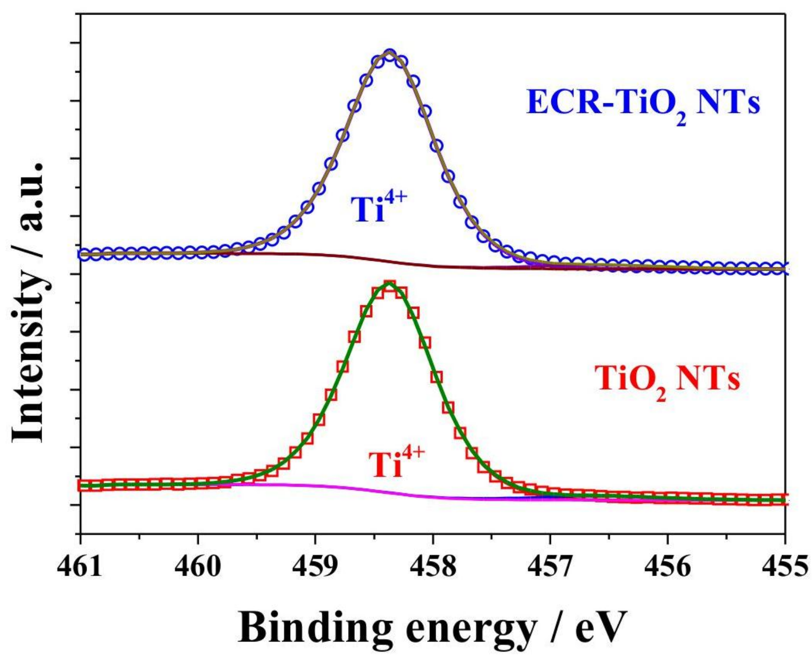

Fig. S6 XPS core level of Ti $2p_{3/2}$ of the TiO_2 NTs and ECR-TiO_2 NTs in the absence of argon sputtering.

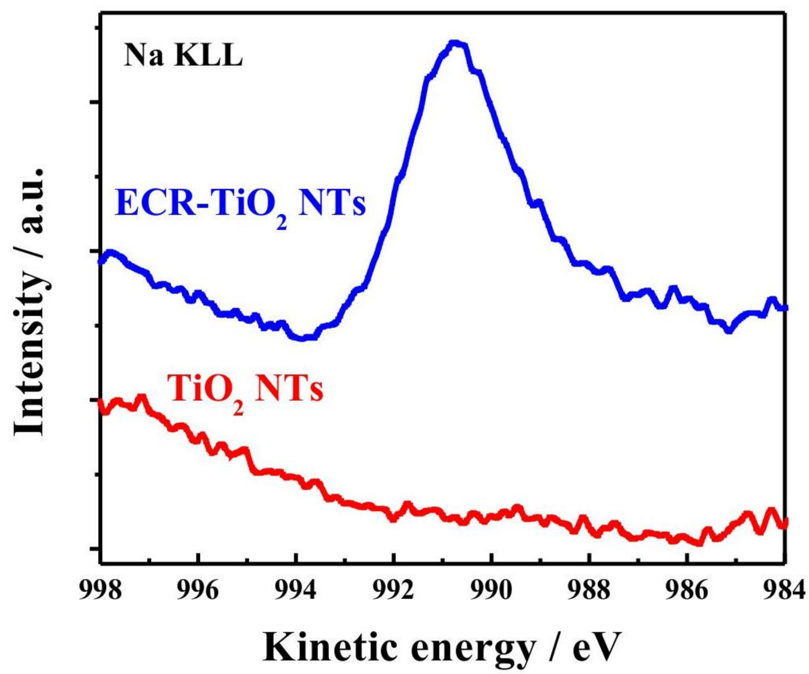

Fig. S7 Na KLL Auger spectra from TiO_2 NTs and ECR-TiO_2 NTs.

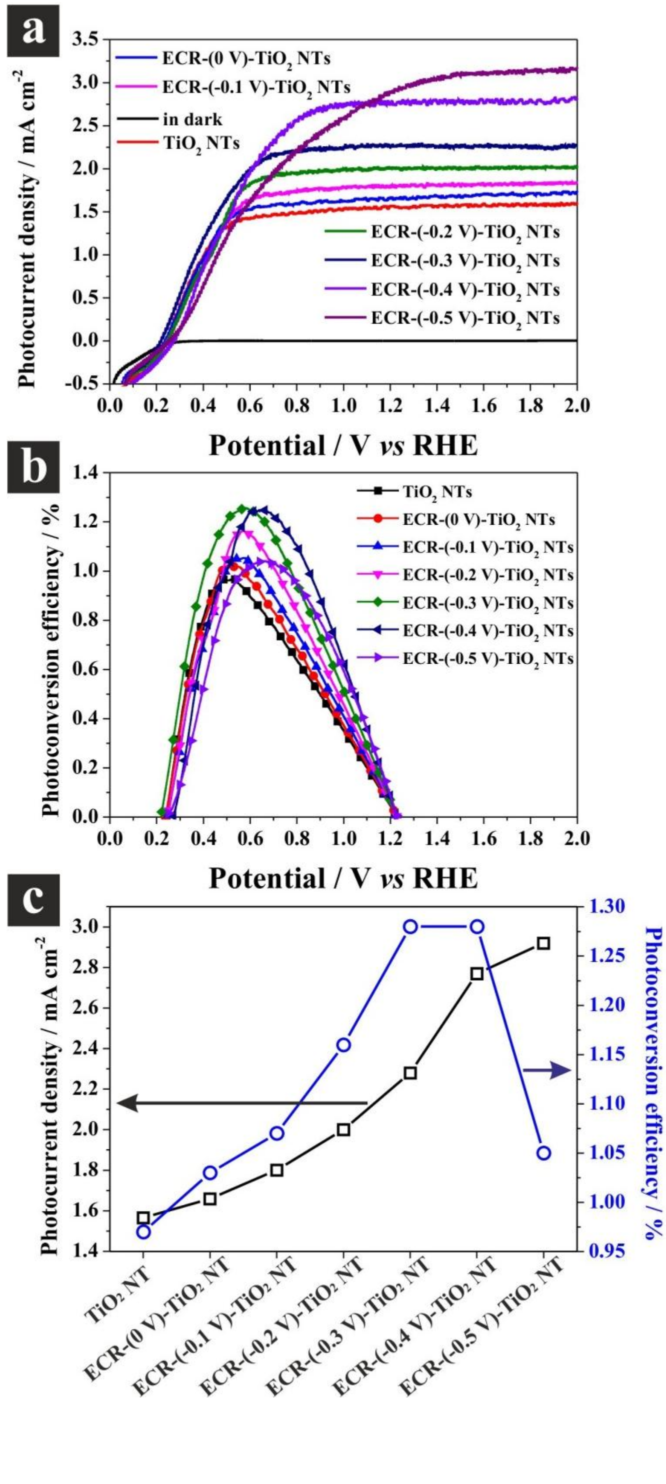

Fig. S8 PEC performance of the ECR-TiO_2 NT photoelectrodes reduced with different reduction potential, where x in ECR-(x)-TiO_2 NTs was the value of the applied potential (V). (a) linear-sweep voltammograms, collected with a scan rate of 5 mV s^{-1} under simulated solar light (AM 1.5G); (b) photoconversion efficiency as a function of applied potential (calculated using equation 1); (c) summarized photocurrent density and photoconversion efficiency data.

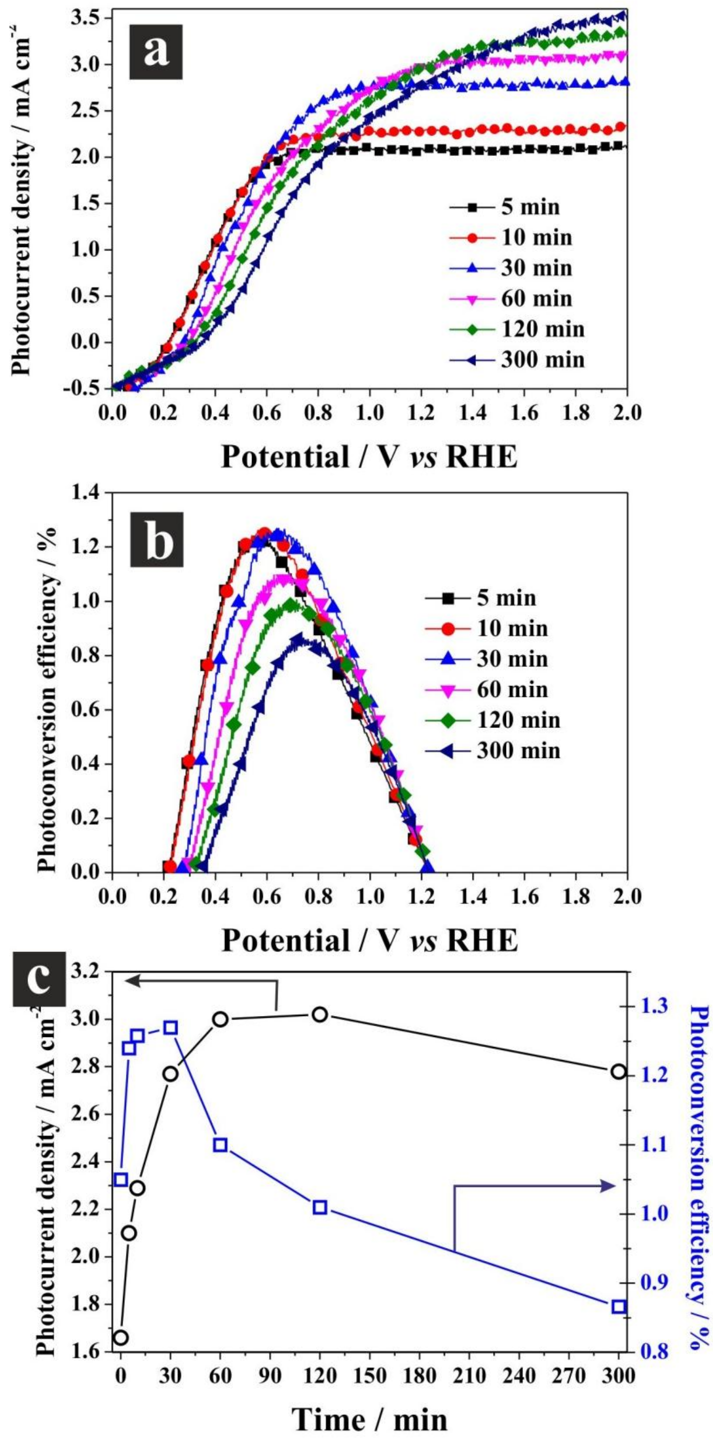

Fig. S9 PEC performance of the ECR-TiO_2 NTs photoelectrodes reduced with different duration length. (a) linear-sweep voltammograms, collected with a scan rate of 5 mV s^{-1} under simulated solar light (AM 1.5G); (b) photoconversion efficiency as a function of applied potential (calculated using equation 1); (c) summarized photocurrent density and photoconversion efficiency data.

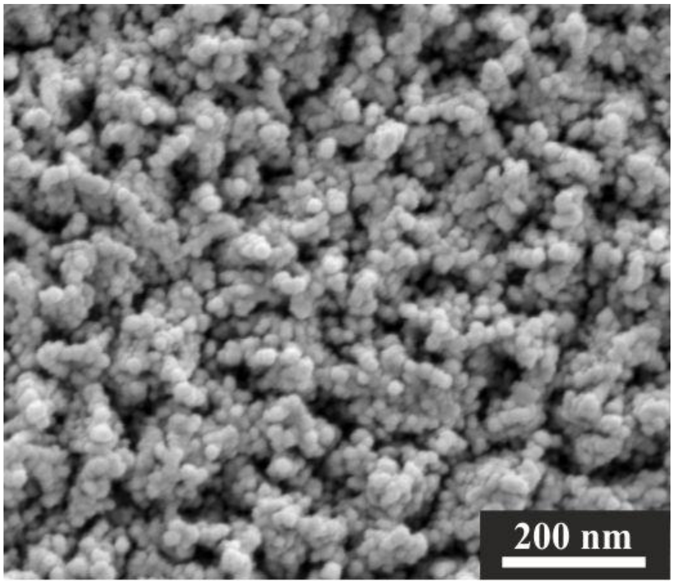

Fig. S10 SEM image of the TiO_2 film on indium tin oxide (ITO) prepared from commercial P25 TiO_2 nanoparticles.

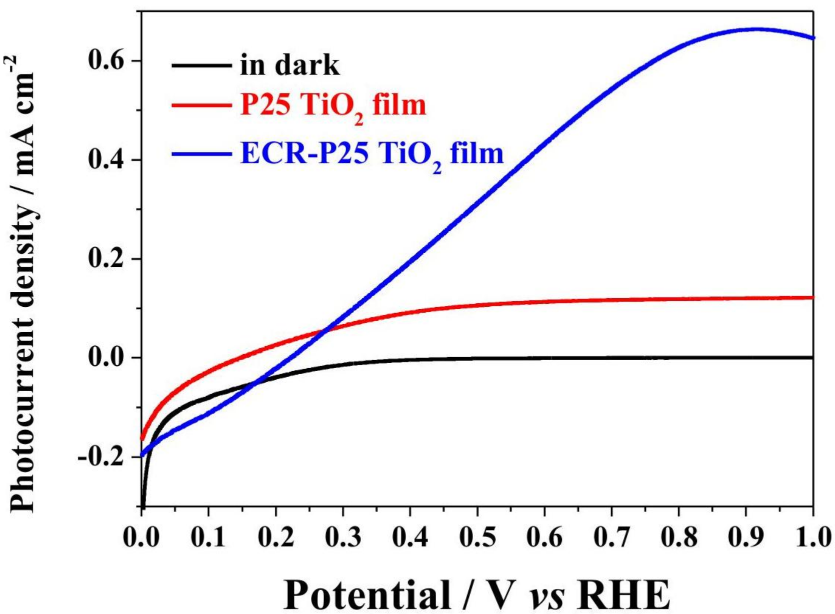

Fig. S11 PEC performance of the P25 TiO_2 film and ECR-P25 TiO_2 film photoelectrodes, prepared on indium tin oxide (ITO) with commercial P25 TiO_2 nanoparticles.