Supplementary Material

Passivation of the surface imperfection of TiO2 by ZIF-8 for efficient carrier separation/transformation

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1. Synthesis of ZIF-8 NPs

Typically, 1.54 g $Zn(NO_3)_2 \cdot 6H_2O$ and 1.7 g 2-MI were added into 75 ml

methanol, respectively. Then, two transparent solutions were mixed under vigorous stirring for 1 hour. The obtained white precipitates were collected through centrifuging and washed them with methanol three times. Finally, the sample was dried under vacuum at 60 °C overnight.

2. Synthesis annealed TiO_2 NRAs and TiO_2/ZIF-8 hybrids

As the synthesis method of TiO_2 in the articles, we take a 30 min annealed treatment at 450 ℃ in air atmosphere. Afterward, we compounded ZIF-8 NPs with the annealed TiO_2 NRAs in the same way.

3. Synthesis sparse TiO_2 NRAs

As the synthesis method of TiO_2 in the articles, we adjust the amount of TBOT in 0.12 ml.

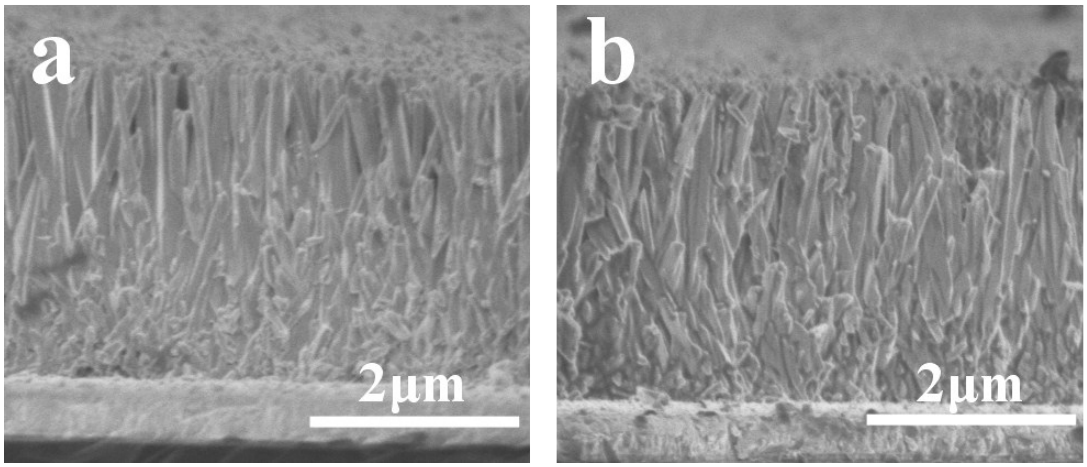

Figure S1. SEM section image of (a) TiO_2 NRAs and (b) TiO_2/ZIF-8 hybrids.

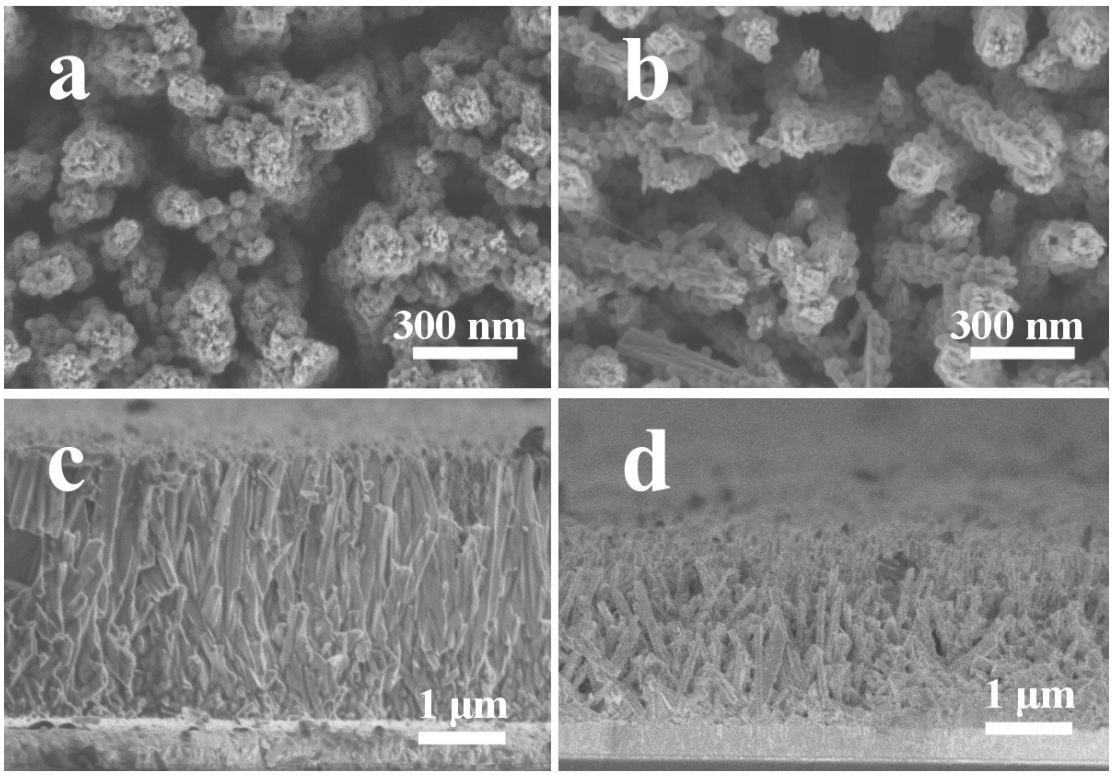

Fig S2. SEM image of TiO_2/ZIF-8 with different ratios. (a) and (c) top view and side view of high density TiO_2 with ZIF-8. (b) and (d) top view and side view of low density TiO_2 with ZIF-8.

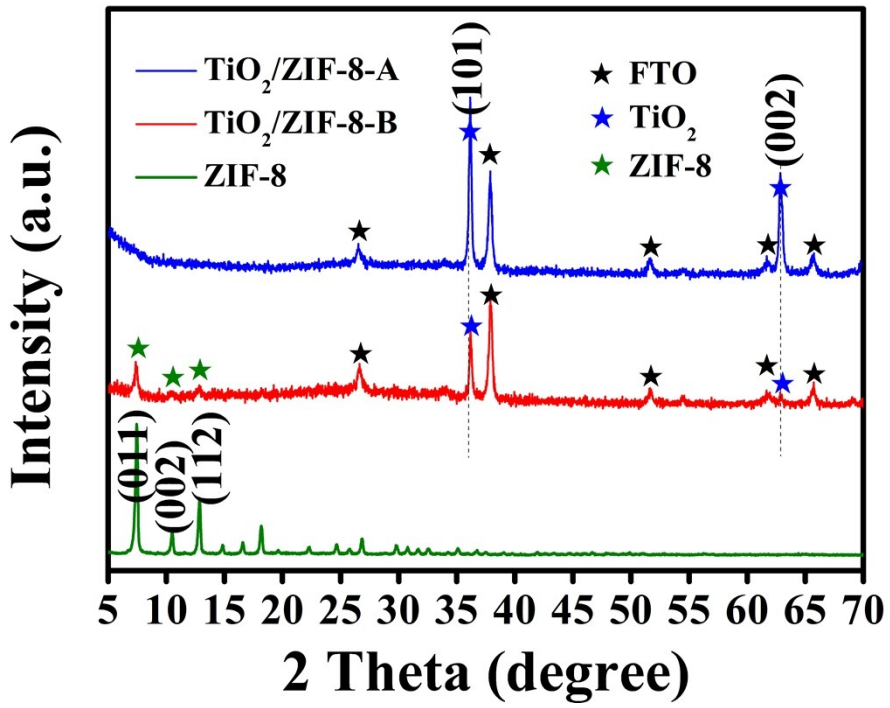

Fig S3. XRD of TiO_2/ZIF-8 with different ratios including high density TiO_2 with ZIF-8 (TiO_2/ZIF-8-A) and low density TiO_2 with ZIF-8 (TiO_2/ZIF-8-B).

The XRD peaks of ZIF-8 can be observed by increasing the loading amount of ZIF-8 and decreasing the content of TiO_2 as shown in Fig S2 and Fig S3. SEM images in Fig. S2 show that the density and length of TiO_2 are decreased as we supposed to weak the XRD peaks from TiO_2. In XRD, by contrasting the relative peaks intensity of 36.1°（TiO_2）and 37.9°（FTO) in different samples, the conclusion of decreased TiO_2 content is confirmed. The weak peaks of ZIF-8 can be observed with the decrease of TiO_2. The invisible peak of ZIF-8 in this work is ascribed the fact that the amount of ZIF-8 is far less than TiO_2 .

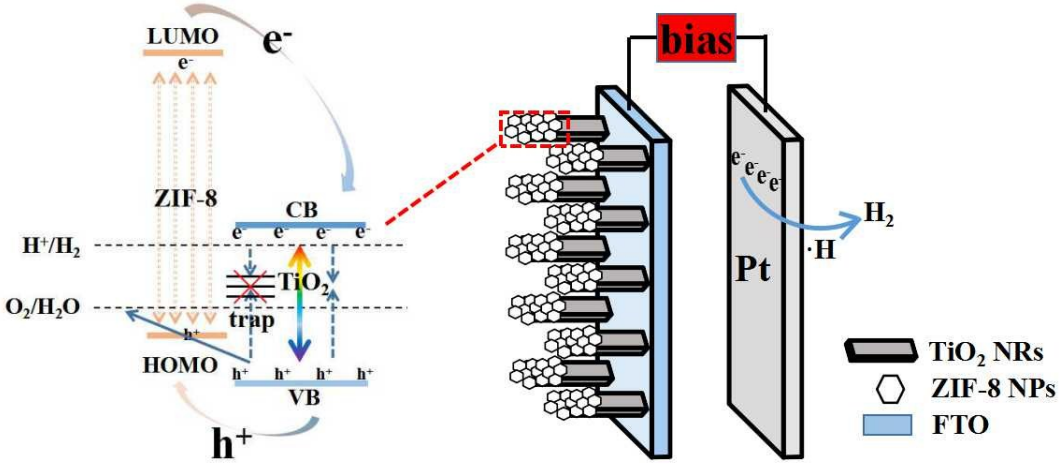

Fig S4. Schematic illustration of TiO_2/ZIF-8 in PEC performance of water splitting.