Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Three-demensional Interconnected Hierarchical FeOOH/TiO_2/ZnO Nanostructural Photoanode for Enhancing Performance of Photoelectrochemical Water Oxidation

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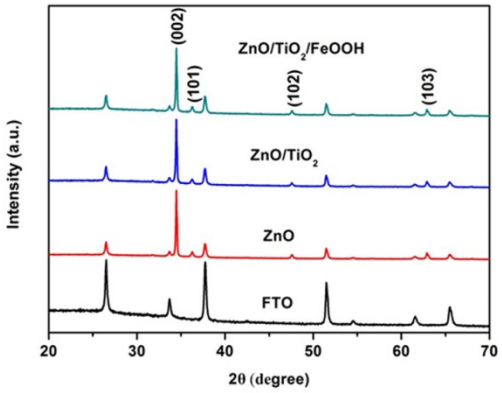

Figure S1. XRD patterns of ZnO, ZnO/TiO_2, and 3D ZnO/TiO_2/FeOOH heterojunction arrays.

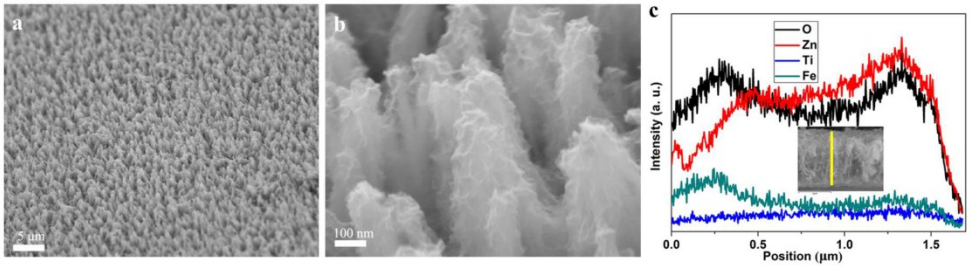

Figure S2. Characterization of 3D ZnO/TiO_2/FeOOH heterojunction arrays. (a, b) SEM images, (c) line scan results.

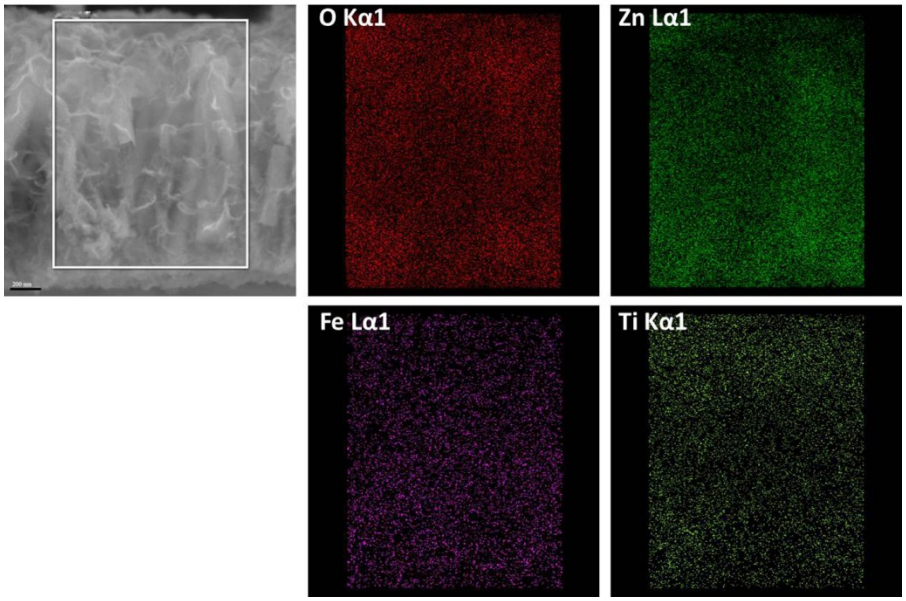

Figure S3. EDX elemental mapping of 3D ZnO/TiO_2/FeOOH heterojunction arrays.

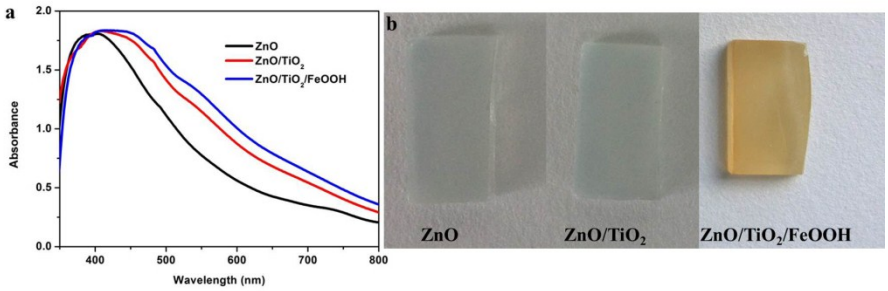

Figure S4. (a) UV-vis absorption spectrum and (b) photograph of ZnO, ZnO/TiO_2, and 3D ZnO/TiO_2/FeOOH heterojunction, respectively.

The bare ZnO nanowires show strong adsorption at the band edge of 380 nm, corresponding to the bandgap of ZnO (3.3 eV). In contrast, the absorption edge of ZnO/TiO_2 core-shell nanowire arrays exhibits an obviously red shift, which indicates the enhanced light absorption after deposition of TiO_2. Moreover, the light absorbance of 3D ZnO/TiO_2/FeOOH nanostructure is slightly higher than ZnO/TiO_2 nanowires, indicating that the modification of FeOOH hardly affects the light absorption of ZnO/TiO_2 nanowires. Besides, the color of samples on FTO substrate becomes pale yellow after growth of FeOOH nanosheets on the ZnO/TiO_2, which is due to the band gap was ~2 eV for FeOOH.

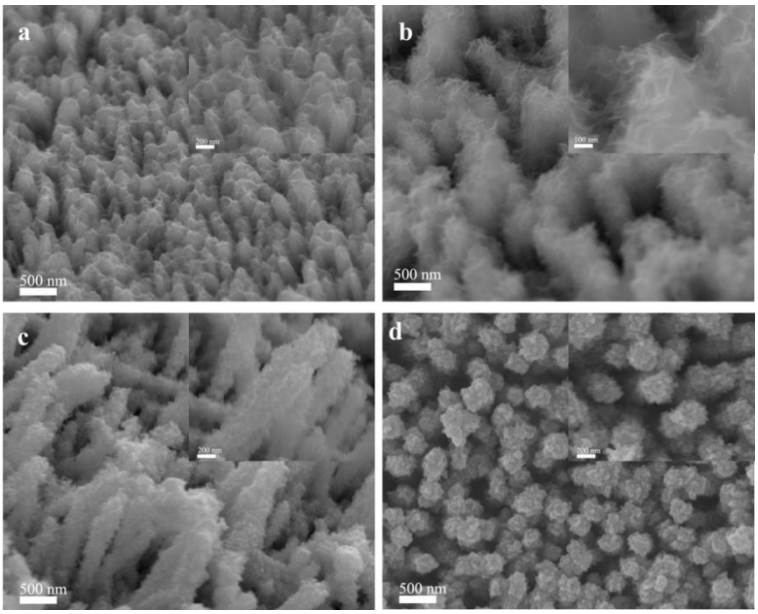

Figure S5. SEM images of samples obtained after different reaction temperature. (a) 20 °C, (b) 70 °C, (c) 80 °C, and (d) 100 °C.

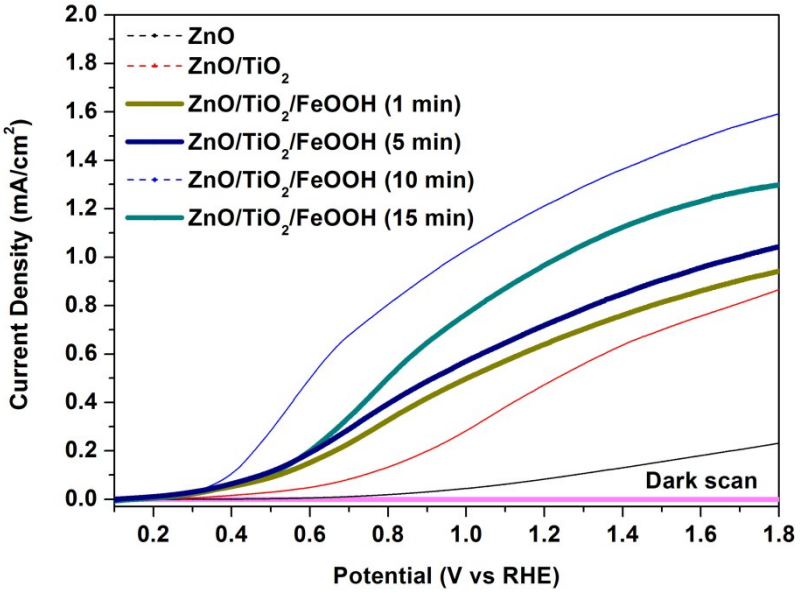

Figure S6. Photocurrent density versus voltage curves of 3D $ZnO/TiO_2/FeOOH$ heterojunction with different FeOOH deposition time.

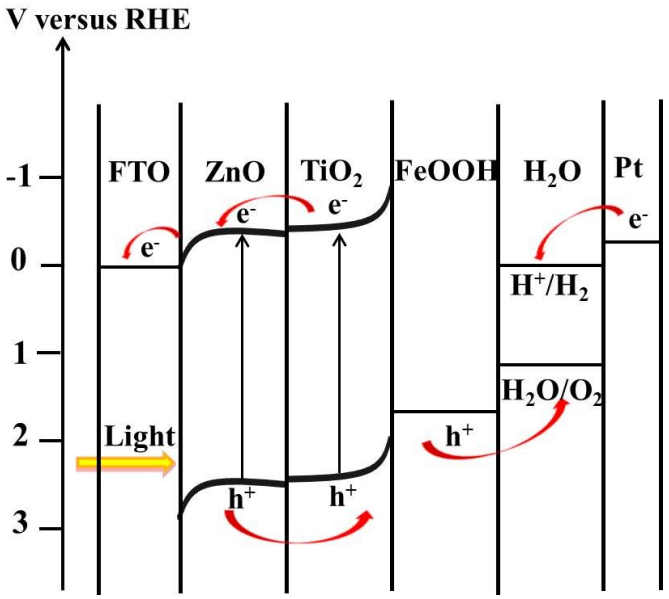

Figure S7. Schematic of energy band (quasi-static equilibrium under solar illumination) for 3D ZnO/TiO_2/FeOOH heterojunction arrays for PEC water splitting.