

Supporting Information

Effects of anions and pH on the stability of ZnO nanorods for photoelectrochemical water splitting

Ching-Fang Liu, Yi-Jing Lu, Chi-Chang Hu*

Department of Chemical Engineering

National Tsing Hua University

Hsin-Chu 30013, Taiwan

*Corresponding Author: Chi-Chang Hu, NTHU Chair Professor

Department of Chemical Engineering

National Tsing Hua University

No.101, Section 2, Kuang-Fu Road

Hsin-Chu 30013, TAIWAN

Phone & Fax: +886-3-5736027

E-mail: cchu@che.nthu.edu.tw

Website: <http://mx.nthu.edu.tw/~cchu/>

This Supporting Information includes 7 figures.

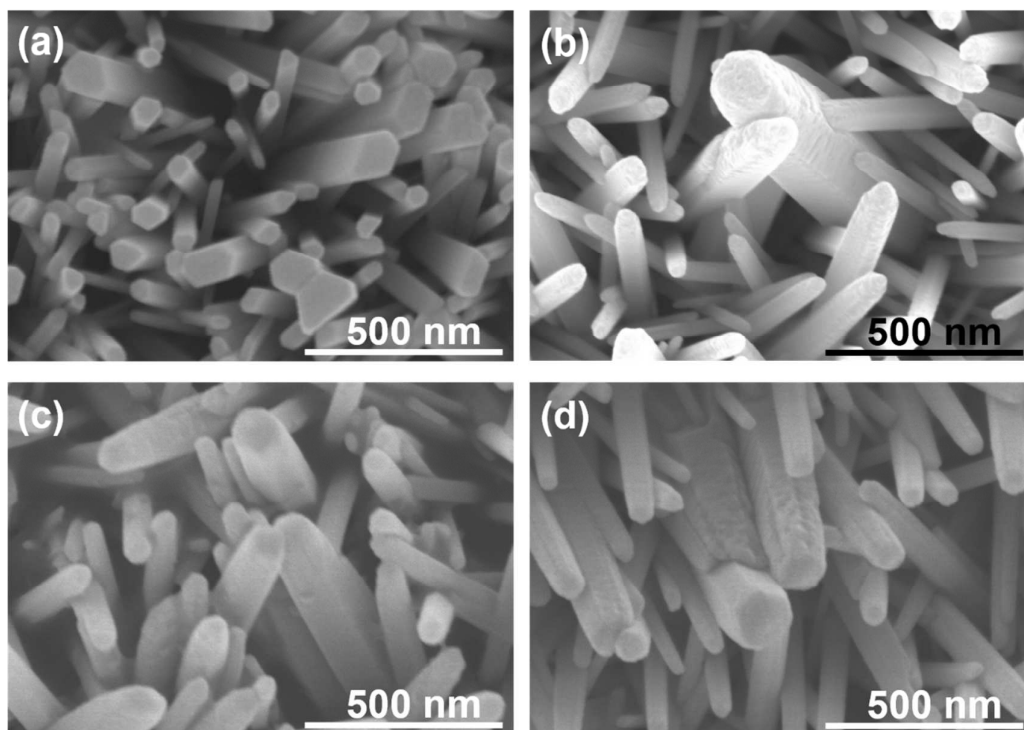


Figure S1. SEM images of ZnO photo-anodes biased at 1.5 V vs. RHE for 1 h in 0.025 M $\text{Na}_2\text{B}_4\text{O}_7$ (borate buffer) at pH (a) 10.5; (b) 12; (c) 12.5; (d) 13 under AM1.5G simulated solar light irradiation.

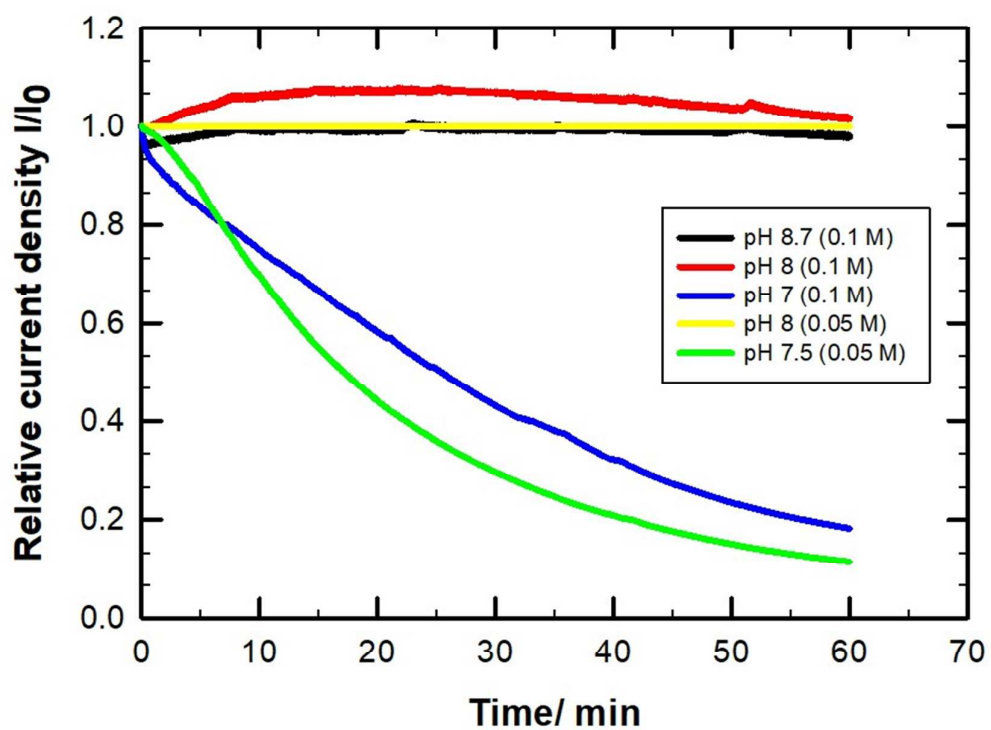


Figure S2. Chronoamperograms of ZnO photo-anodes biased at 1.5 V vs. RHE in 0.05 M and 0.1 M $\text{Na}_2\text{B}_4\text{O}_7$ (buffer) at various pH values under AM1.5G simulated solar light irradiation.

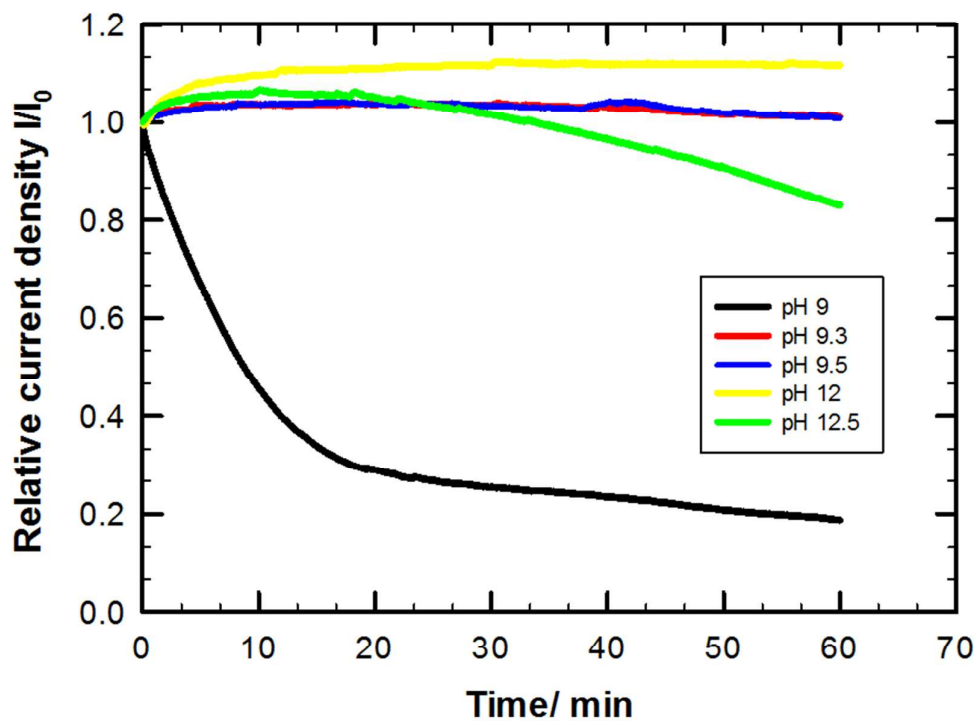


Figure S3. Chronoamperograms of ZnO photo-anodes biased at 1.5 V vs. RHE in 0.25 M Na_2CO_3 (buffer) at various pH values under AM1.5G simulated solar light irradiation.

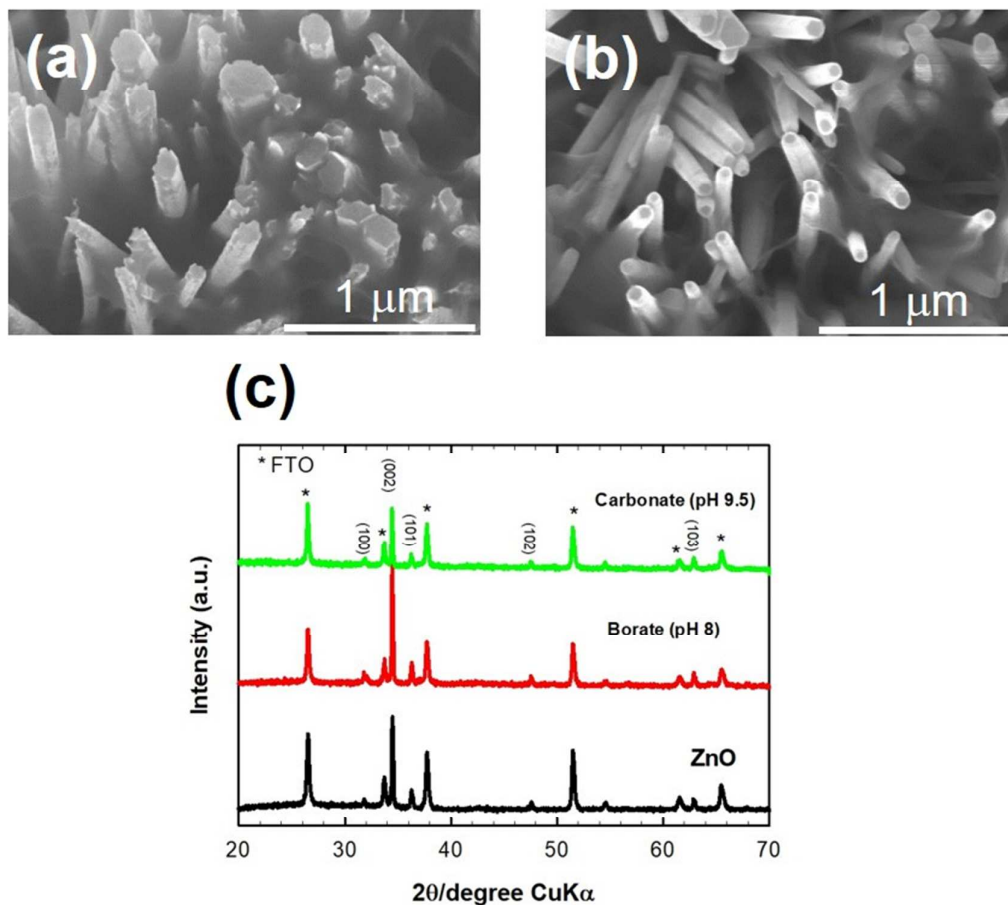


Figure S4. SEM images of ZnO NRs after the 1-h PEC test at 1.5 V vs. RHE in (a) 0.1 M $\text{Na}_2\text{B}_4\text{O}_7$ (pH 8) and (b) 0.25 M Na_2CO_3 (pH 9.5) under AM1.5G simulated solar light irradiation; (c) XRD patterns of freshly prepared ZnO NRs and those after the 1-h PEC test at 1.5 V vs. RHE in 0.1 M $\text{Na}_2\text{B}_4\text{O}_7$ (pH 8) and 0.25 M Na_2CO_3 (pH 9.5).

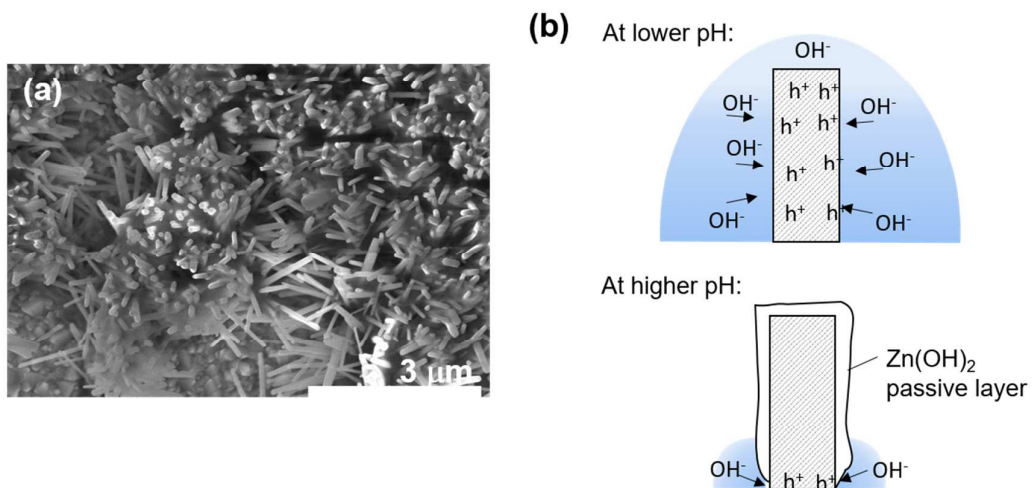


Figure S5. (a) A SEM image of ZnO NRs after the 1-h PEC test at 1.5 V vs. RHE in 0.2 M NaOH under AM1.5G simulated solar light irradiation; (b) two schematic diagrams of ZnO dissolved at low and high pH values.

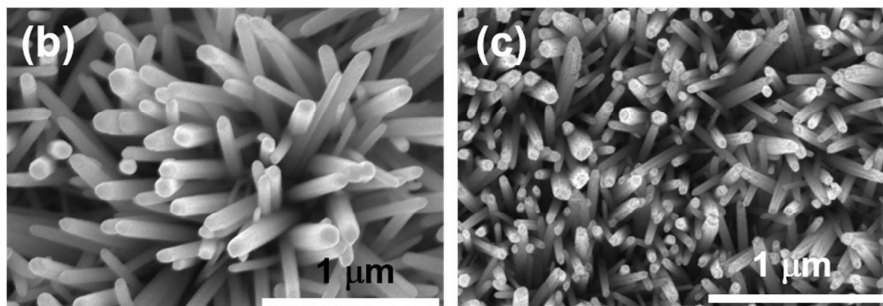
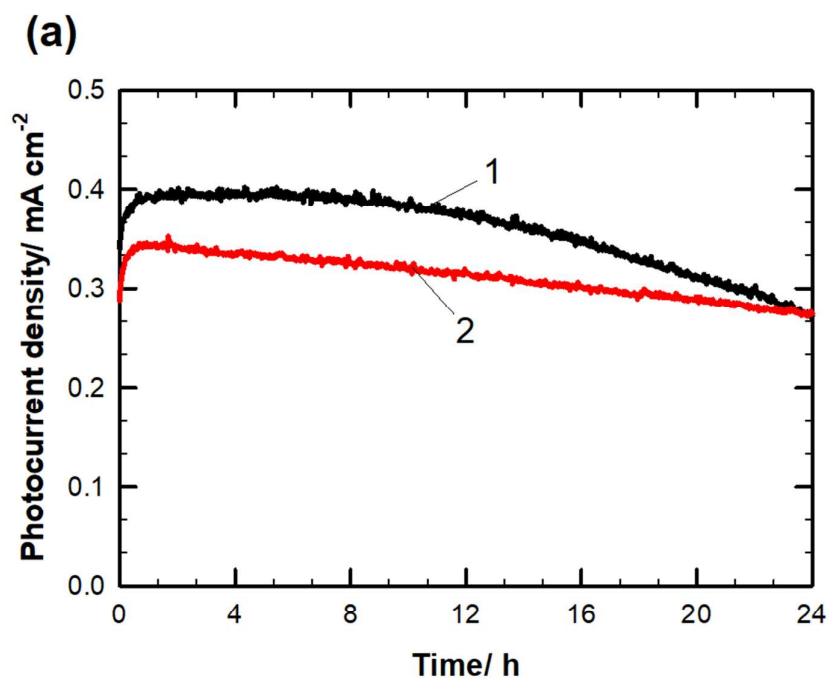


Figure S6. (a) CA curves of ZnO photoanodes biased at 1.0 V vs. RHE in (1) 0.025 M $\text{Na}_2\text{B}_4\text{O}_7$ and (2) 0.025 M Na_2CO_3 at pH 10.5. SEM images of ZnO photo-anodes after the 24-h PEC test at 1.5 V vs. RHE in (b) 0.025 M $\text{Na}_2\text{B}_4\text{O}_7$ and (c) 0.025 M Na_2CO_3 under the AM1.5G simulated solar light irradiation.

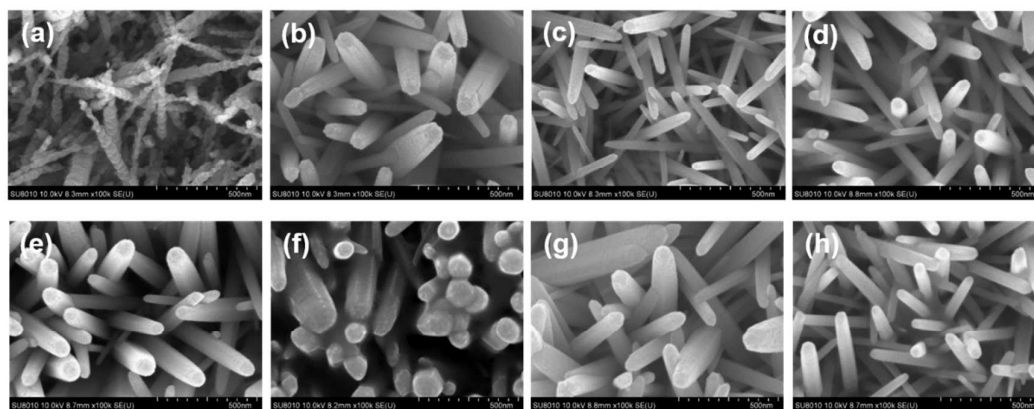


Figure S7. SEM images of ZnO photo-anodes after the 1-h PEC test at 1.5 V vs. RHE in 0.025 M $\text{Na}_2\text{B}_4\text{O}_7 + \text{Na}_2\text{CO}_3$ at pH = (a) 8.3; (b) 8.5; (c) 9.0; (d) 10.5; (e) 11.0; (f) 12.0; (g) 12.5; and (h) 13.0 under AM1.5G simulated solar light irradiation.