Electronic Supplementary Material (ESI) for RSC Advances.


# Electronic Supplementary Information

## Surface plasmon-driven photoelectrochemical water splitting of Ag/$TiO_2$ Nanoplate Photoanode

Piangjai Peerakiatkhajohn[a], Jung-Ho Yun[b], Teera Butburee[c], Waraporn Nisspa[d], and Supphasin Thaweesak [e*]

*a Faculty of Environment and Resource Studies, Mahidol University, Nakhon Pathom 73170, Thailand; piangjai.pee@mahidol.ac.th*

*b Nanomaterials Centre, School of Chemical Engineering and Australian Institute for Bioengineering and Nanotechnology (AIBN), The University of Queensland, St Lucia, QLD 4123, Australia; j.yun1@uq.edu.au*

*c National Nanotechnology Center, National Science and Technology Development Agency, 111 Thailand Science Park, Pathum Thani 12120, Thailand; teera.but@nanotec.or.th*

*d Division of Science and Technology, Faculty of Science and Technology, Phetchaburi Rajabhat University, Phetchaburi 76000, Thailand; waraporn.bun@mail.pbru.ac.th*

*e Department of Chemical Engineering, Faculty of Engineering, Burapha University, Chon Buri 20131, Thailand; supphasin@eng.buu.ac.th*

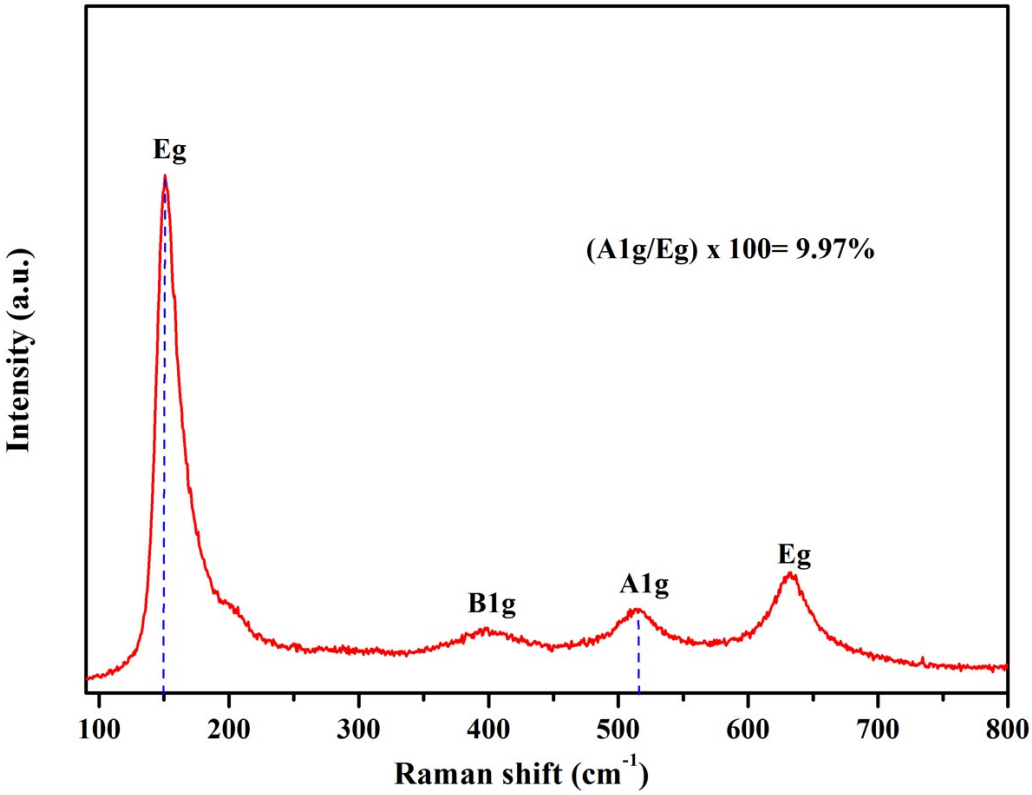


**Fig. S1** Raman spectra of $TiO_2$ NP photoanode.

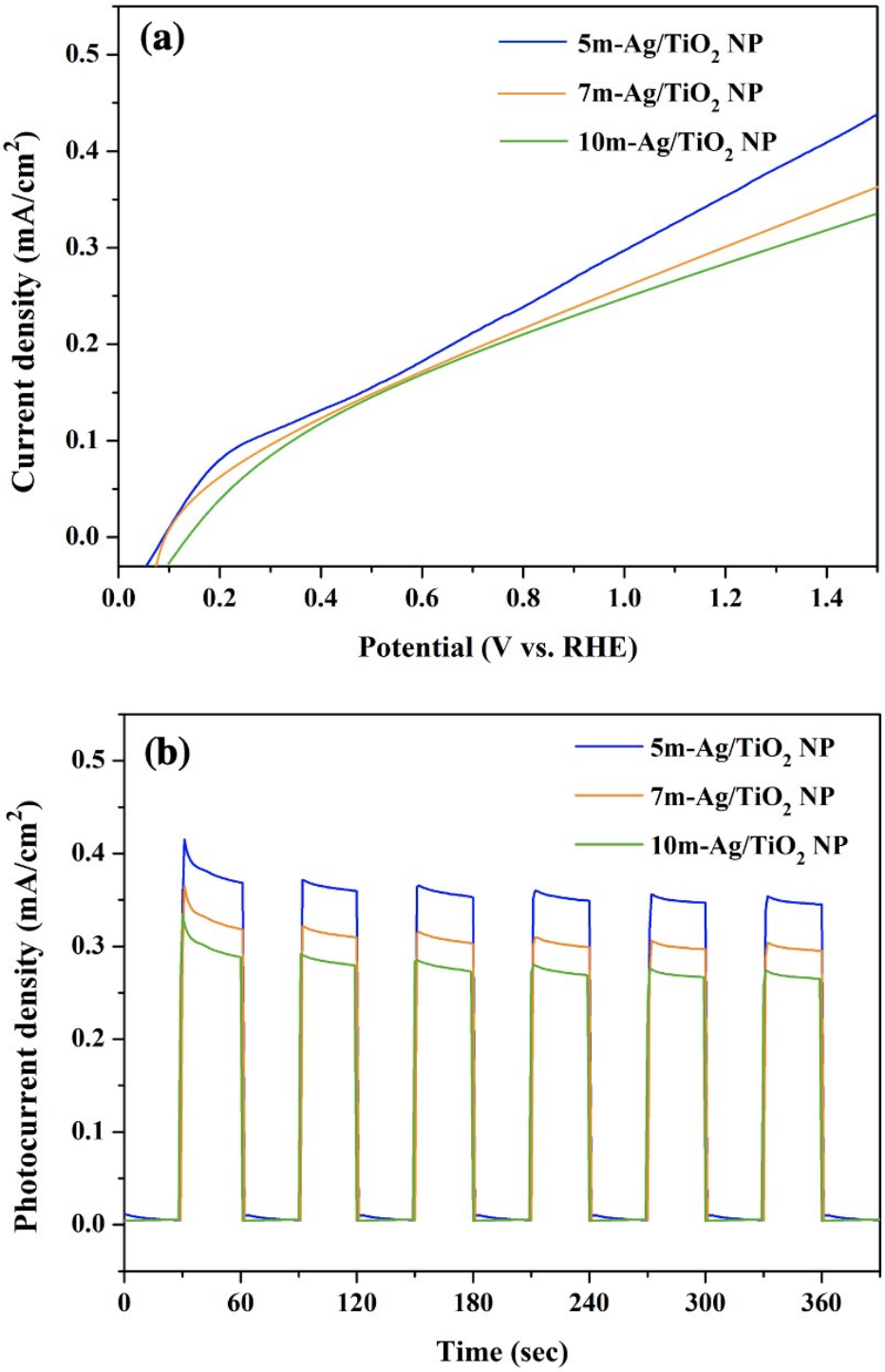


**Fig. S2** The variations of photocurrent density of $Ag/TiO_2$ NP photanodes at different deposition time (a) linear sweep voltametric (I-V) curves and (b) Transient photocurrent response (I-t) at 1.23 V vs. RHE under simulated AM1.5G illumination.

**Table S1** A summary of recent studies for Ag/$TiO_2$ based photoanodes in photoelectrochemical system.

| **Photoanode** | **Photocurrent density** | **Electrolyte/ Illumination** | **Method** | **Ref.** |
|---|---|---|---|---|
| $TiO_2$ nanotube<br>Ag/$TiO_2$ nanotube | -<br>0.104 mA/cm$^2$<br>at 0.7 V vs. SCE | 0.5 M $Na_2SO_4$,<br>300 W Xe lamp | Anodization and electrodeposition | [1] |
| $TiO_2$ nanorod<br>Ag/$TiO_2$ nanorod | 0.014 mA/cm$^2$<br>0.047 mA/cm$^2$ | 0.35 M $NaSO_3$ and<br>0.25 M NaS,<br>100 mW/cm$^2$ | Hydrothermal and photodeposition | [2] |
| $TiO_2$ nanorod<br>Ag/$TiO_2$ nanorod | 0.012 mA/cm$^2$<br>0.043 mA/cm$^2$ | 0.1 M $Na_2SO_4$,<br>150 W xenon lamp | Hydrothermal and photodeposition | [3] |
| Fe/$TiO_2$ nanotube<br>Ag/$TiO_2$ nanotube | 0.05 mA/cm$^2$<br>0.23 mA/cm$^2$<br>at 0.6 V vs. Ag/AgCl | 0.1M $Na_2S$ and<br>0.2 M NaOH,<br>100 mW/cm$^2$ | Anodization and electrodeposition | [4] |
| $TiO_2$ nanotube<br>Ag/$TiO_2$ nanotube | 0.011 mA/cm$^2$<br>0.1 mA/cm$^2$<br>at 0 V vs. Ag/AgCl | 0.1M $Na_2S$ and<br>0.2 M NaOH,<br>100 mW/cm$^2$ | Anodization and photodeposition | [5] |
| $TiO_2$ nanoplate<br>Ag/$TiO_2$ nanoplate | 0.07 mA/cm$^2$<br>0.35 mA/cm$^2$<br>at 1.23 V vs. RHE | 0.5 M $Na_2SO_4$,<br>100 mW/cm$^2$ | Hydrothermal and electrodeposition | This study |

**Table S2** The fitting results using the equivalent model for EIS measurements

| Photoanode | R(Ω) | | | CPE (F) | |
|---|---|---|---|---|---|
| | **Rs** | **Rct1** | **Rct2** | **CPE1** | **CPE2** |
| $TiO_2$ | 7.595 | 113.9 | 66.59 | $4.747 \times 10^{-8}$ | $1.579 \times 10^{-7}$ |
| 1m-Ag/$TiO_2$ | 5.078 | 31.06 | 40.54 | $1.912 \times 10^{-7}$ | $3.198 \times 10^{-6}$ |
| 3m-Ag/$TiO_2$ | 3.522 | 29.74 | 35.93 | $2.349 \times 10^{-7}$ | $3.703 \times 10^{-6}$ |
| 5m-Ag/$TiO_2$ | 3.452 | 21.81 | 31.12 | $2.995 \times 10^{-7}$ | $3.822 \times 10^{-6}$ |

## References


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