Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supporting Information

Designing Z-scheme system based on photocatalyst panels towards separated Hydrogen and Oxygen production from Overall Water Splitting

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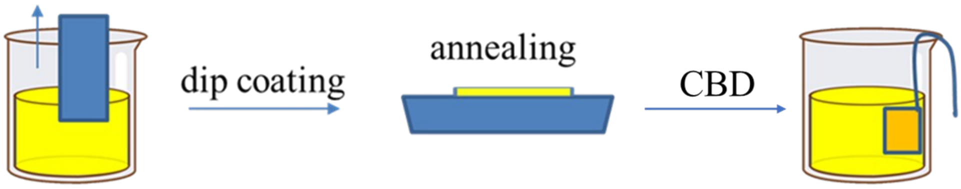

Fig S1. Illustration of synthesis method applied for fabricating $BiVO_4$ panels.

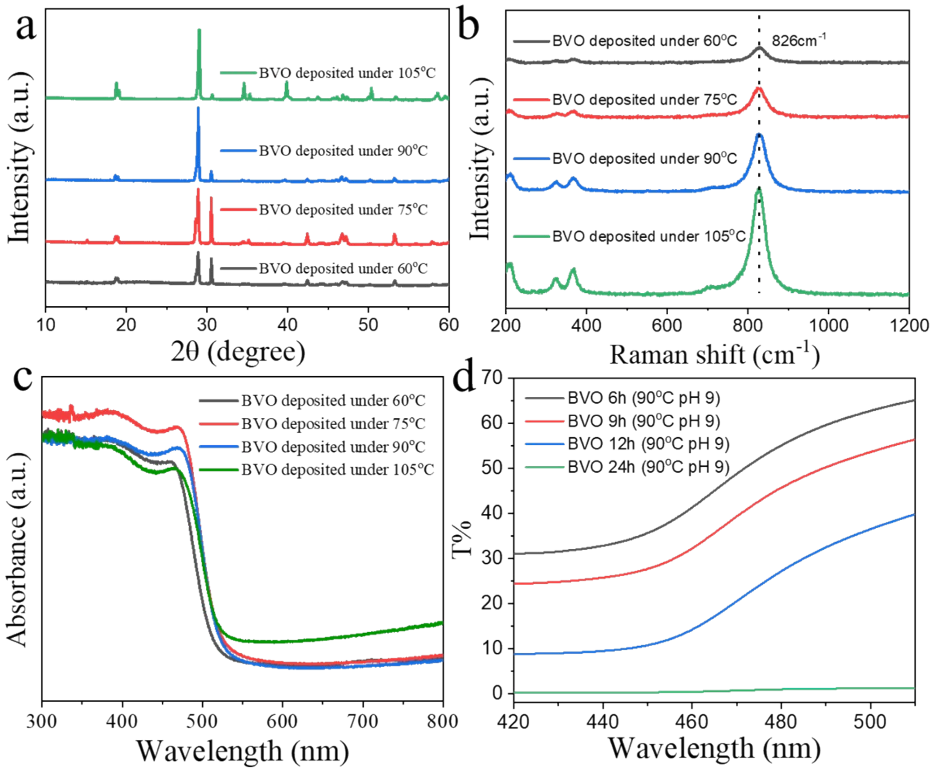

Fig S2. (a) XRD patterns (b) Raman spectra (c) UV-Vis DRS pattern and (d) Visible light transmittance spectra of $BiVO_4$ panels fabricated under different temperature.

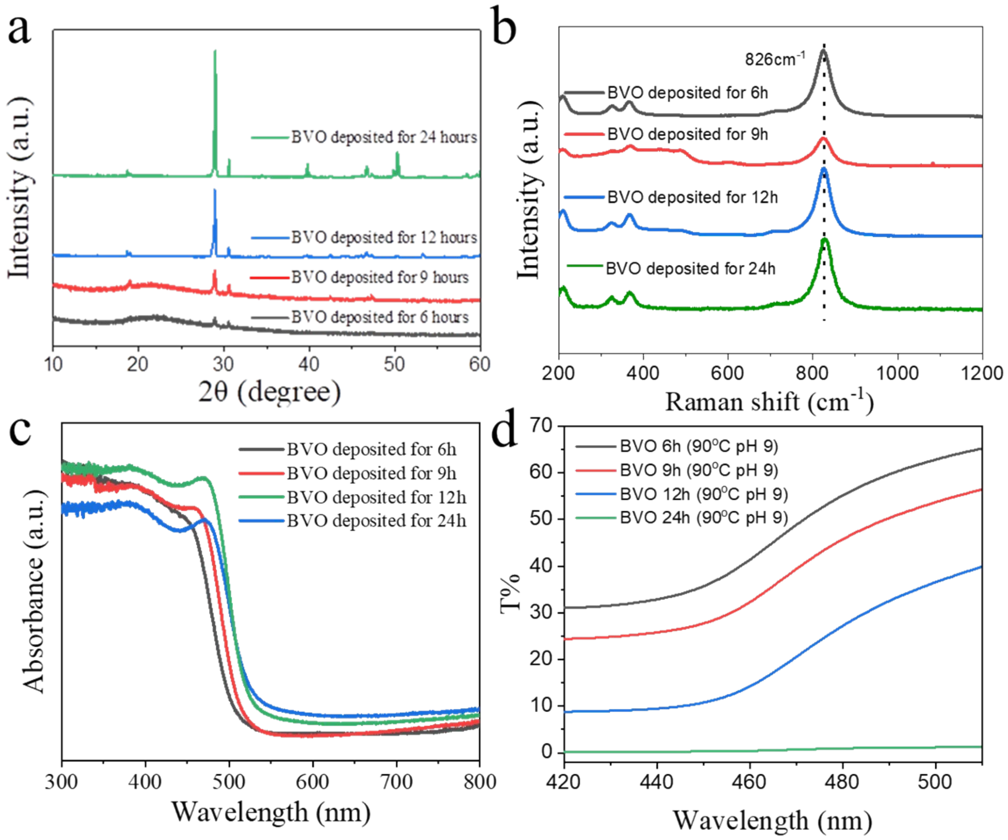

Fig S3. (a) XRD patterns (b) Raman spectra (c) UV-Vis DRS spectra and (d) Visible light transmittance spectra of $BiVO_4$ panels fabricated under different deposition time.

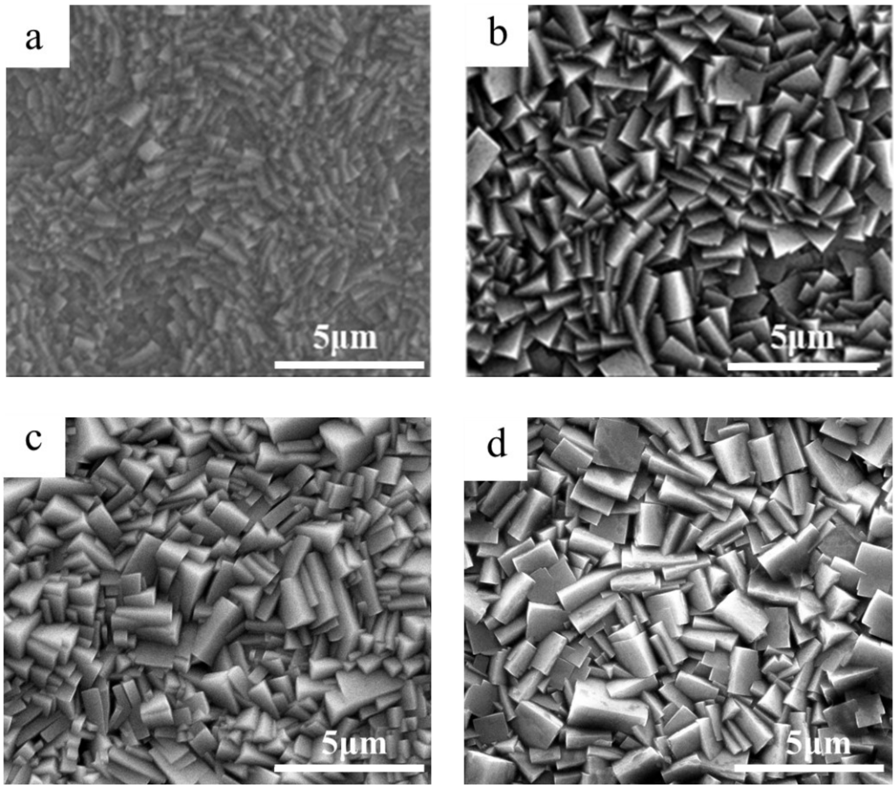

Fig S4. SEM images of the $BiVO_4$ crystals obtained under different deposition temperature: (a) $BiVO_4$-60°C (12h pH 9) (b) $BiVO_4$-75°C (12h pH 9) (c) $BiVO_4$-90°C (12h pH 9) (d) $BiVO_4$-105°C (12h pH 9).

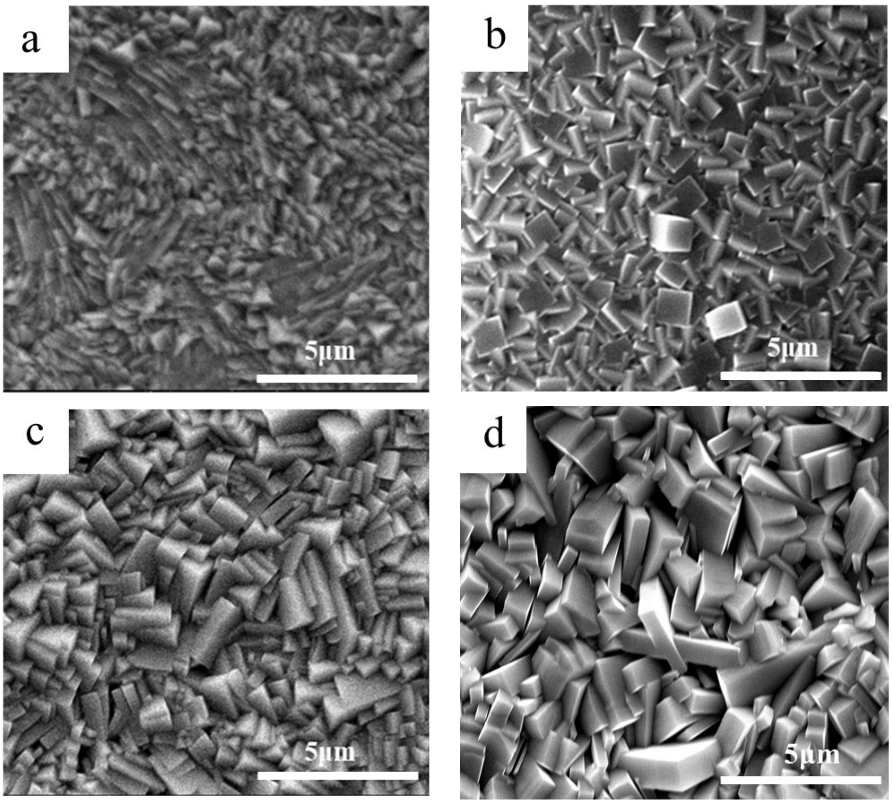

Fig S5. SEM images of the $BiVO_4$ crystals obtained under different deposition time: (a) $BiVO_4$-6h (90^{o}C pH 9) (b) $BiVO_4$-9h (90^{o}C pH 9) (c) $BiVO_4$-12h (90^{o}C pH 9) (d) $BiVO_4$-24h (90^{o}C pH 9).

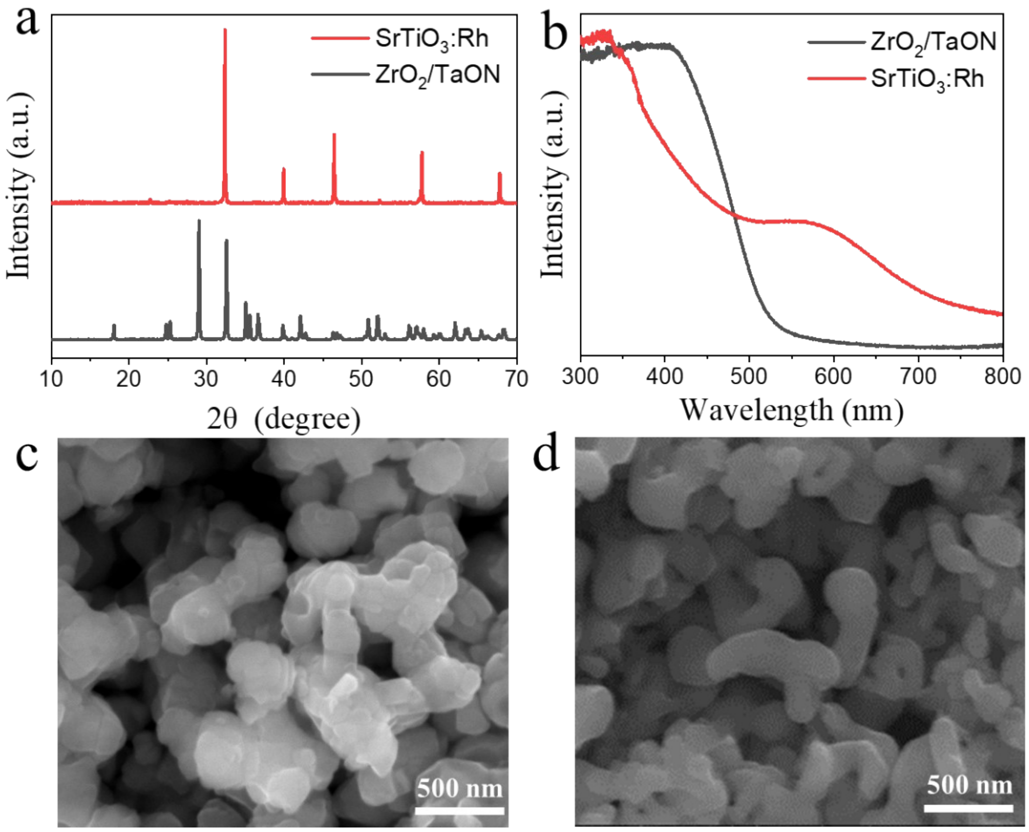

Fig S6. (a, b) XRD patterns and UV-Vis DRS of $SrTiO_3$: Rh and ZrO_2/TaON panel (c, d) SEM images of $SrTiO_3$: Rh and ZrO_2/TaON particles.

Table S1. H_2 evolution rate of HEPPs

Sample	H_2 evolution rate (μmol/h)
Ru-$SrTiO_3$: Rh panel	**18**
$Rh_{2-y}Cr_yO_3$-ZrO_2/TaON panel	**16.7**

Reaction condition: Area of panel, 4*4 cm^2; 100 mL solution containing 5 mM Fe^{2+} or $[Fe(CN)_6]^{4-}$ ions, 300 W Xenon lamp (λ>420 nm), temperature 288 K.

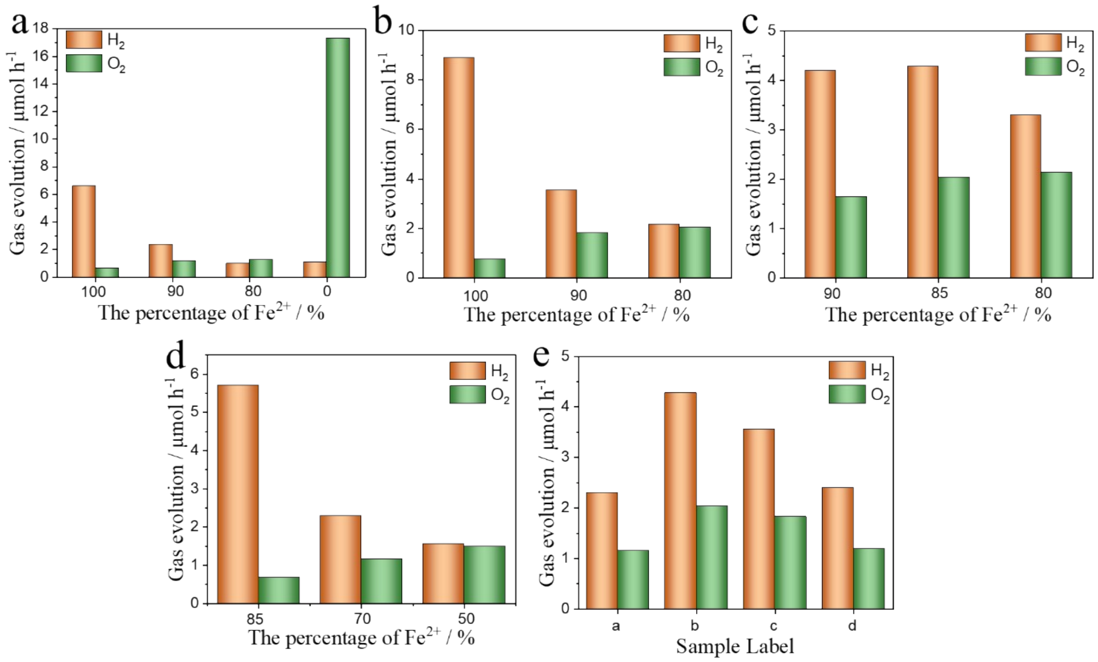

Fig S7. Overall water splitting activities dependent on the percentage of Fe^{2+} using different $BiVO_4$ panel (a) Au/CoO_x-$BiVO_4$-pH 9 (12h 90°C) (b) Au/CoO_x-$BiVO_4$-pH 8.5 (12h 90°C) (c) Au/CoO_x-$BiVO_4$-pH 8 (12h 90°C) (d) Au/CoO_x-$BiVO_4$-pH 7.5 (12h 90°C) (e) OWS activities dependent on various $BiVO_4$ panels.

a: Au/CoO_x-$BiVO_4$-pH 7.5 (12h 90°C) b: Au/CoO_x-$BiVO_4$-pH 8 (12h 90°C) c: Au/CoO_x-$BiVO_4$-pH 8.5 (12h 90°C) d: Au/CoO_x-$BiVO_4$-pH 9 (12h 90°C)

Reaction conditions: Area of panel, 4*4 cm^2; 100 mL solution containing a certain amount of redox shuttle ions, 300 W Xenon lamp (λ>420 nm), temperature 288 K, pH=2.4.

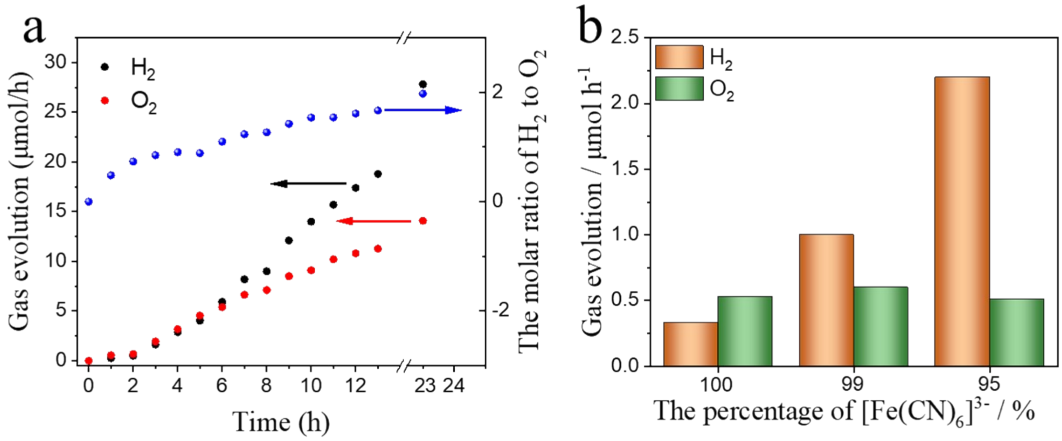

Fig S8. (a) Time course of overall water splitting activity on Au/CoO_x-$BiVO_4$- [Fe $(CN)_6]^{3-/4-}$-$Rh_yCr_{2-y}O_3$-ZrO_2/TaON system via the typical measurement (b) Overall water splitting activities dependent on the percentage of [Fe $(CN)_6]^{3-}$ on Au/CoO_x-$BiVO_4$- [Fe $(CN)_6]^{3-/4-}$-$Rh_yCr_{2-y}O_3$-ZrO_2/TaON system.

Reaction conditions: Area of panel, 4*4 cm^2; 100 mL solution containing a certain amount of redox shuttle ions, 300 W Xenon lamp (λ>420 nm), temperature 288 K