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 BiVO₄ crystals obtained under different deposition temperature: (a) BiVO₄-60°C (12h pH 9) (b) BiVO₄-75°C (12h pH 9) (c) BiVO₄-90°C (12h pH 9) (d) BiVO₄-105°C (12h pH 9).
Fig S5. SEM images of the BiVO$_4$ crystals obtained under different deposition time: (a) BiVO$_4$-6h (90°C pH 9) (b) BiVO$_4$-9h (90°C pH 9) (c) BiVO$_4$-12h (90°C pH 9) (d) BiVO$_4$-24h (90°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

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<tr>
<th>Sample</th>
<th>H$_2$ evolution rate (μmol/h)</th>
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<tr>
<td>Ru-SrTiO$_3$: Rh panel</td>
<td>18</td>
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<tr>
<td>Rh$_{2-y}$Cr$_y$O$_3$-ZrO$_2$/TaON panel</td>
<td>16.7</td>
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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$_y$Cr$_{2-y}$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$_y$Cr$_{2-y}$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 ($\lambda$$>$420 nm), temperature 288 K