ARTICLE

# Support Information

## $FeVO_4$ nanowires for efficient photocatalytic $CO_2$ reduction

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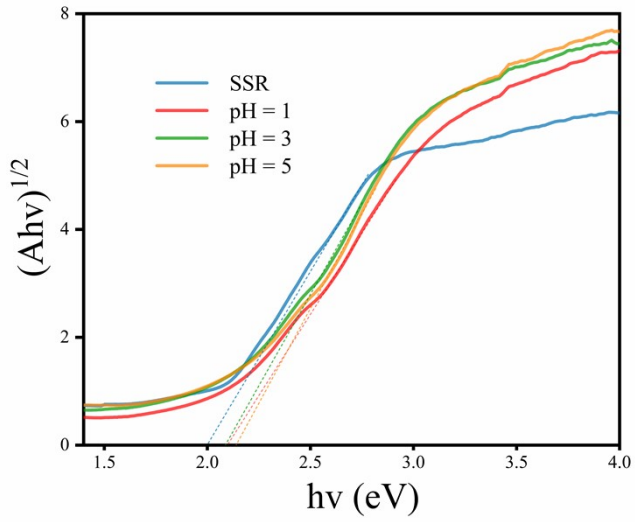


**Figure S1**. Tauc plot of $FeVO_4$

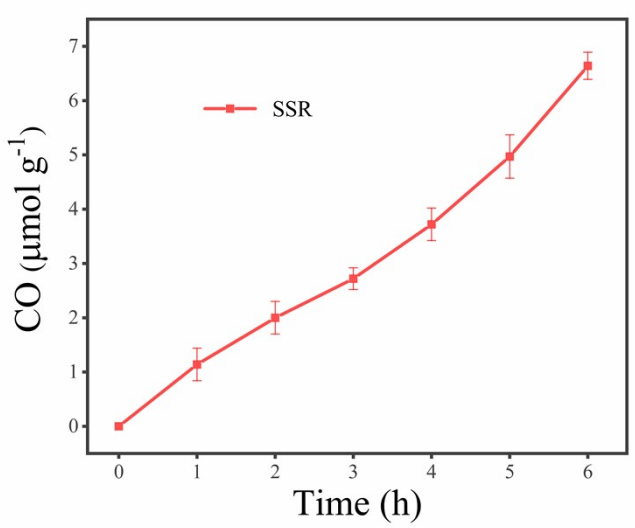


**Figure S2**. Photocatalytic CO production over $FeVO_4$ samples prepared by solid-state reaction as a function of light irradiation times.

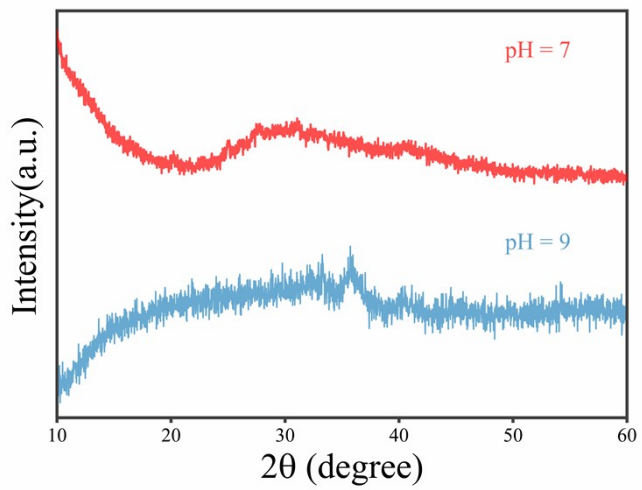


**Figure S3**. XRD patterns of $FeVO_4$ sample prepared by hydrothermal synthesis with pH = 7 and pH = 9.

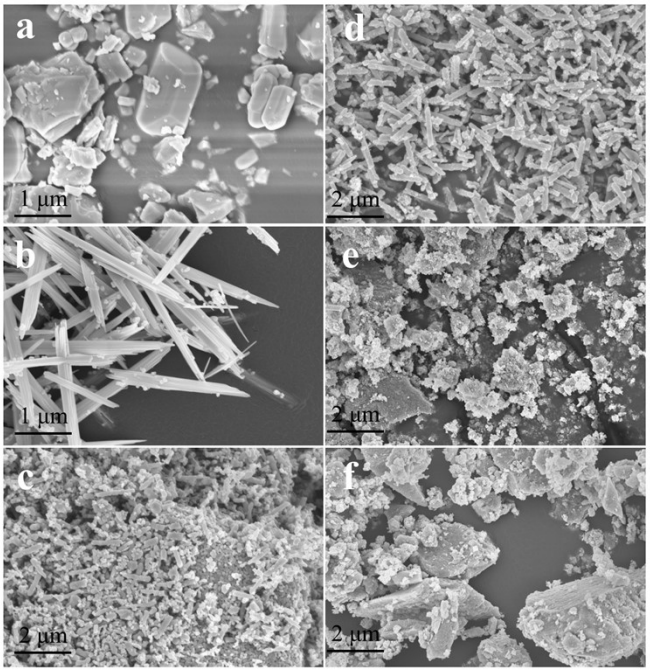


**Figure S**4. SEM images of $FeVO_4$ samples synthesized by solid state reaction (a) and hydrothermal synthesis with pH = 1(b), 3(c), 5(d), 7(e), 9(f).

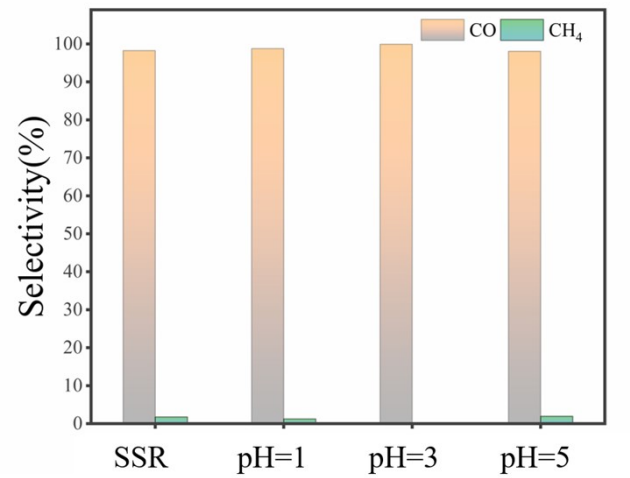


**Figure S5**. Product selectivity of photocatalytic $CO_2$ reduction over various $FeVO_4$ samples.

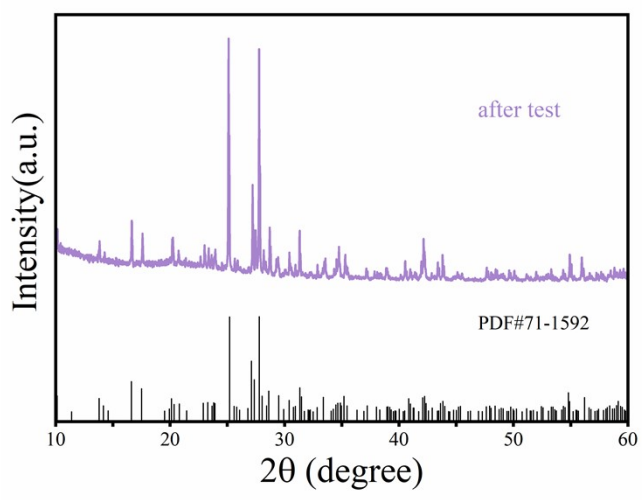


**Figure S6**. XRD patterns of $FeVO_4$ nanowires after the test.

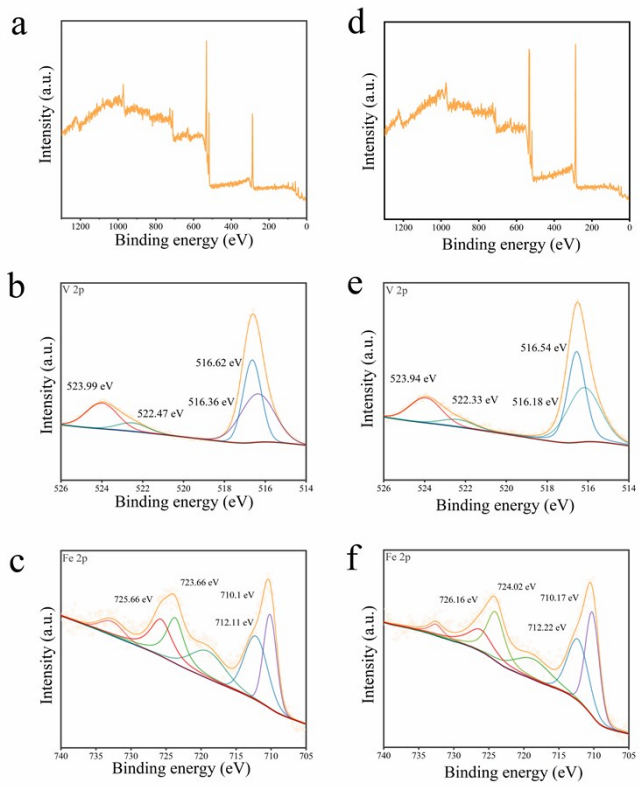


**Figure S7**. (a) XPS spectra of $FeVO_4$ particles. (b) V 2p XPS spectra of $FeVO_4$ particles. (c) Fe 2p XPS spectra of $FeVO_4$ particles. (d) XPS spectra of $FeVO_4$ nanowires. (e) V 2p XPS spectra of $FeVO_4$ nanowires. (f) Fe 2p XPS spectra of $FeVO_4$ nanowires.

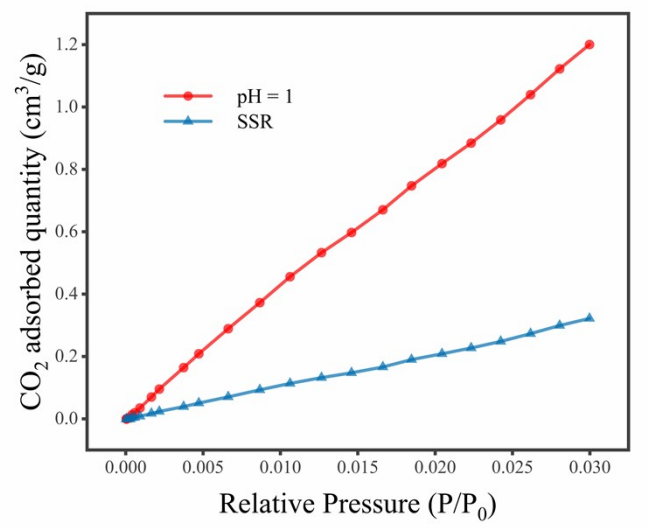


**Figure S8.** $CO_2$ adsorption isotherms of $FeVO_4$ nanowires (pH=1) and $FeVO_4$ particles (SSR).

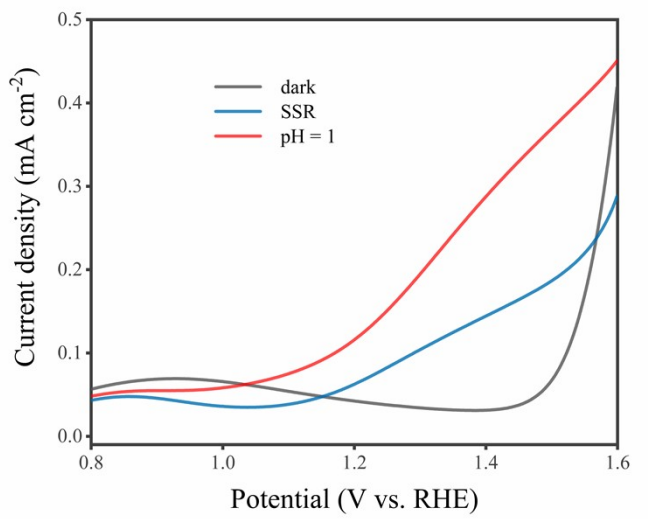


**Figure S9** Current-potential curves of the $FeVO_4$ particle-assembled films measured in 1 M NaOH aqueous solution under xenon illumination (100 mW $cm^{-2}$)

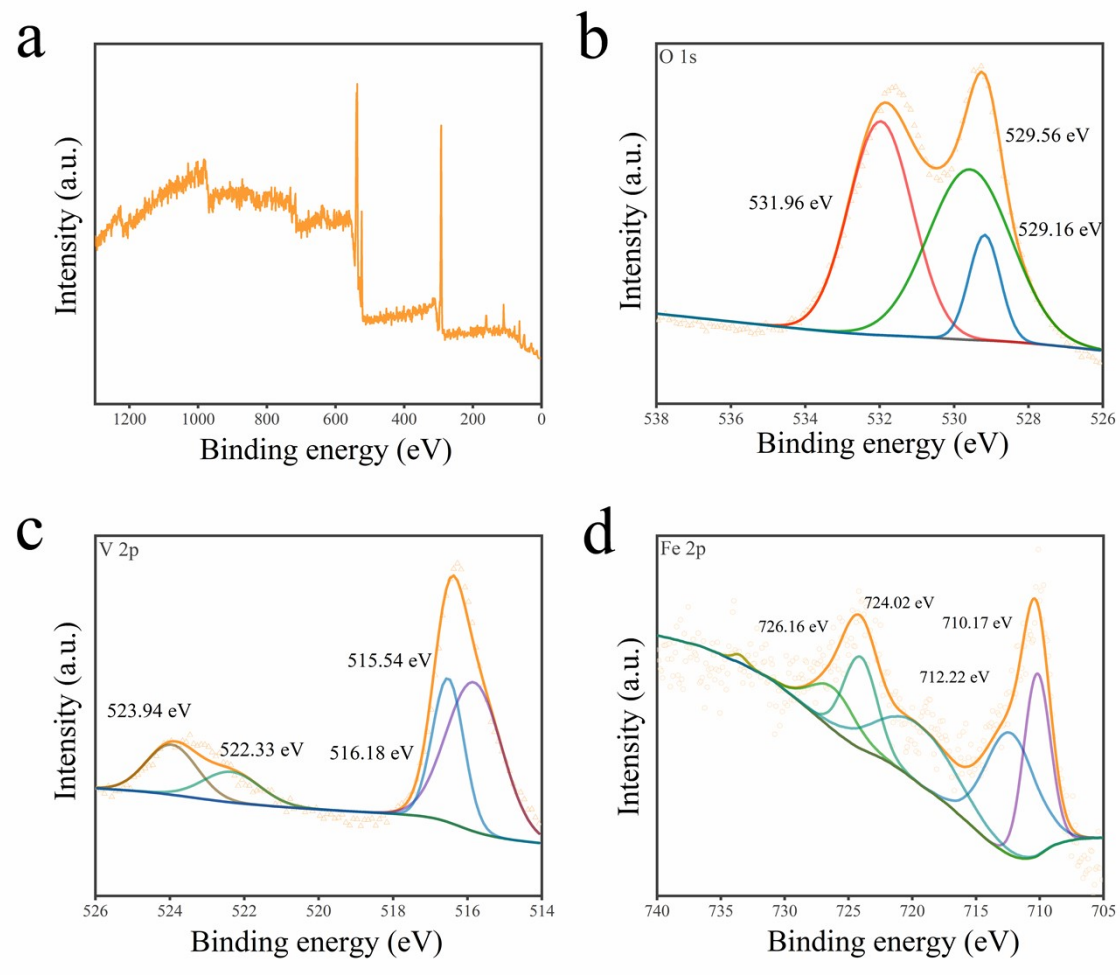


**Figure S10** (a) XPS spectra of $FeVO_4$ nanowires after the test. (b) O 1s, (c) V 2p, and (d) Fe 2p XPS spectra of $FeVO_4$ nanowires after the test.

Table S1 Fluorescence emission decay parameters of the $FeVO_4$ particles and nanowires (pH =1).

| $R(t) = B_1e^{(-1/\tau1)} + B_2e^{(-1/\tau2)}$ | | | | | |
|---|---|---|---|---|---|
| Sample | $\tau_1$(ns) | $B_1$(%) | $\tau_2$(ns) | $B_2$(%) | Ave. $\tau$(ns) |
| SSR | 1.22 | 97.35 | 8.31 | 2.65 | 1.41 |
| pH = 1 | 1.51 | 0.27 | 32.81 | 99.73 | 32.78 |