Supporting Information

Conformal coating of superhydrophilic nickel iron phytic acid complex to boost $BiVO_4$ photoanode solar water oxidation

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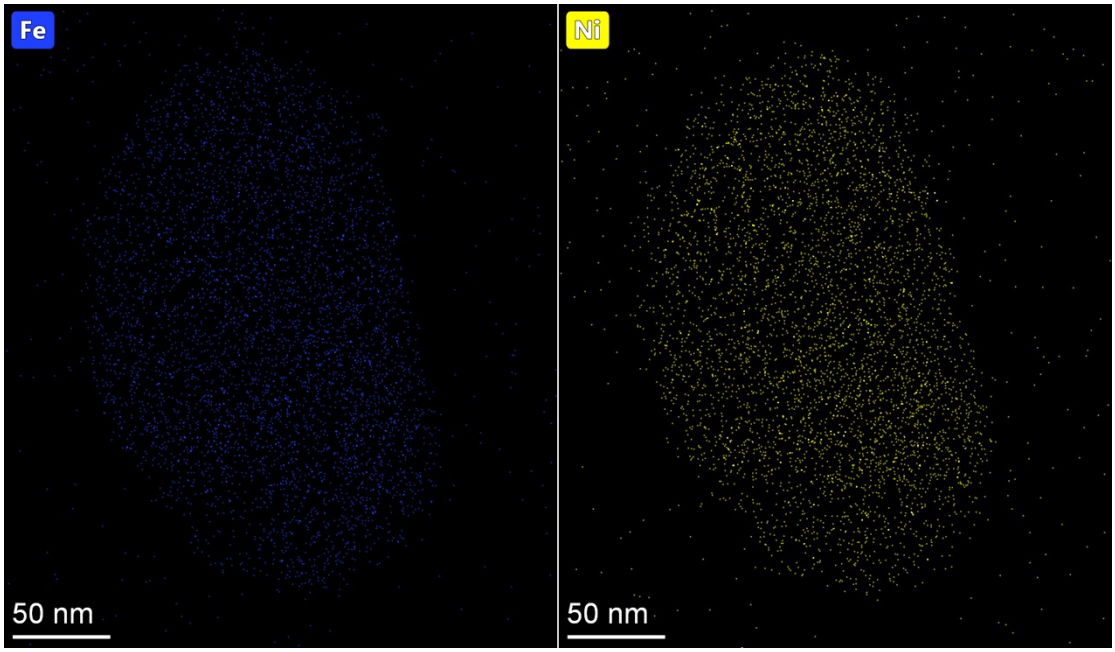

Fig. S1. The enlarged mapping images of the Fe and Ni in $BiVO_4$@PA-NiFe photoanode.

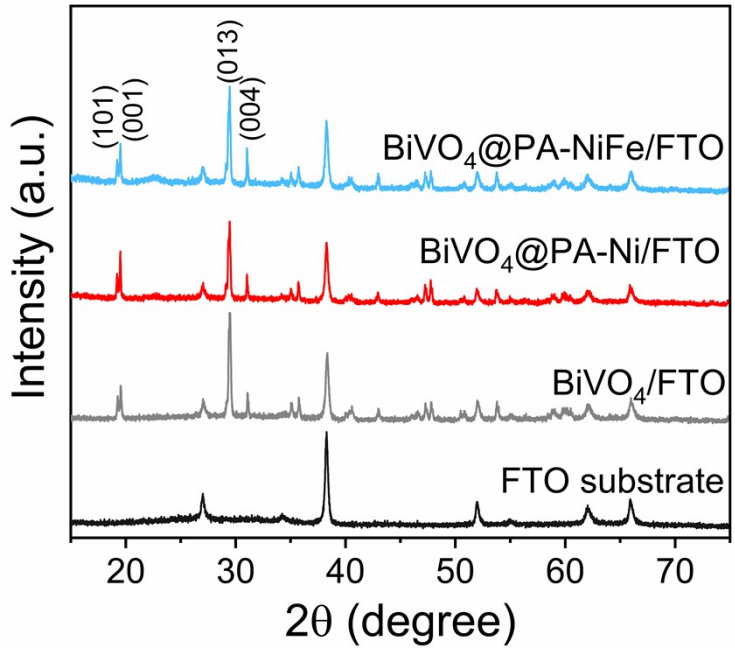

Fig. S2. The XRD patterns of the FTO substrate, $BiVO_4$, $BiVO_4$@PA-Ni and $BiVO_4$@PA-NiFe photoanode.

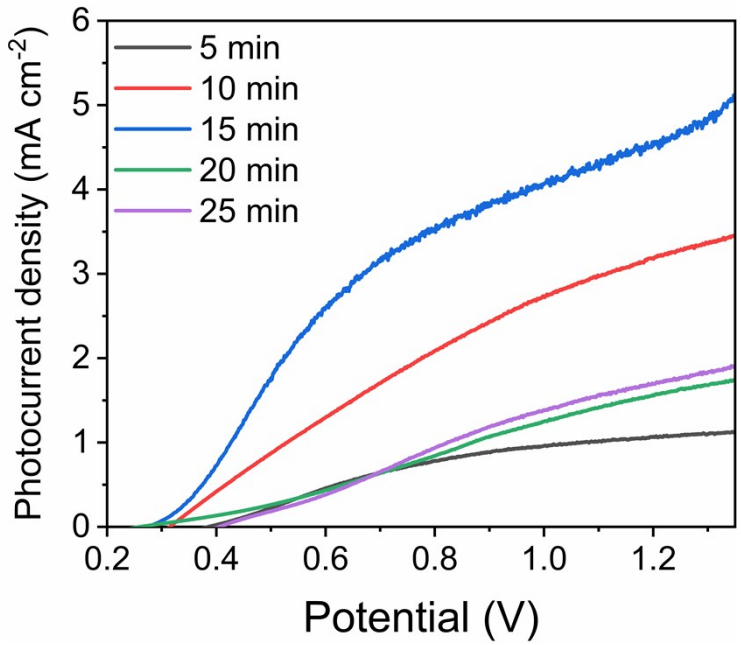

Fig S3. The LSV curves of the $BiVO_4$@PA-NiFe photoanodes with the varying soaking times ranging from 5 – 25 min.

Table S1. The photocurrent density of the $BiVO_4$@PA-NiFe compared with the previously reported photoanodes.

Photoelectrode	Photocurrent density (mA cm^{-2}) at 1.23 V_{RHE}	Ref.
FeOOH/rGO/$BiVO_4$ Photoanode	3.25	1
Hierarchical mesoporous SnO_2/$BiVO_4$ photoanode	3.98	2
Conformal $BiVO_4$/WO_3 nanobowl array photoanode	3.05	3
Ni-Doped $BiVO_4$ photoanode	3.02	4
Ni_3B/$BiVO_4$ photoelectrode	1.47	5
WCoFe oxyhydroxide /$BiVO_4$ photoanode	4.35	6
$BiVO_4$/N:NiFeOx photoanodes	6.4	7
$BiVO_4$/NiO/rGO photoanode	1.52	8
Ni-NDAD/$BiVO_4$ photoelectrodes	5.6	9
Sb_2S_3-modified $BiVO_4$ photoanode	1.1	10
$BiVO_4$-Ni/Co_3O_4 photoanode	2.23	11
NiOOH/$BiVO_4$ photoanode	1.2	12
$BiVO_4$/In/FeNi photoanode	4.0	13
FeOOH/In-$BiVO_4$(L) photoanode	5.02	14
g-C_3N_4/ThO_2@$BiVO_4$ heterojunction photoanode	0.45	15

CoNi-MOFs/$BiVO_4$ photoanode	3.2	[16]
$Co_2P_2O_7$/$BiVO_4$ composite photoanode	3.93	[17]
Zr-CoF_2/ $BiVO_4$ photoanode	3.6	[18]
p-n heterostructured $BiVO_4$/g-C_3N_4 Photoanode	4.63	[19]
Ternary NiFePB-modified ZnO/$BiVO_4$ heterojunction photoanode	1.66	[20]
$BiVO_4$@PA-NiFe photoanode	4.58	This work

A pivotal metric in evaluating the efficiency of photoelectrochemical (PEC) water splitting is the photocurrent density, specifically at a potential of 1.23 V_{RHE}. To highlight advancements in this field, we have systematically compiled data on the progress achieved with representative $BiVO_4$-based photoelectrodes in PEC water splitting, as reported over the past five years. The aforementioned findings unambiguously indicate that the $BiVO_4$@PA-NiFe photoanode exhibits performance that is distinctly superior, positioning it in a relatively advanced state compared to its counterparts.

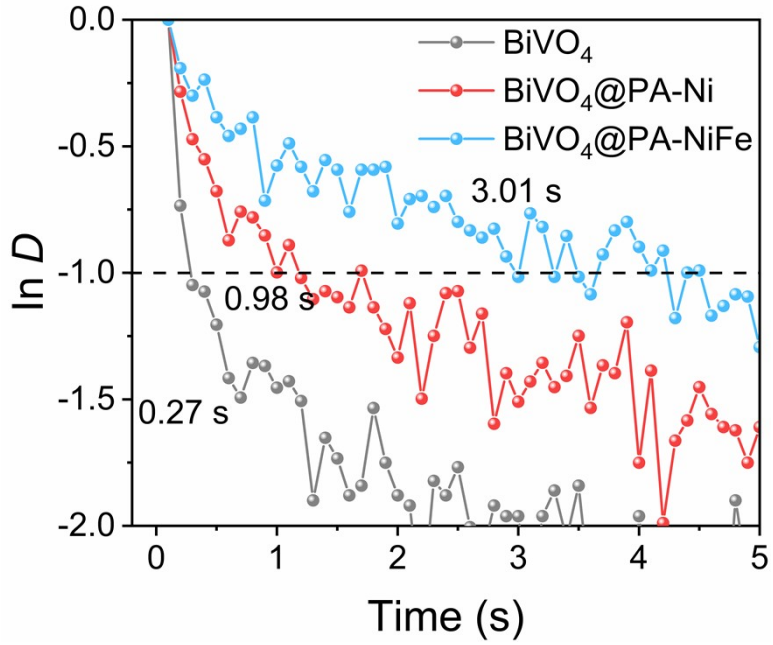

Fig. S4. Normalized transient current–time plots of the pristine $BiVO_4$, $BiVO_4$@PA-Ni and $BiVO_4$@PA-NiFe photoanode.

Transient decay time τ via a logarithmic plot of the parameter D, given by the equation:

$$D = (I_t - I_{st})/(I_{in} - I_{st})$$

where I_t, I_{st} and I_{in} are the photocurrent at time t(s), steady-state photocurrent and initial current, respectively.

The transient time constant (τ) is defined as the time at which ln D = -1.

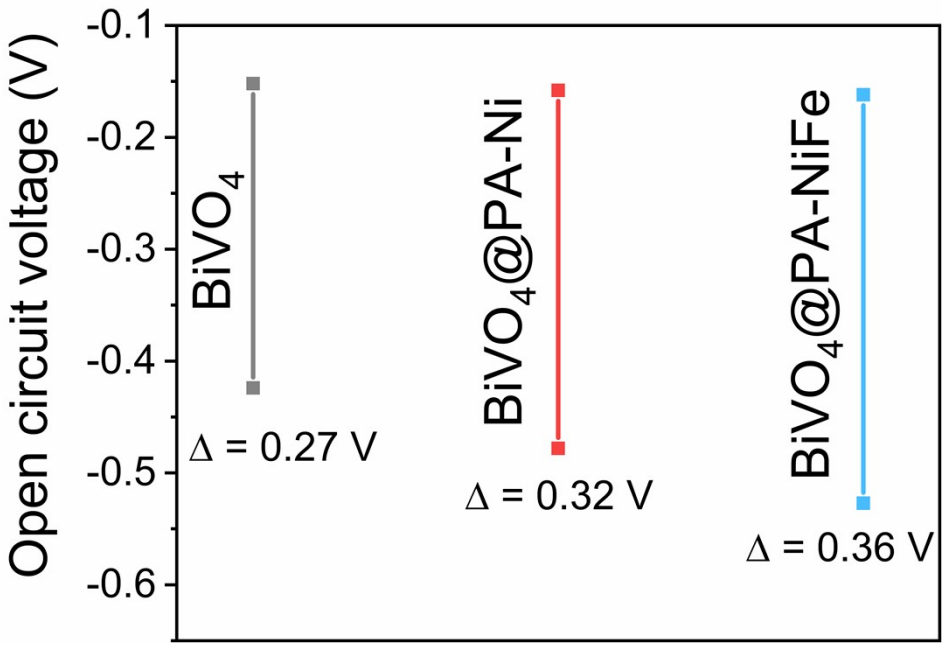

Fig. S5. The open circuit voltages of the $BiVO_4$, $BiVO_4$@PA-Ni and $BiVO_4$@PA-NiFe photoanode.

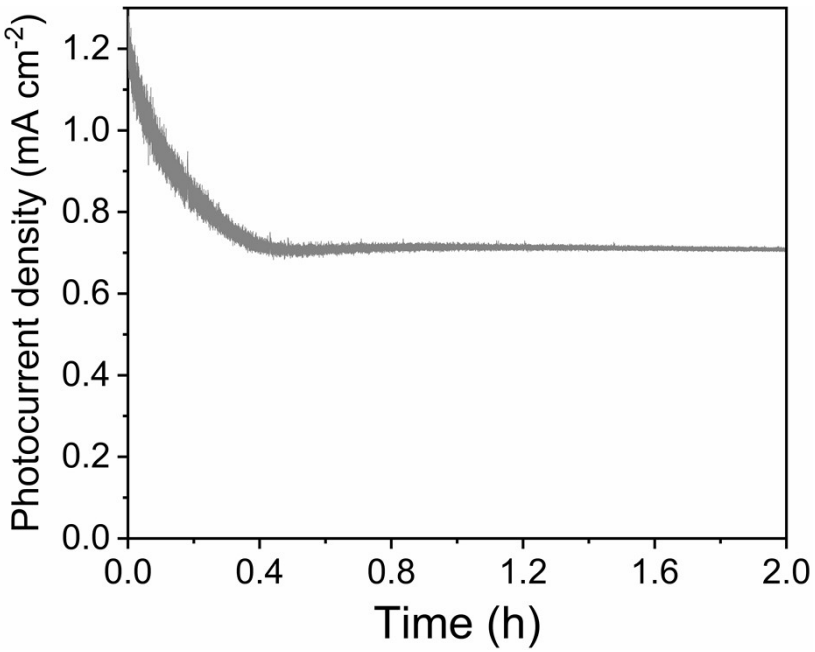

Fig. S6. The stability test of the pristine $BiVO_4$ photoanode.

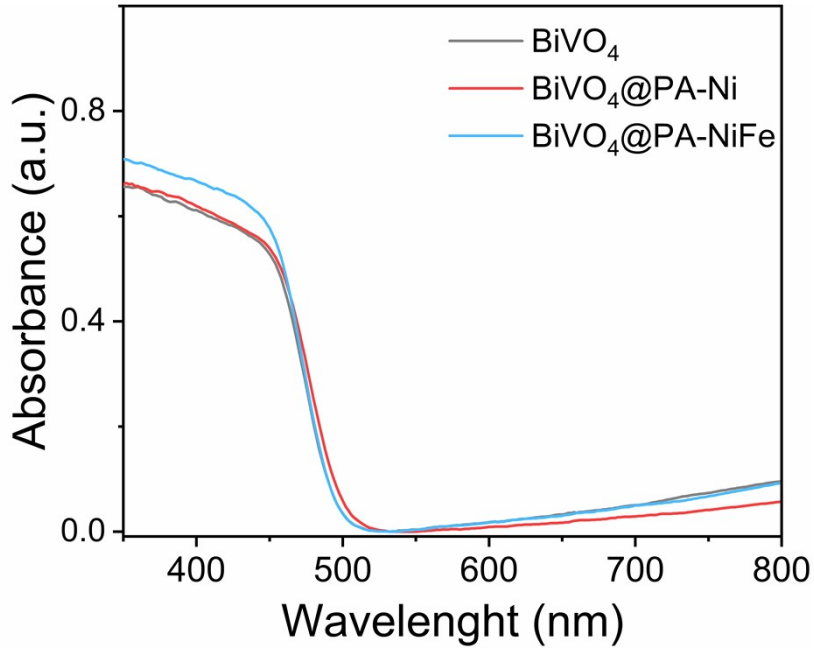

Fig. S7. The light absorption curve of the pristine $BiVO_4$, $BiVO_4$@PA-Ni, $BiVO_4$@PA-NiFe photoanode.

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