Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting Information

InN Nanorods/Ni(OH)$_2$ Heterojunction Photoelectrode for Efficient PEC Water splitting

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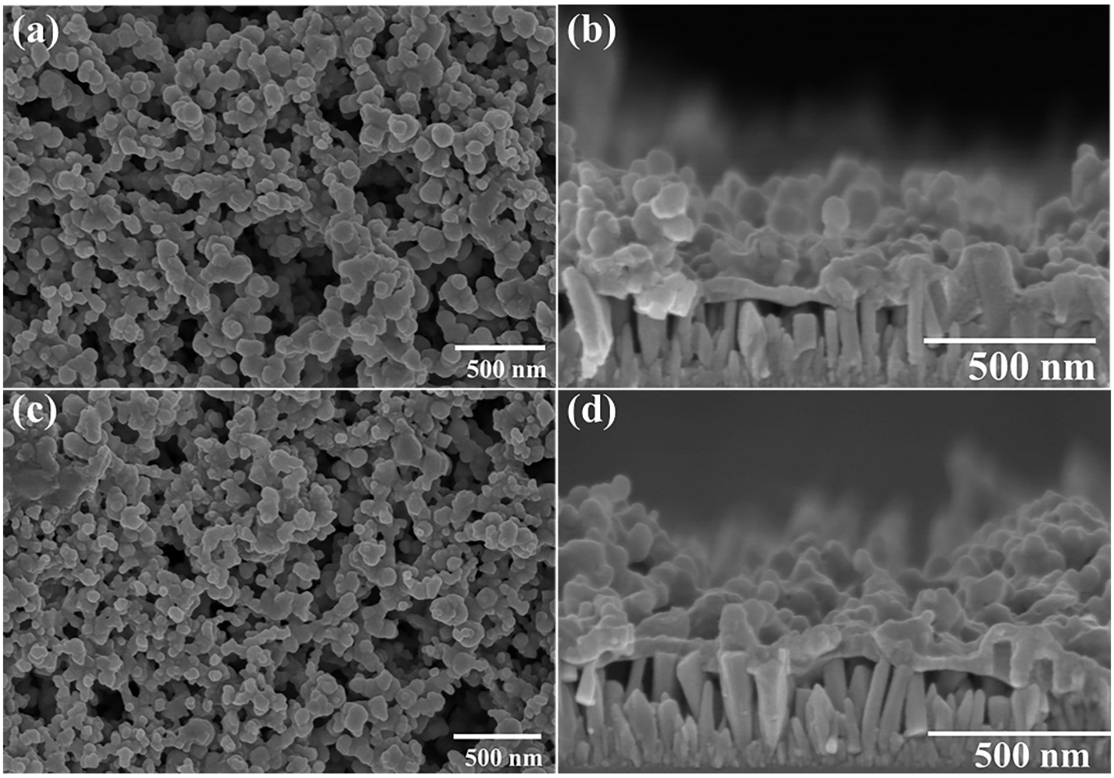

Fig. S1 (a) SEM top-view and (b) cross-sectional images of the InN/Ni$(OH)_2$-60. (c) SEM top-view and (d) cross-sectional images of the InN/Ni$(OH)_2$-180.

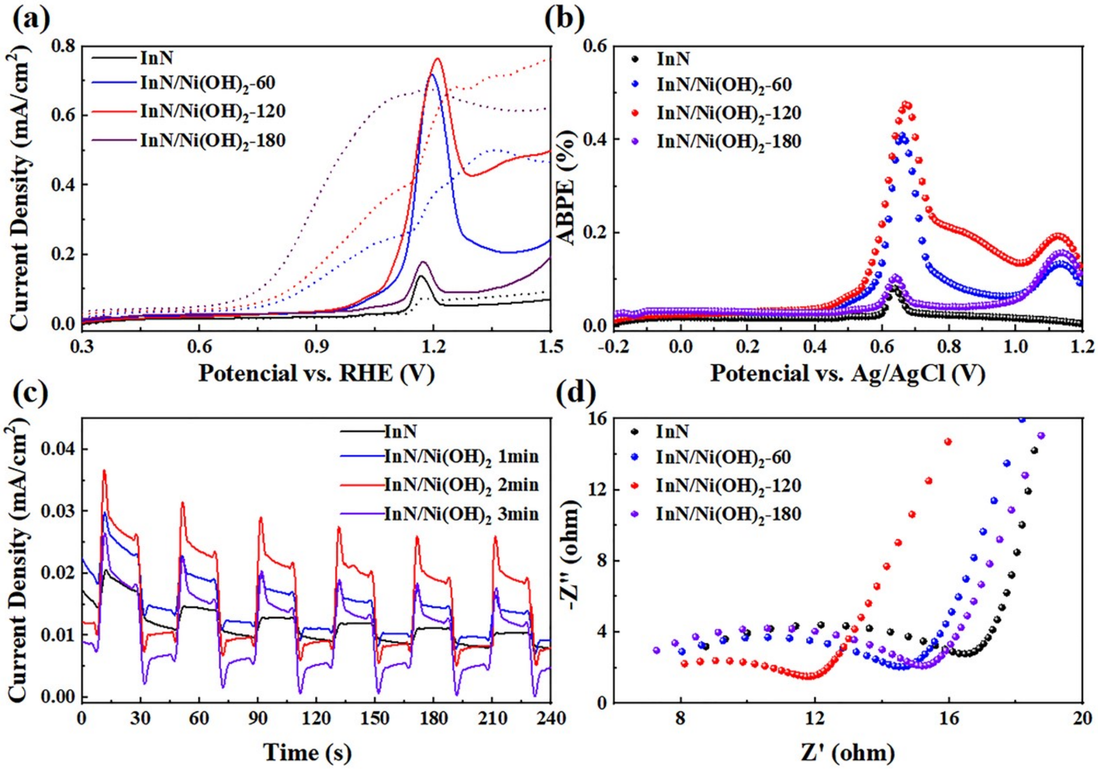

Fig. S2 In the 0.1 M Na_2PO_4 solution with pH = 9, PEC properties of InN and InN/$Ni(OH)_2$ photoelectrodes. (a) LSV curves, (b) ABPE curves of all photoelectrodes, (c) I-T curves, (d) EIS spectra of all photoelectrodes at 0.72 V vs. RHE.

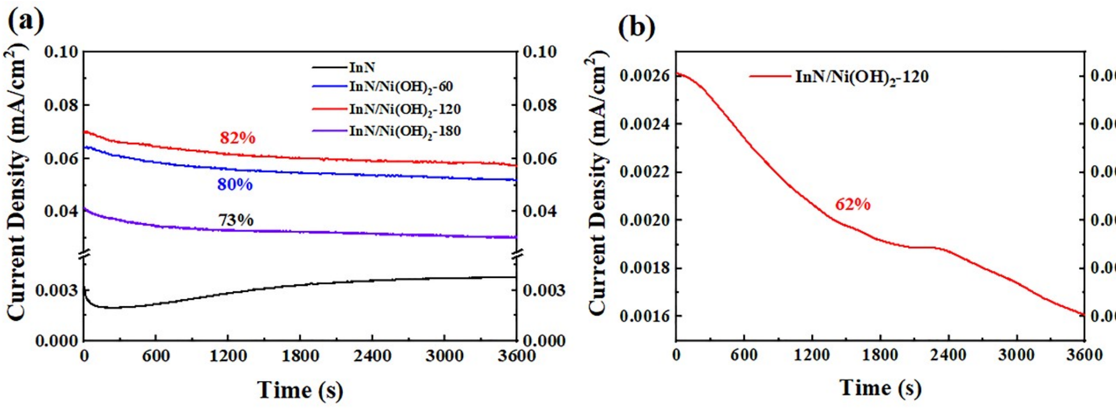

Fig. S3 (a) The stability of InN NRs and InN/$Ni(OH)_2$ photoelectrode (pH = 13), (b) the stability of InN/$Ni(OH)_2$-120 photoelectrode (pH = 9).

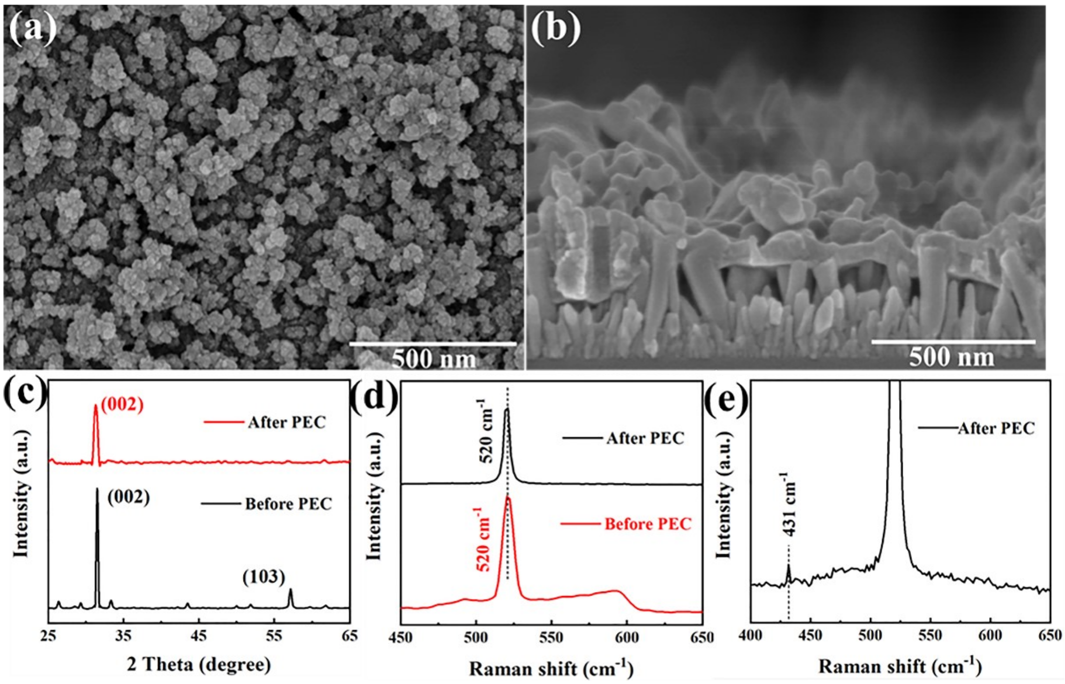

Fig. S4 (a) SEM top-view and (b) cross-sectional images of the InN/Ni(OH)$_2$-120 after PEC test, (c)-(d)XRD patterns and (e) Raman spectra of the InN/Ni(OH)$_2$-120 after PEC test.

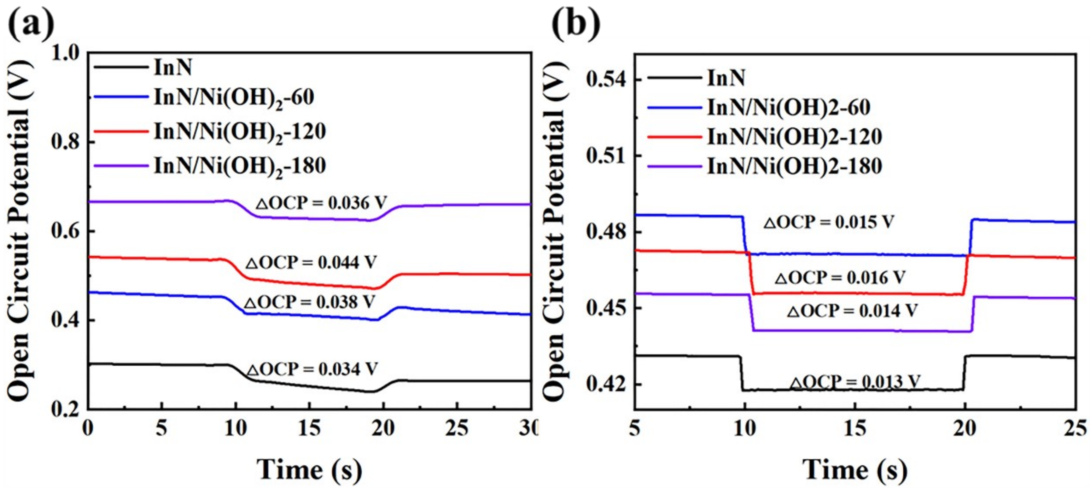

Fig. S5 (a) OCP of the all photoelectrode samples (pH = 13), (b) OCP of the all photoelectrode samples (pH = 9).

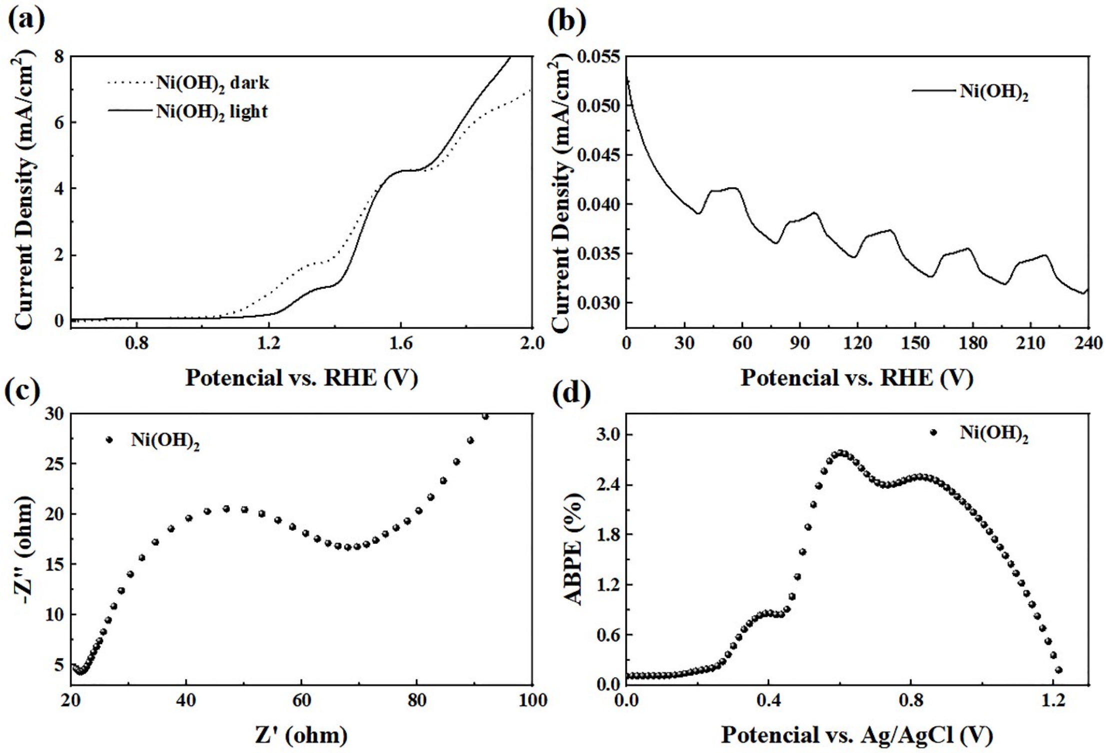

Fig. S6 PEC properties of pure $Ni(OH)_2$ (pH = 13).

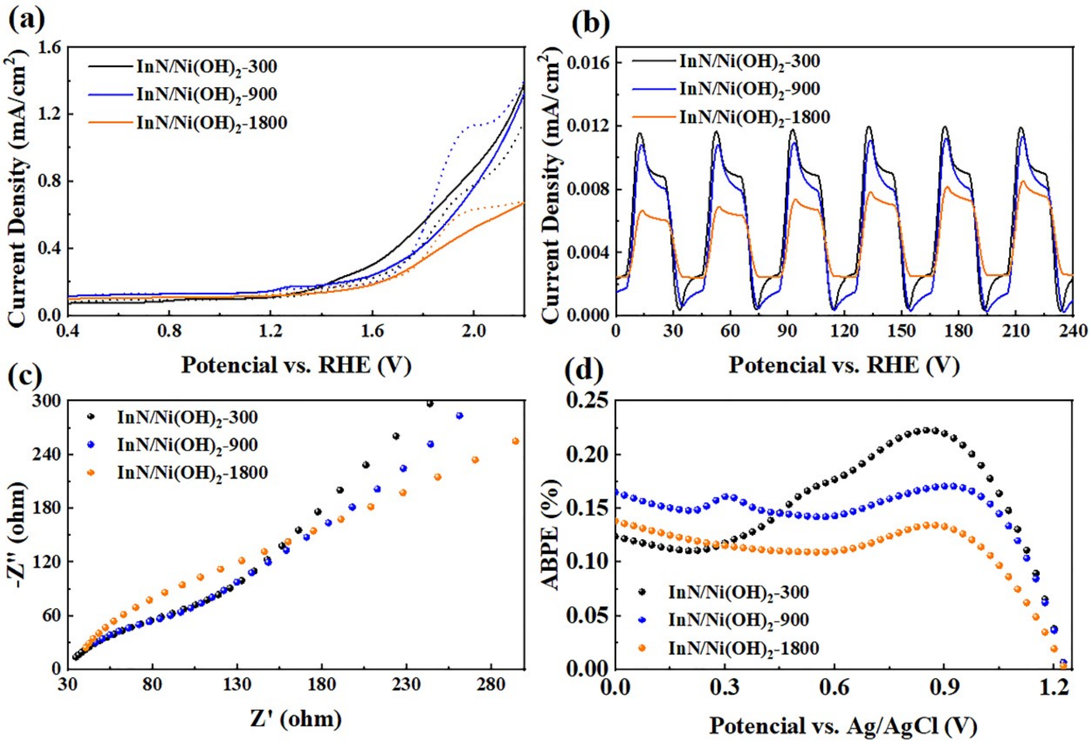

Fig. S7 PEC properties of InN and InN/Ni$(OH)_2$ photoelectrodes prepared by immersing method.

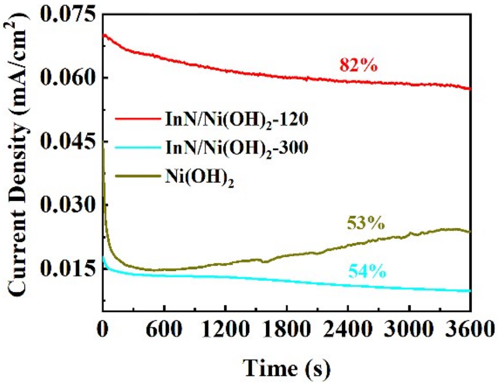

Fig. S8 The stability of InN/Ni(OH)$_2$-120 prepared by electrodepositing method, InN/Ni(OH)$_2$-300 prepared by immersing method and pure Ni(OH)$_2$ (pH = 13).

Table 1. Summary of the PEC performance of InN-based and $Ni(OH)_2$-based photoanodes under illumination of 100 mW cm^{-2} (AM 1.5 G).

PEC photoanode	Conditions	Photocurrent density	Reference
InN NRs/$Ni(OH)_2$	**0.1 M NaOH**	**4.43 mA cm^{-2} at 1.47 V vs. RHE**	**This work**
InN/Si	**1 M NaOH**	**0.06 mA cm^{-2} at 1.2 V vs. RHE**	**Ref. [1]**
In_2O_3/InN	**0.1 M PBS**	**0.795 mA cm^{-2} at 1 V vs. Ag/AgCl**	**Ref. [2]**
InN/ZnO	**0.1 M Na_2SO_4**	**0.017 mA cm^{-2} at 1.4 V vs. RHE**	**Ref. [3]**
ZnO: InN	**0.5 M Na_2SO_4**	**0.015 mA cm^{-2} at 1 V vs. Ag/AgCl**	**Ref. [4]**
$Ni(OH)_2$/ZnO	**0.5 M Na_2SO_4**	**1.68 mA cm^{-2} at 1.25 V vs. Ag/AgCl**	**Ref. [5]**
TiO2/$Ni(OH)_2$	**1 M NaOH**	**3.5 mA cm^{-2} at 1.0 V vs. SCE**	**Ref. [6]**
TNTAs/Ni–$Ni(OH)_2$/NiPi	**0.5 M Na_2SO_4**	**3.12 mA cm^{-2} at 1.5 V vs. RHE**	**Ref. [7]**
ZnO/$Ni(OH)_2$	**0.5 M Na_2SO_4**	**3.75 mA cm^{-2} at 1.5 V vs. SCE**	**Ref. [8]**

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