

## Supporting Information

**Enhanced stability and ultrahigh activity of amorphous ripple nanostructured Ni-doped Fe oxyhydroxide electrode toward synergetic electrocatalytic water splitting**

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**Figure S1. FESEM –EDS image of Ni@Fe-NP. A) FESEM; B) Fe, C) O; D) Ni; E) overlap of Fe, Ni and OEDS signals and F) EDS spectrum.**

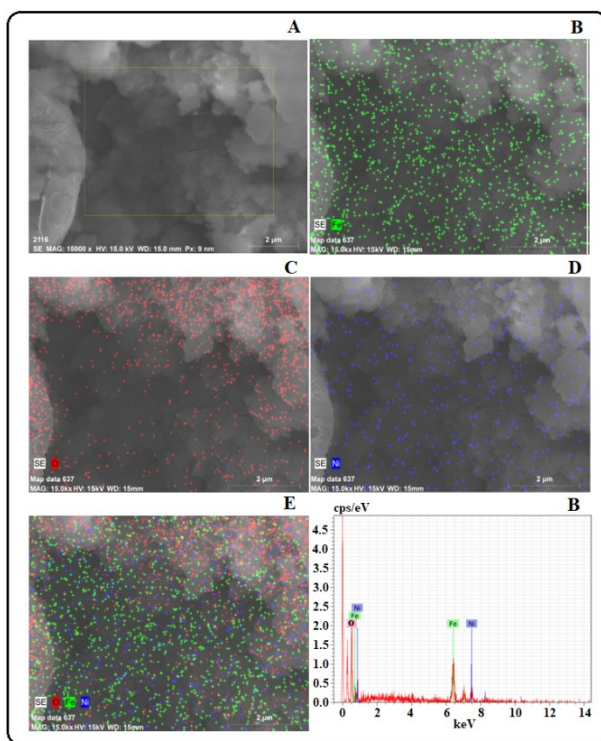
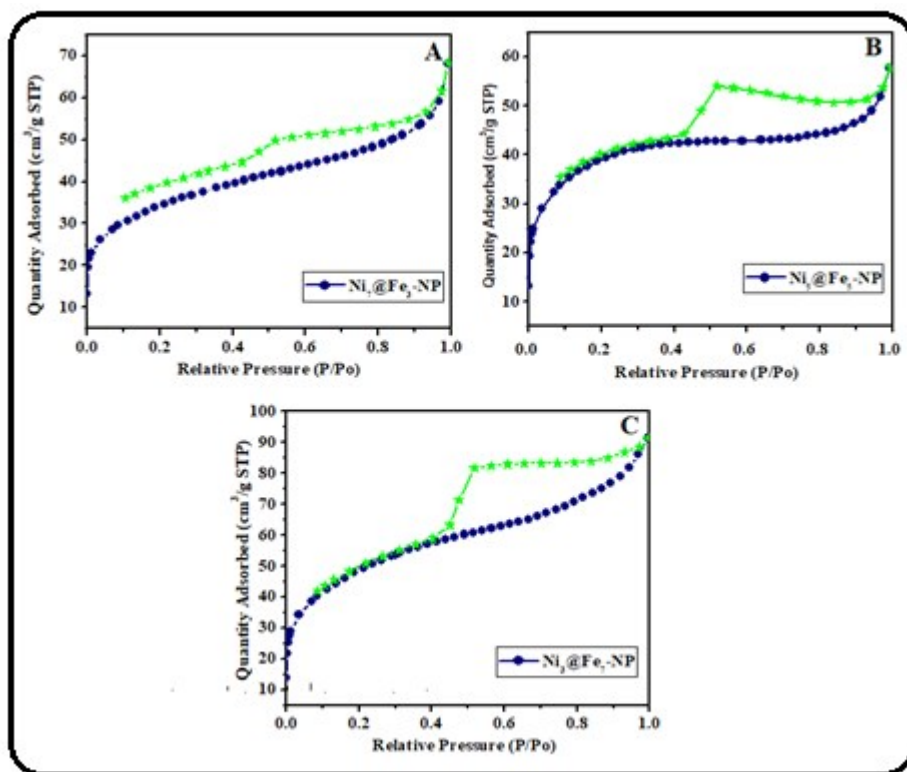


Figure S2. BET Specific surface area characterization of A) Ni<sub>7</sub>@Fe<sub>3</sub>-NP; B) Ni<sub>5</sub>@Fe<sub>5</sub>-NP; C) Ni<sub>3</sub>@Fe<sub>7</sub>-NP.



FigureS3. A) EDS-HAADF elemental image; B) EDS line scanning analysis spectra and C) Elemental analysis spectra of Ni@Fe-NP.

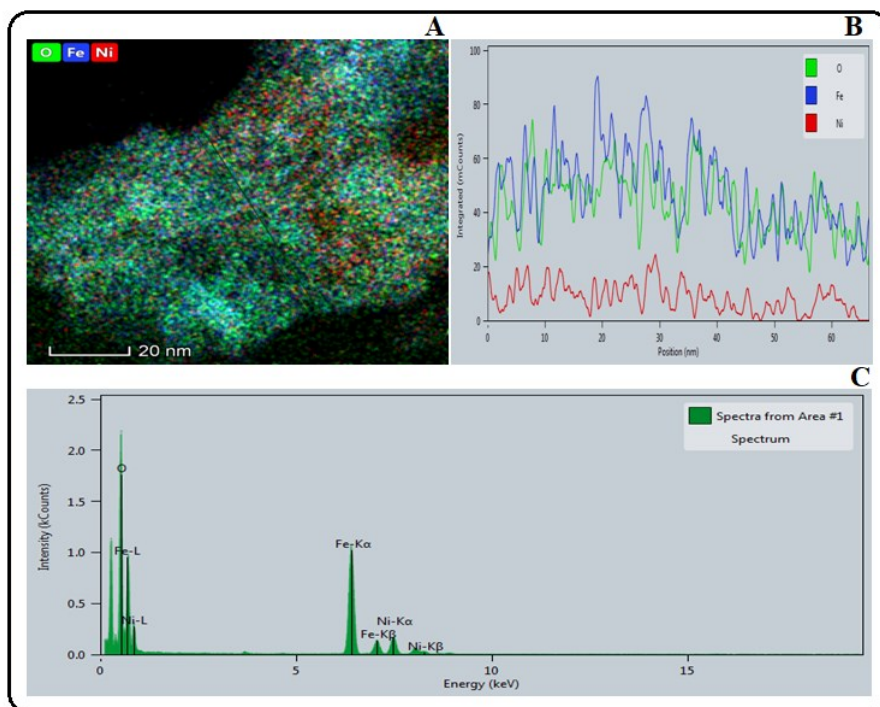


Figure S4.A) Chronopotentiometric durability test at current density  $10 \text{ mA cm}^{-2}$  for 130 h;  
B) Morphology of the catalyst after long-term stability test.

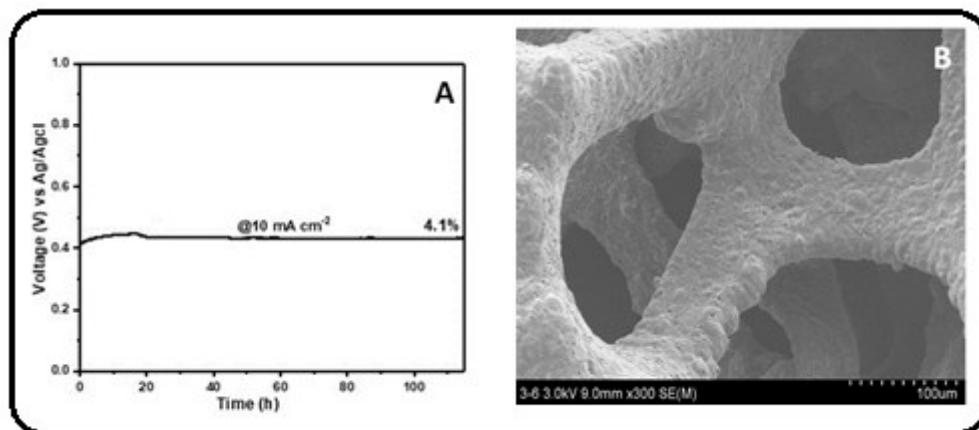


Figure S5. Solar panel current-voltage (I-V) curve under the light illumination (1 sun).

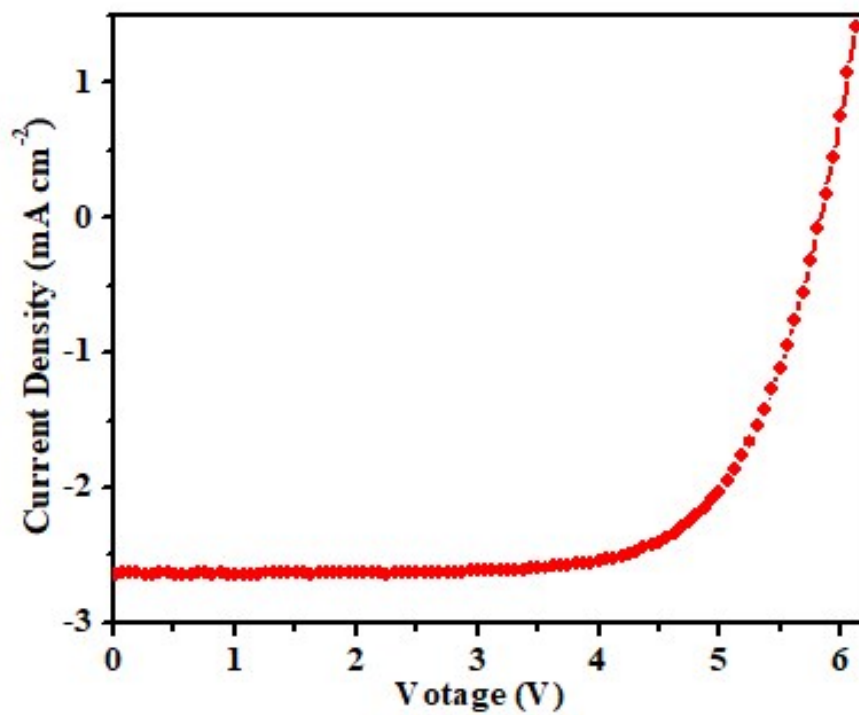
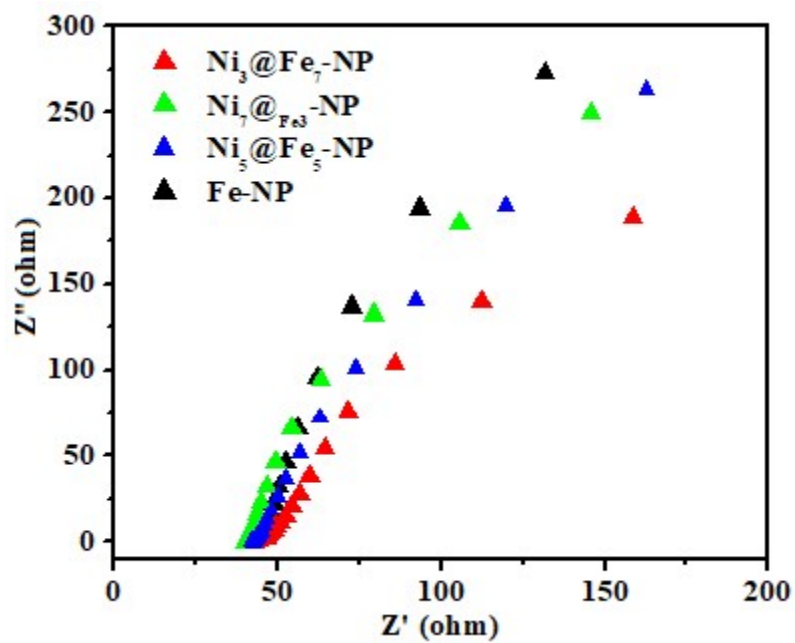
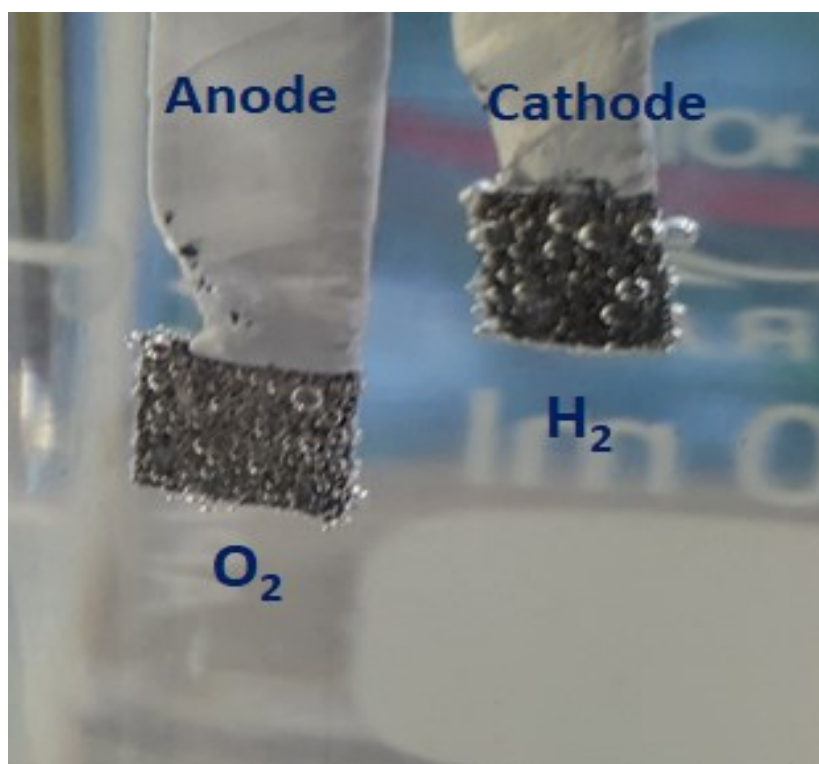


Figure S6. Nyquist plots for different catalysts prepared at different ratio of Ni doped FeOH-NP.



**Figure S7 Digital image of conventional water electrolyzer during full cell water electrolysis**  
 **$\text{Ni}_3\text{@Fe}_7\text{-NP/Ni F}$  anode and 20%Pt/C/Ni F cathode.**



**Table S1. Overall water splitting cell voltage and durability comparison with recently reported works.**

Catalyst	Support	Electrolyte Cell	Cell Voltage @ 10 mA cm <sup>-2</sup> [V]	Durability @ 10 mA cm <sup>-2</sup> [h]	Ref
Ni@Fe-NP	GC Ni foam	0.1 M KOH 1 M KOH	1.59	18	This work
			1.49	150	
Core-shell Co@NC-600	GC Ni foam	0.1 M KOH 1 M KOH	1.60	16	<b>Adv. Energy Mater.</b> 2018, 1702838
			1.57	350	
NiCo <sub>2</sub> O <sub>4</sub>	Ni foam	1 M KOH	1.65	15	<b>Angew. Chem.</b> <b>Int. Ed.</b> 2016, 55, 6290.
CoFe LDH-F	Ni foam	1 M KOH	1.63	-	<b>ACS Appl. Mater.</b> <b>Interfaces</b> 2016, 8, 34474
NiFe/NiCo <sub>2</sub> O <sub>4</sub>	Ni foam	1 M KOH	1.67	10	<b>Adv. Funct. Mater.</b> 2016, 26, 3515–3523
Fe-P nanotube	Carbon cloth	1 M KOH	1.69	14	<b>Chem. Eur. J.</b> 2015, 21, 18062
Co <sub>0.85</sub> Se/NiFe- LDH	Exfoliated graphene foil	1 M KOH	1.67	10	<b>Energy Environ.</b> <b>Sci.</b> 2016, 9, 478.