## **Supplementary Material**

## Acid- and Alkaline-induced Phase and Structure Reconstruction of

## Nickel Sulfide toward Enhanced Electrochemical Performance

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Fig. S1 (a) XRD patterns of NS-1-1MHCl-24h and NS-1-2MHCl-24h, and (b) NS-2-3MHCl-2h

and NS-3-3MHCl-2h



Fig. S2 XRD pattern of NS-1-3MH<sub>2</sub>SO<sub>4</sub>-24h



Fig. S3 (a) XRD patterns of NS-1, NS-1-2MKOH-24h, and NS-1-6MKOH-24h; (b) XRD pattern of NS-4-6MKOH-24h



(a) 120 (d) b) 50 mV 40 mV 30 mV 20 mV 10 mV 5 mV s - 1 Ag - 2 Ag - 5 Ag - 8 Ag - 10 Ag - 15 Ag - 20 Ag 2 A g<sup>-1</sup> 5 A g<sup>-1</sup> 8 A g<sup>-1</sup> 10 A g<sup>-1</sup> 15 A g<sup>-1</sup> 20 A g<sup>-1</sup>  $Current Density(A g^1)$ Potential (V vs. SCE) Potential (V vs. SCE) 30 mV 20 mV 10 mV 5 mV s Current Density(A 0.0 0.0 0.0 0.5 <sup>600</sup> Time (s) 0.0 <sup>600</sup> Time (s) Potential (V vs. SCE) 0.1 0.2 (V vs. SCE) 0.5 (e)16 (f) (h)0.4 (**g**) 12 -1 A g<sup>-1</sup> -2 A g<sup>-1</sup> -5 A g<sup>-1</sup> -8 A g<sup>-1</sup> -10 A g<sup>-1</sup> -15 A g<sup>-1</sup> -20 A g<sup>-1</sup> - 50 mV s - 40 mV s - 30 mV s - 20 mV s - 10 mV s - 5 mV s<sup>-1</sup> 1 Ag<sup>1</sup> 2 Ag<sup>1</sup> 5 Ag<sup>1</sup> 8 Ag<sup>1</sup> 10 Ag 15 Ag 20 Ag 50 mV 40 mV 30 mV 20 mV 10 mV s 5 mV s t Density(A  $g^1$ ) Potential (V vs. SCE) Potential (V vs. SCE) Current -120 0.6 0.0 01 Potential (V vs. SCE) <sup>600</sup> Time (s) 120 Time (s) 0.1 0.2 (V vs. SCE)

Fig. S4 XPS survey of NS-3, NS-3-3MHCl-24h, NS-4, and NS-4-6MKOH-72h

Fig. S5 (a) CV curves and (b) GCD curves of NS-1, (c) CV curves and (d) GCD curves of NS-2,

(e) CV curves and (f) GCD curves of NS-3, (g) CV curves and (h) GCD curves of NS-4



Fig. S6 (a) CV curves and (b) GCD curves of NS-1-3MHCl-24h, (c) CV curves and (d) GCD curves



Fig. S7 (a) CV curves and (b) GCD curves of NS-1-6MKOH-72h, (c) CV curves and (d) GCD curves of NS-2-6MKOH-72h, (e) CV curves and (f) GCD curves of NS-4-6MKOH-72h



Fig. S8 EIS plots of (a) NS-1and NS-1-3MHCl-24h, (b) NS-2 and NS-2-3MHCl-24h, (c) NS-3 and

NS-3-3MHCl-24h, (d) NS-1 and NS-1-6MKOH-72h, (e) NS-2 and NS-2-6MKOH-72h, and (f) NS-

4 and NS-4-6MKOH-72h