## **Supplementary Information**



Figure S1 (a) TEM image and (b) corresponding element mappings of CoPx.



Figure S2 (a-b) TEM images and (c) corresponding element mappings of e-CoPx.



Figure S3 C 1s high-resolution spectra of CoAl LDH.



**Figure S4** (a) CV curves of CoOOH at different scan rates; (b) CC curves of CoOOH at different current densities.



**Figure S5** (a) CV curves of CoPx at different scan rates; (b) CC curves of CoPx at different current densities.



Figure S6 (a) CV curves of e-CoPx at different scan rates; (b) CC curves of e-CoPx at different current densities.