Supporting Information for

CoOOH ultrathin nanoflake array aligned on nickel foam: fabrication and use in high-performance supercapacitor device

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Calculation of surface energies

Plane-wave density functional theory (DFT) + U calculations of the electronic properties of CoOOH systems with exposed (001) and (100) facets were carried out using the CASTEP module in Materials Studio. GGA with a PBE functional was employed for the DFT exchange correlation energy, and a cut off of 340 eV was assigned to the plane-wave basis set. The self-consistent field (SCF) tolerance was 1×10^{-6} eV. The Brillouin zone was sampled by 1×1×1 k-points. The core electrons were replaced with ultrasoft pseudo-potentials.

Figurers:

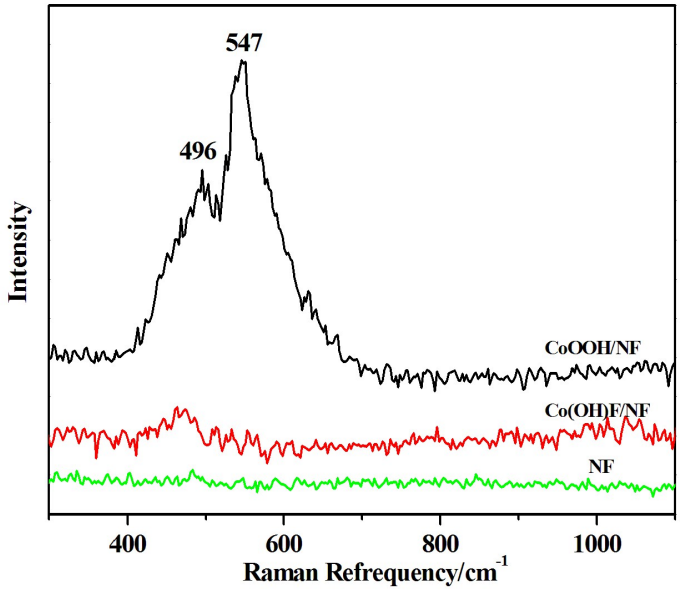

Fig. S1. Raman spectra of NF, Co(OH)F and CoOOH/NF.

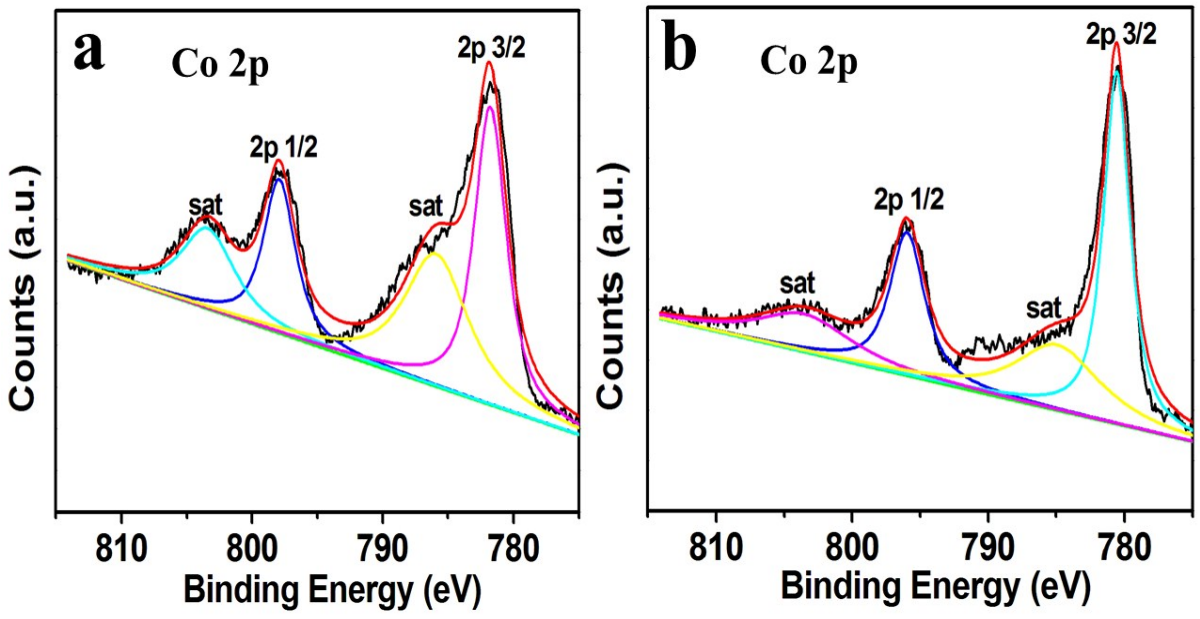

Fig. S2. XPS spectra of Co(OH)F (a) and CoOOH (b).

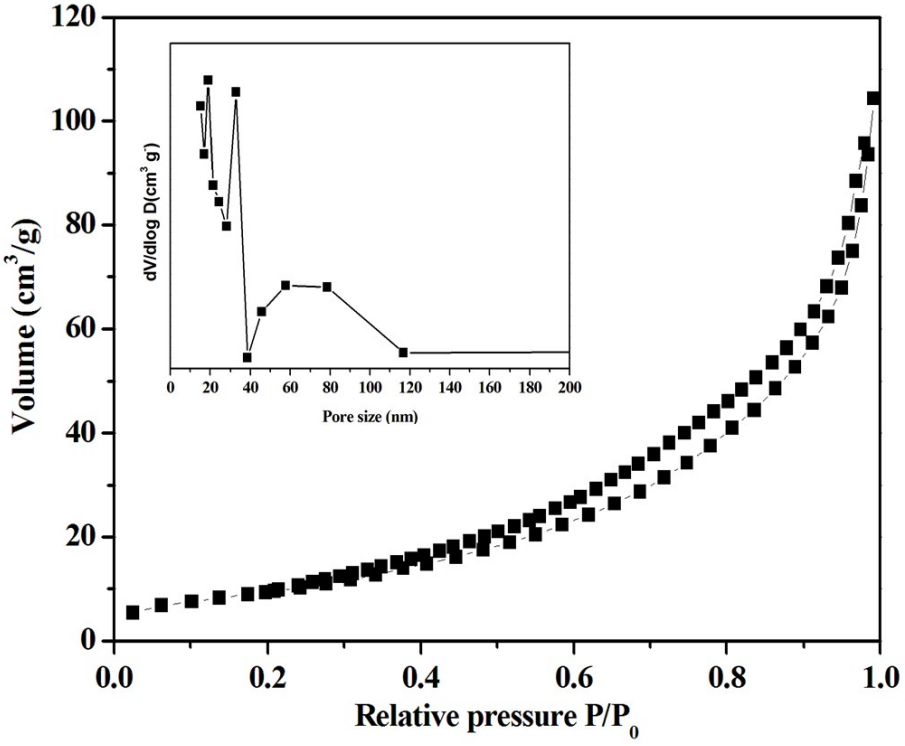

Fig. S3. N_2 adsorption-desorption isotherms of CoOOH/NF and the corresponding pore size distribution (inset).

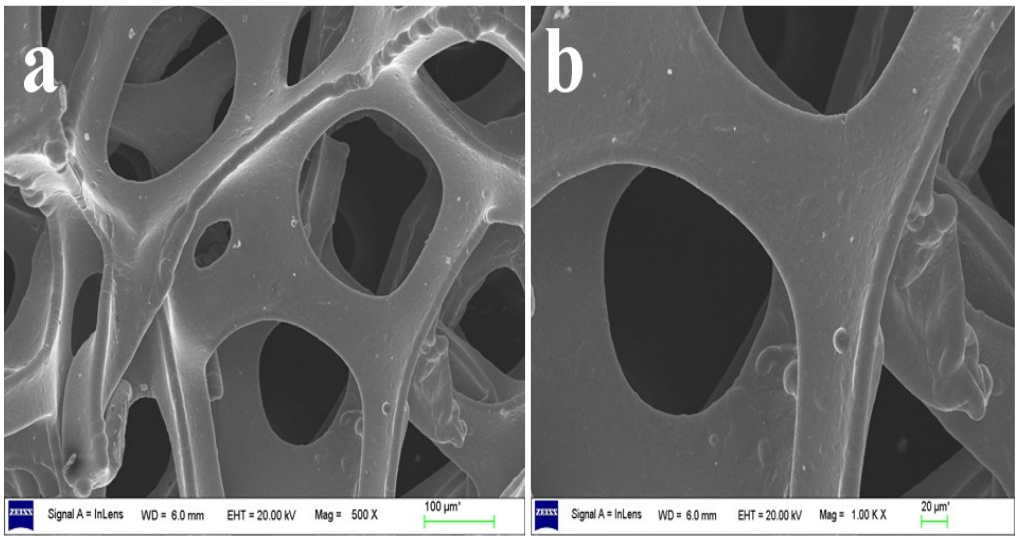

Fig. S4. SEM images of the bare NF at a) low and b) high magnification.

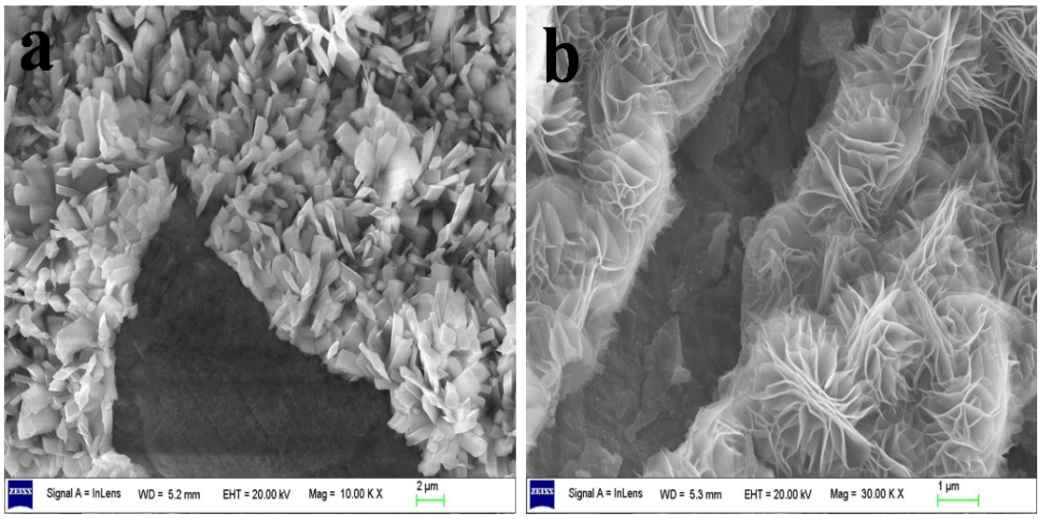

Fig. S5. Cross-sectional SEM images: a) Co(OH)F/NF and b) CoOOH/NF.

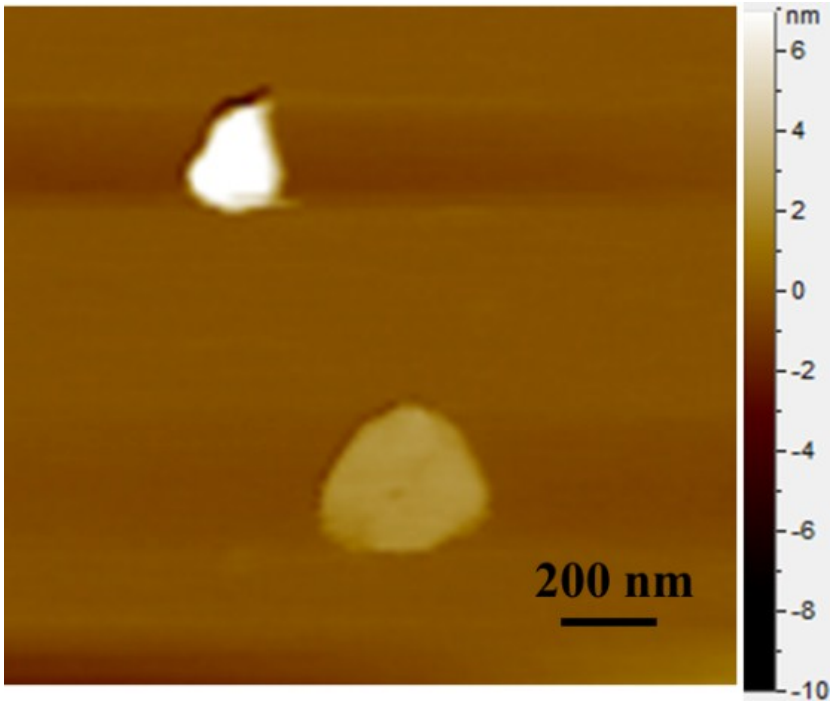

Fig. S6. AFM images of CoOOH nanoflakes

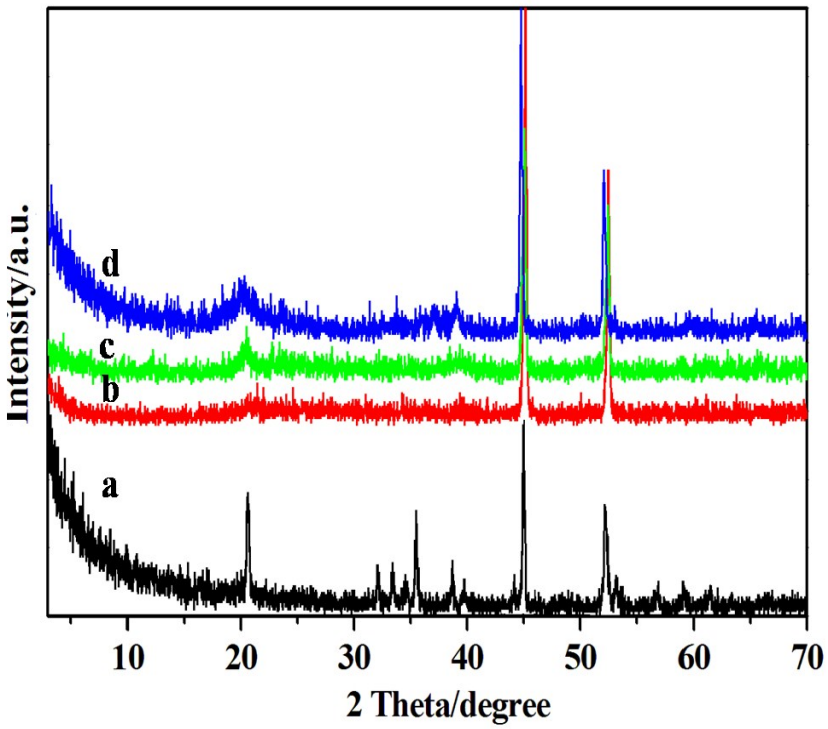

Fig. S7. XRD patterns of samples prepared using different times: a) 0 h, b) 3 h, c) 7 h and d) 9 h.

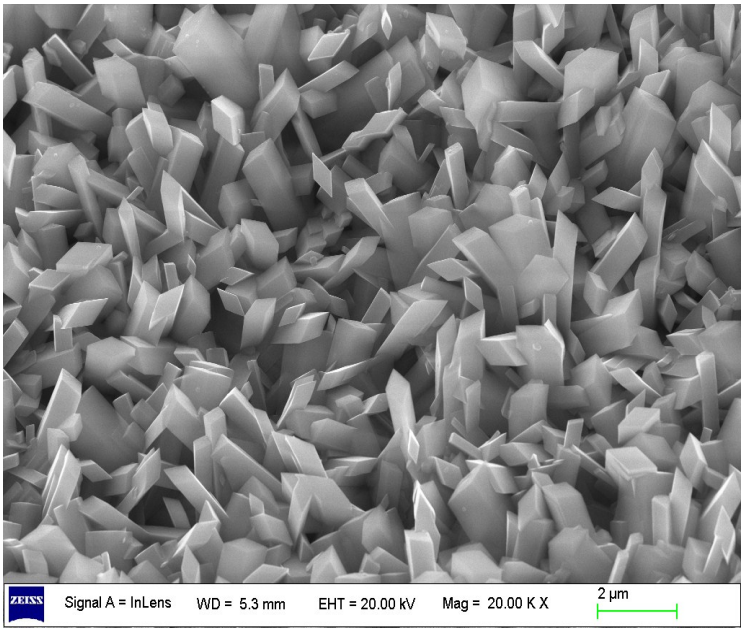

Fig. S8. SEM images of the sample preparedin the absence of $KBrO_3$.

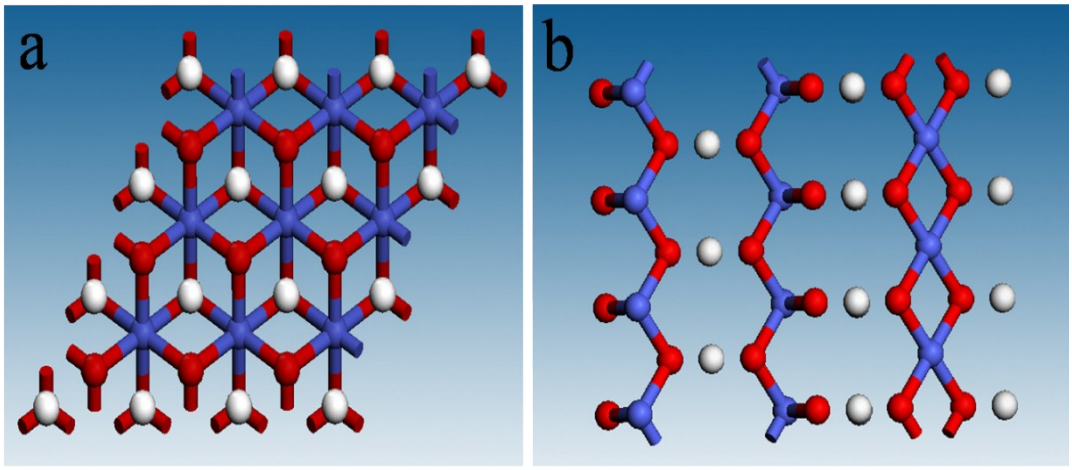

Fig. S9. Views of a) the (001) facet and b) the (100) facet of CoOOH showing the calculated surface energies.

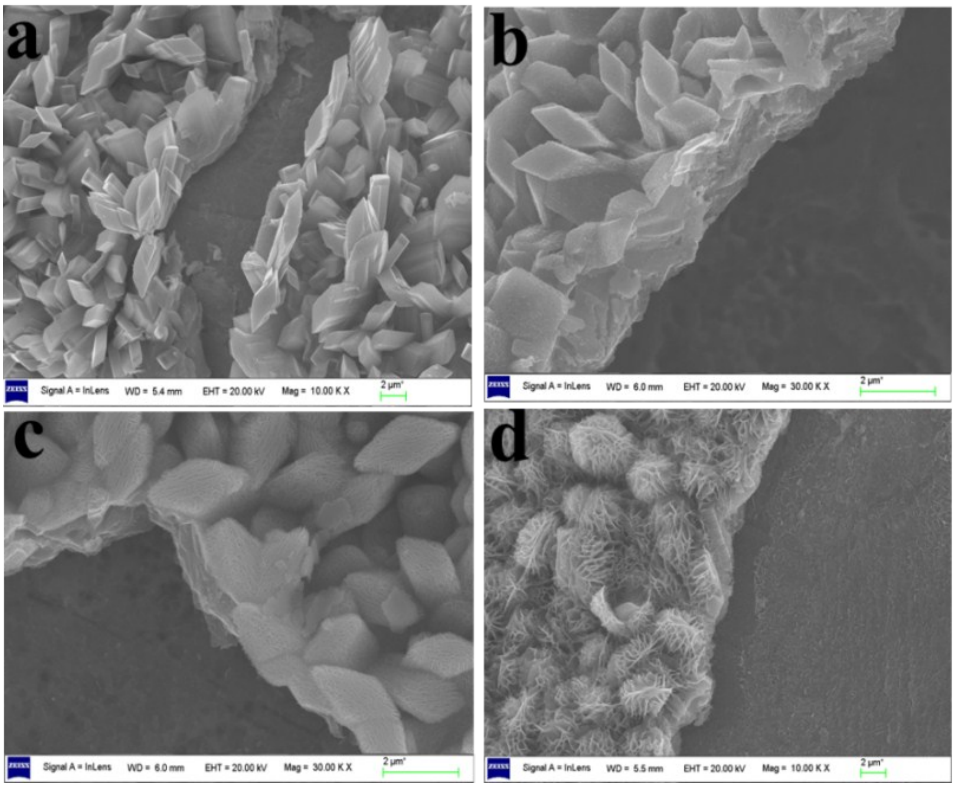

Fig. S10. The cross-sectional FESEM images of products at different oxidation stage: 3 h (a), 5 h (b), 7 h (c) and 9 h (d).

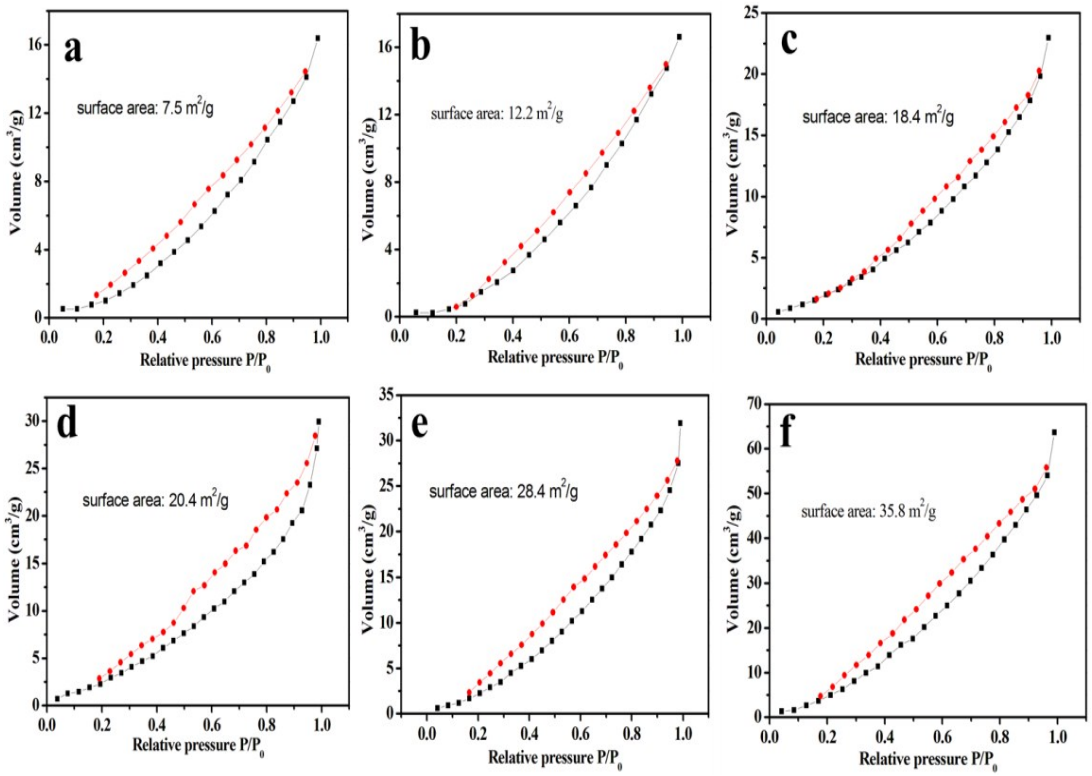

Fig. S11. N_2 adsorption–desorption isotherms of products at different oxidation stage: pristine NF (a), 0 h (b), 3 h (c), 5 h (d), 7 h (e) and 9 h (f).

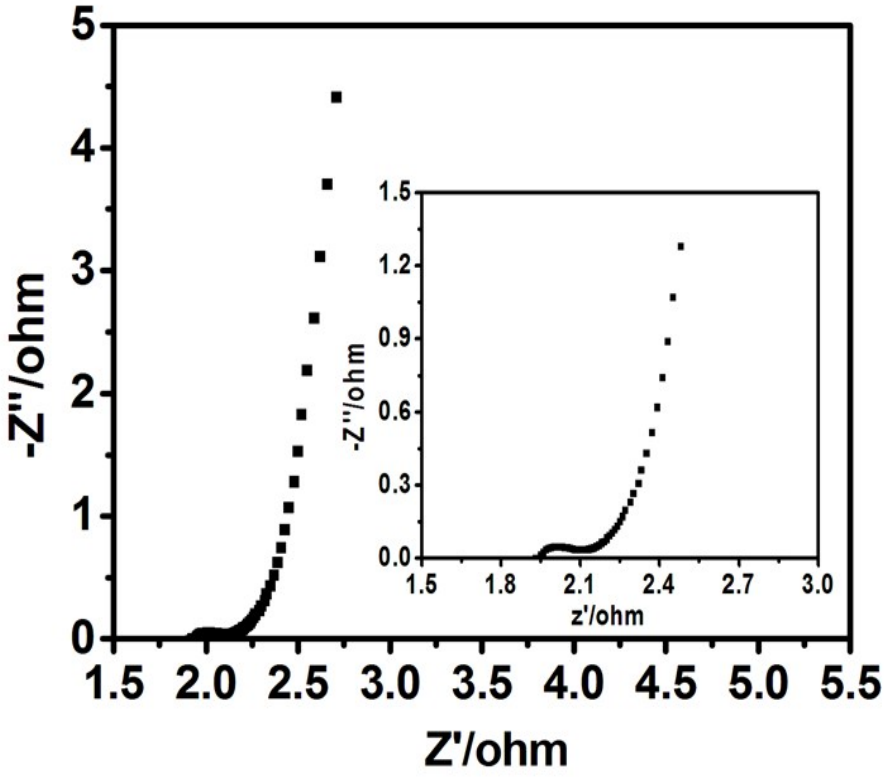

Fig. S12. Nyquist plots of the CoOOH/NF eletrode.

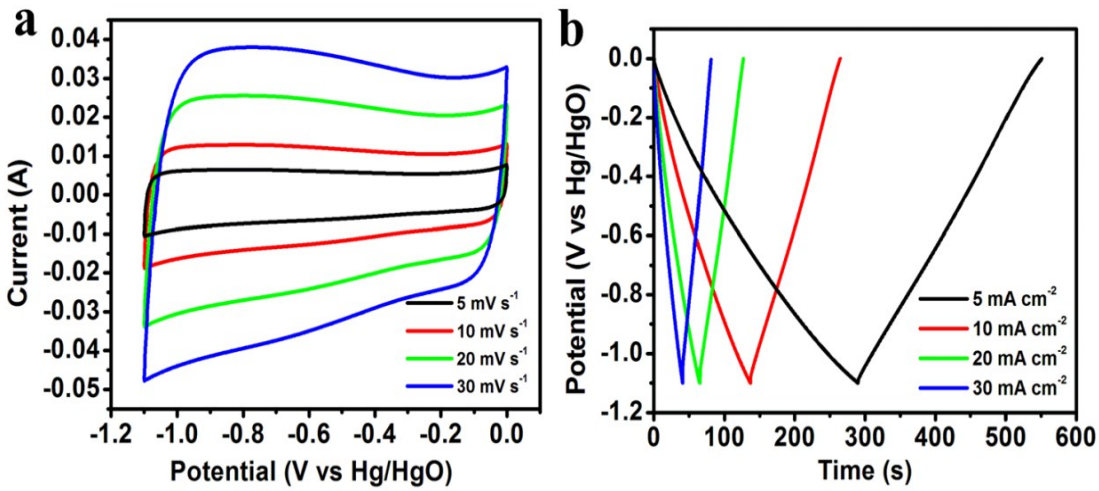

Fig. S13. a) CV curves of the rGO at different scan rate. b) Galvanostatic charge–discharge curves of the rGO at different current densities.