

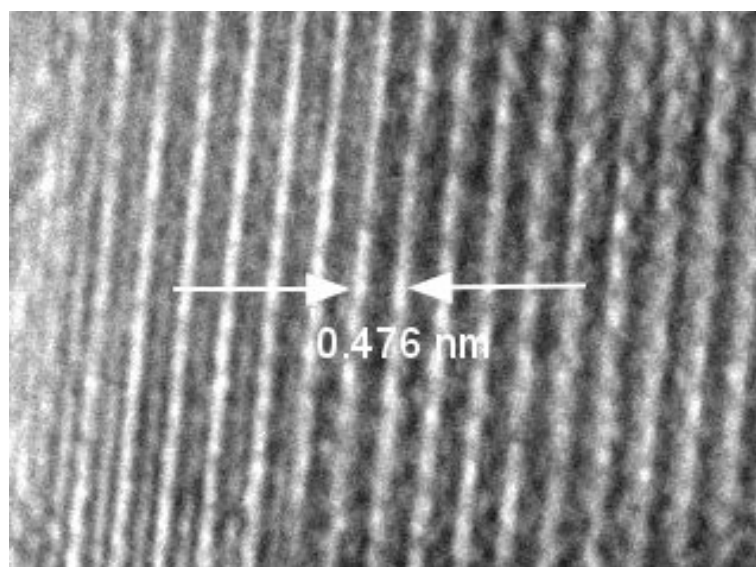
Supplementary Information

# Capacitive properties of ferrimagnetic $\text{NiFe}_2\text{O}_4$ -conductive polypyrrole nanocomposites

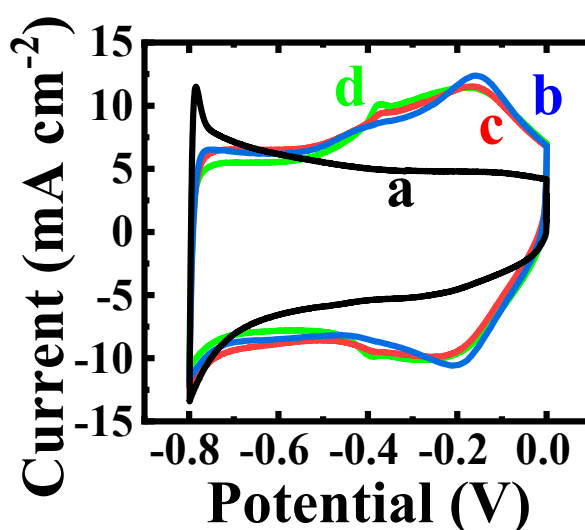
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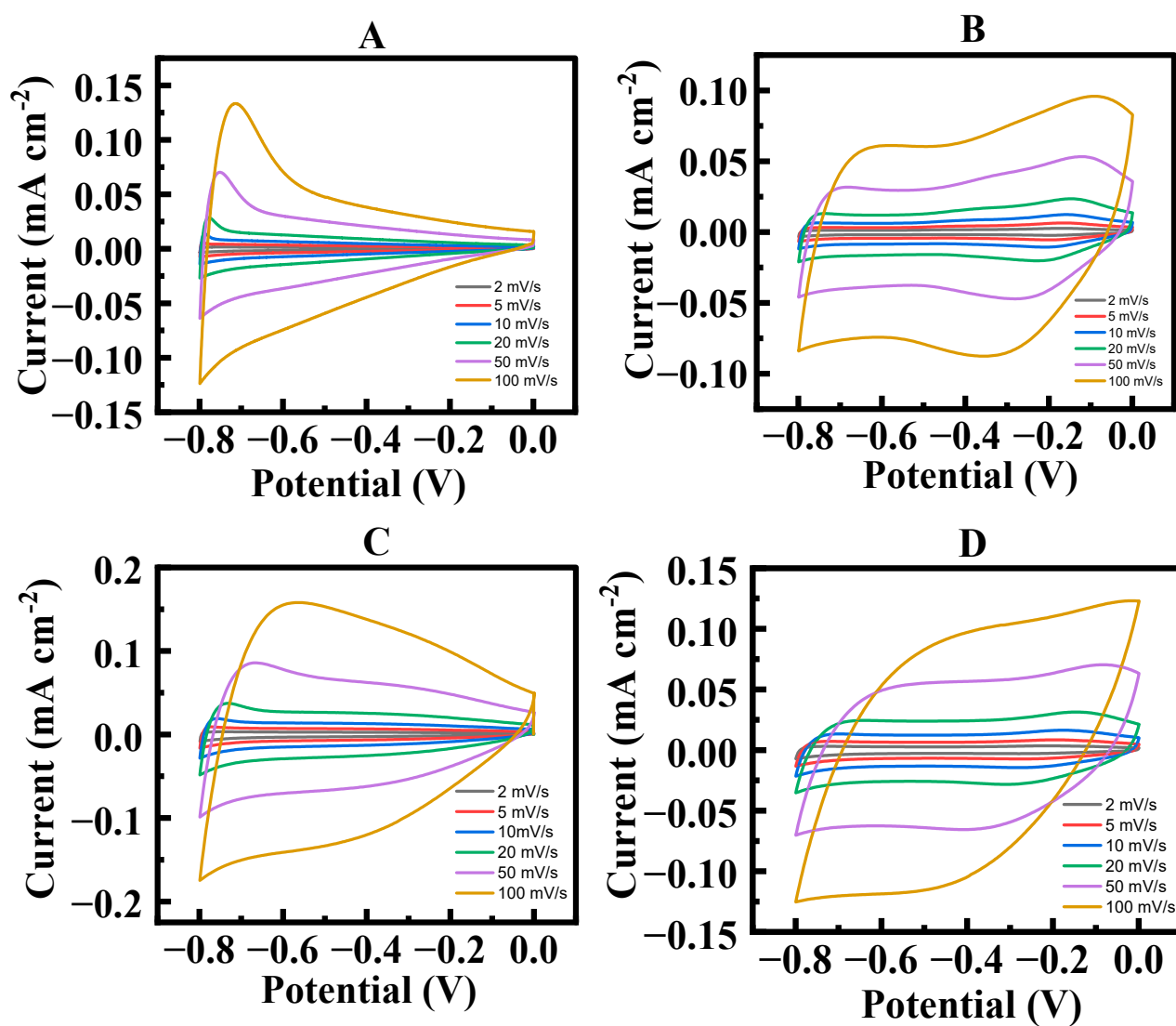
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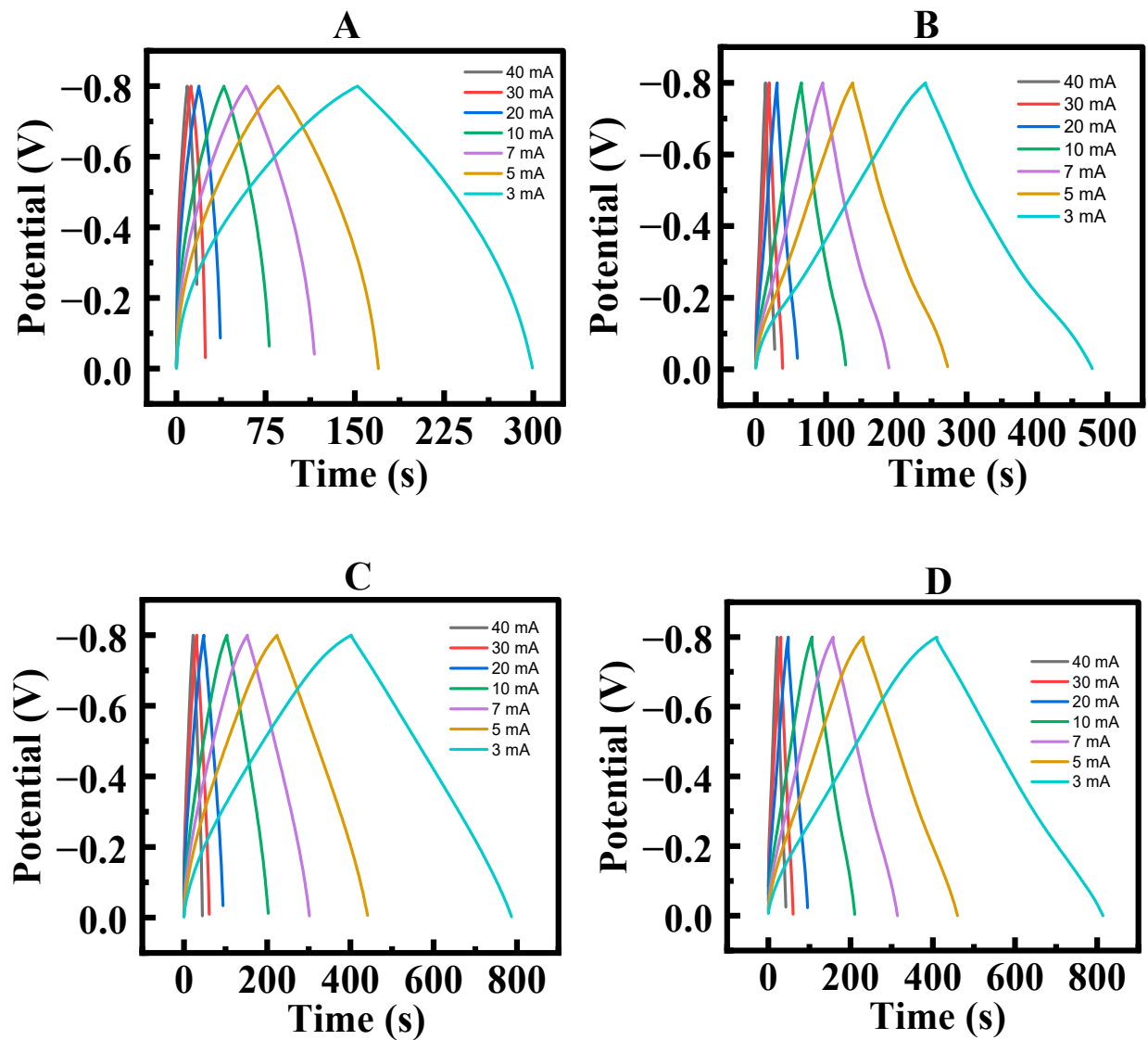
**Figure S1.** High resolution TEM image of NFO showing (111) planes.



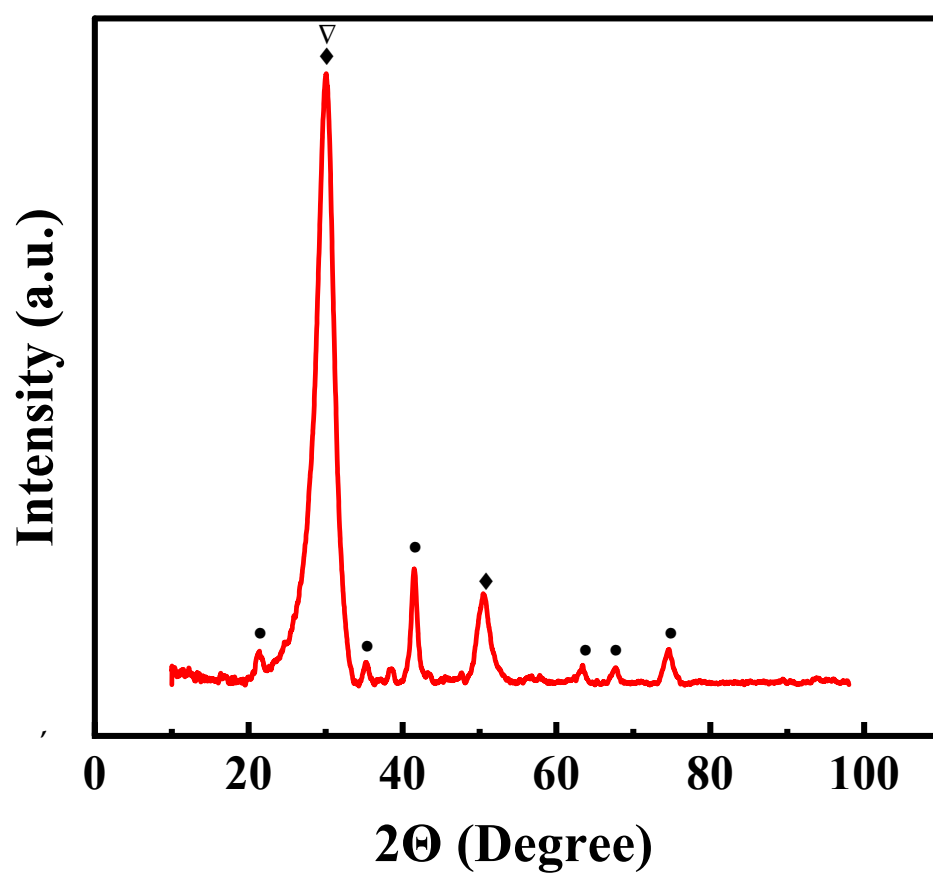
**Figure S2.** CVs at  $10 \text{ mV s}^{-1}$  for NFO electrodes, prepared using as-received NFO: (a) without GCD and (b-d) with GCD for (b)  $R_D=0.02$ , (c)  $R_D=0.05$  and (d)  $R_D=0.1$ .



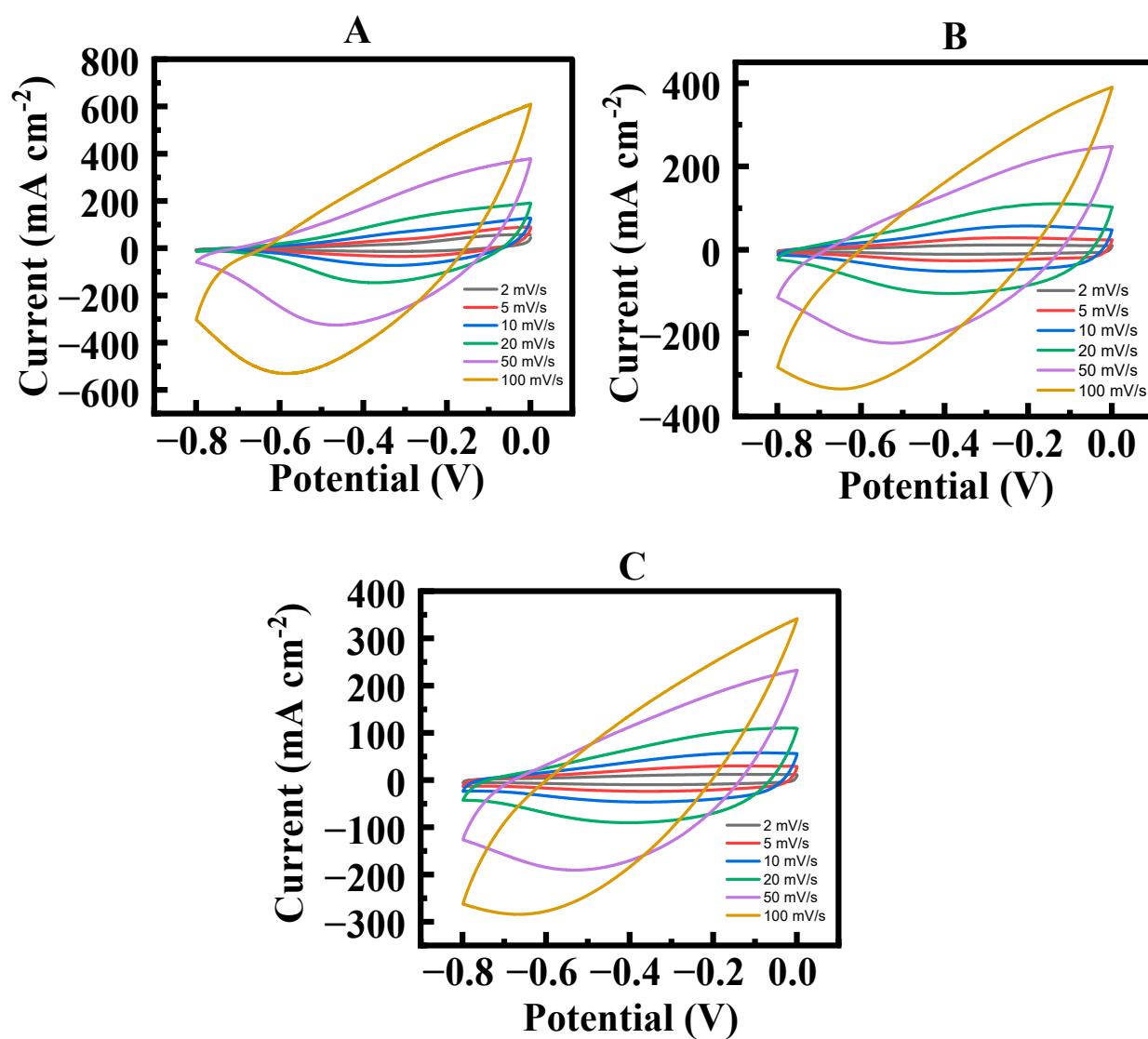
**Figure S3.** CVs at different sweep rates for (A) as-received NFO, (B) as-received NFO with GCD at different scan rates, (C) HEBM NFO and (D) HEBM NFO with GCD.



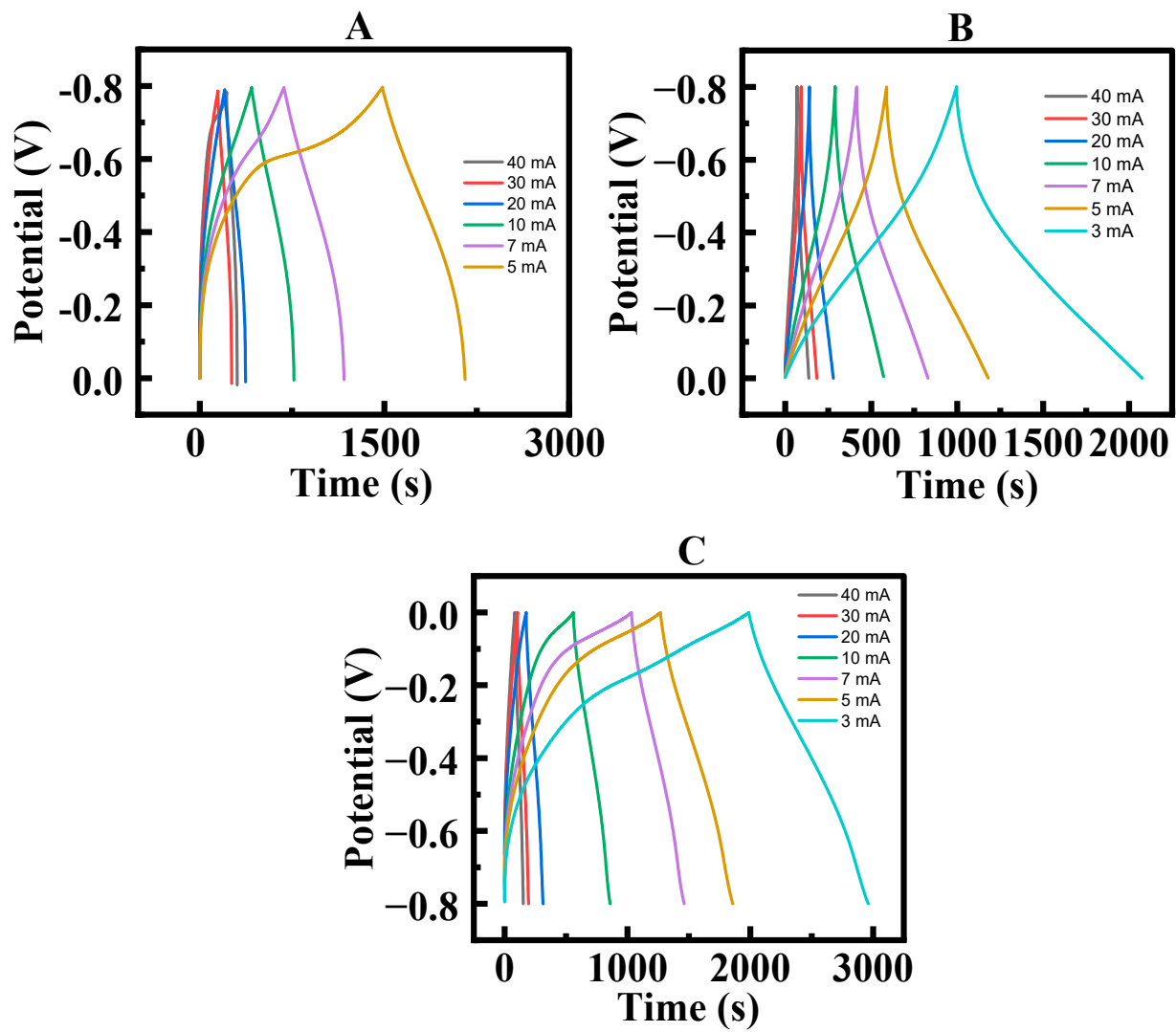
**Figure S4.** CP data at different current densities for (A) as-received NFO, (B) as-received NFO with GCD at different scan rates, (C) HEBM NFO and (D) HEBM NFO with GCD.



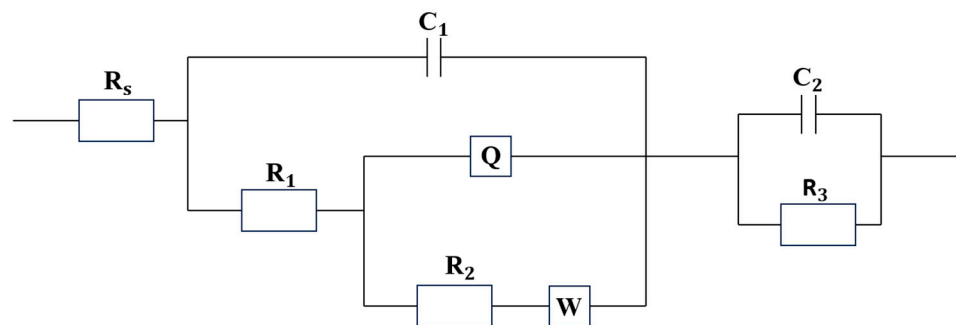
**Figure S5.** X-ray diffraction pattern of Composite 1. (♦- MWCNT, JCPDS file 00-058-1638, ▽- PPy[1, 2], ● -NFO, JCPDS file 00-044-1485).



**Figure S6.** CVs at different sweep rates for (A) PPy, (B) Composite 1 and (C) Composite 2 electrodes.



**Figure S7.** CP data at different current densities for (A) PPy, (B) Composite 1 and (C) Composite 2 electrodes.



**Figure S8.** Equivalent circuit used for EIS data simulation.

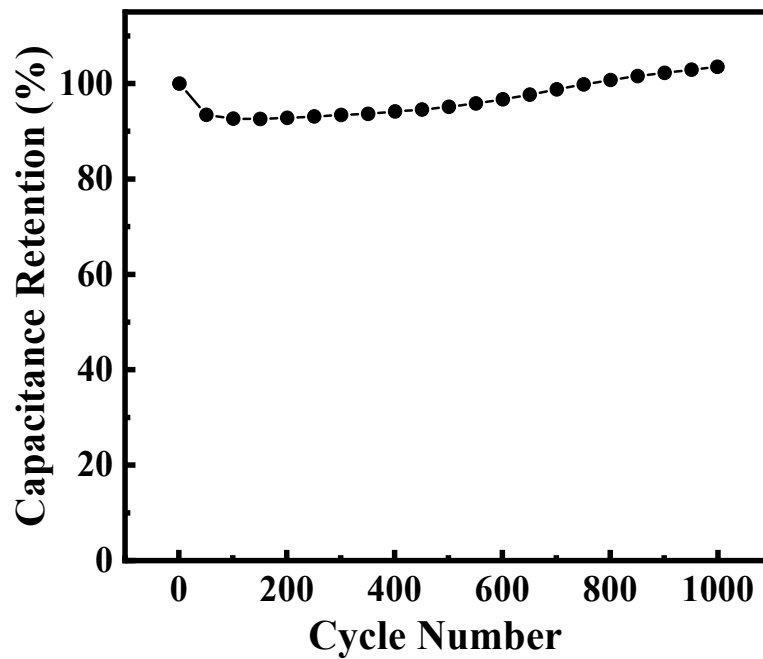


Figure S9. Capacitance retention of HEBM NFO with GCD for  $R_D=0.02$ .

## References

1. Shrikrushna, S.; Kher, J. A.; Kulkarni, M. V. Influence of dodecylbenzene sulfonic acid doping on structural, morphological, electrical and optical properties on polypyrrole/3C-SiC nanocomposites. *Journal of Nanomedicine & Nanotechnology* **2015**, *6* (5), 1.
2. Hu, J.; Li, Y.; Gao, G.; Xia, S. A mediated BOD biosensor based on immobilized *B. subtilis* on three-dimensional porous graphene-polypyrrole composite. *Sensors* **2017**, *17* (11), 2594.