Supplementary Material (ESI) for Journal of Materials Chemistry

Supplementary information

Achieving High Specific Charge Capacitances in Fe_3O_4/Reduced Graphene Oxide Nanohybrids†

Wenhui Shi,[a] Jixin Zhu,[a] Dao Hao Sim,[a] Yee Yan Tay,[a] Ziyang Lu,[a] Xiaojun Zhang,[a] Yogesh Sharma,[b] Madhavi Srinivasan,[a] Hua Zhang,[a] Huey Hoon Hng,[a] Qingyu Yan*[a]

[a] School of Materials Science and Engineering, Nanyang Technological University, Singapore 639798. Fax: +65 6790 9081 ; Tel: +65 6790 4583; E-mail: alexyan@ntu.edu.sg
b Energy research Institute @ NTU, Nanyang Technological University, Singapore

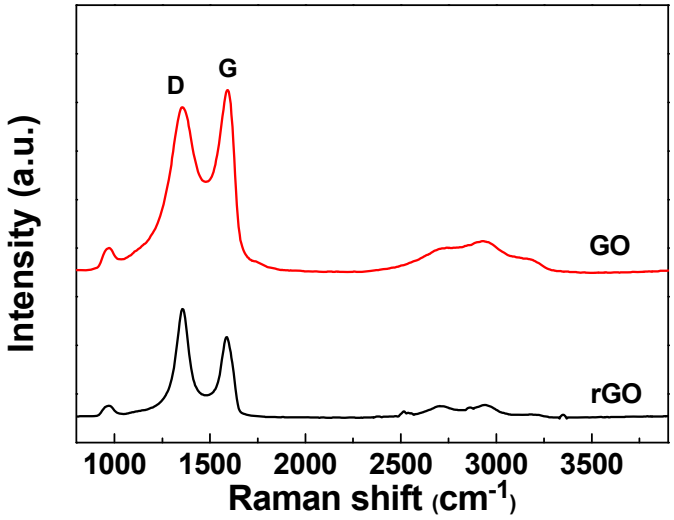

Figure S1 Raman spectra of graphene oxide (GO) and reduced graphene oxide (rGO).

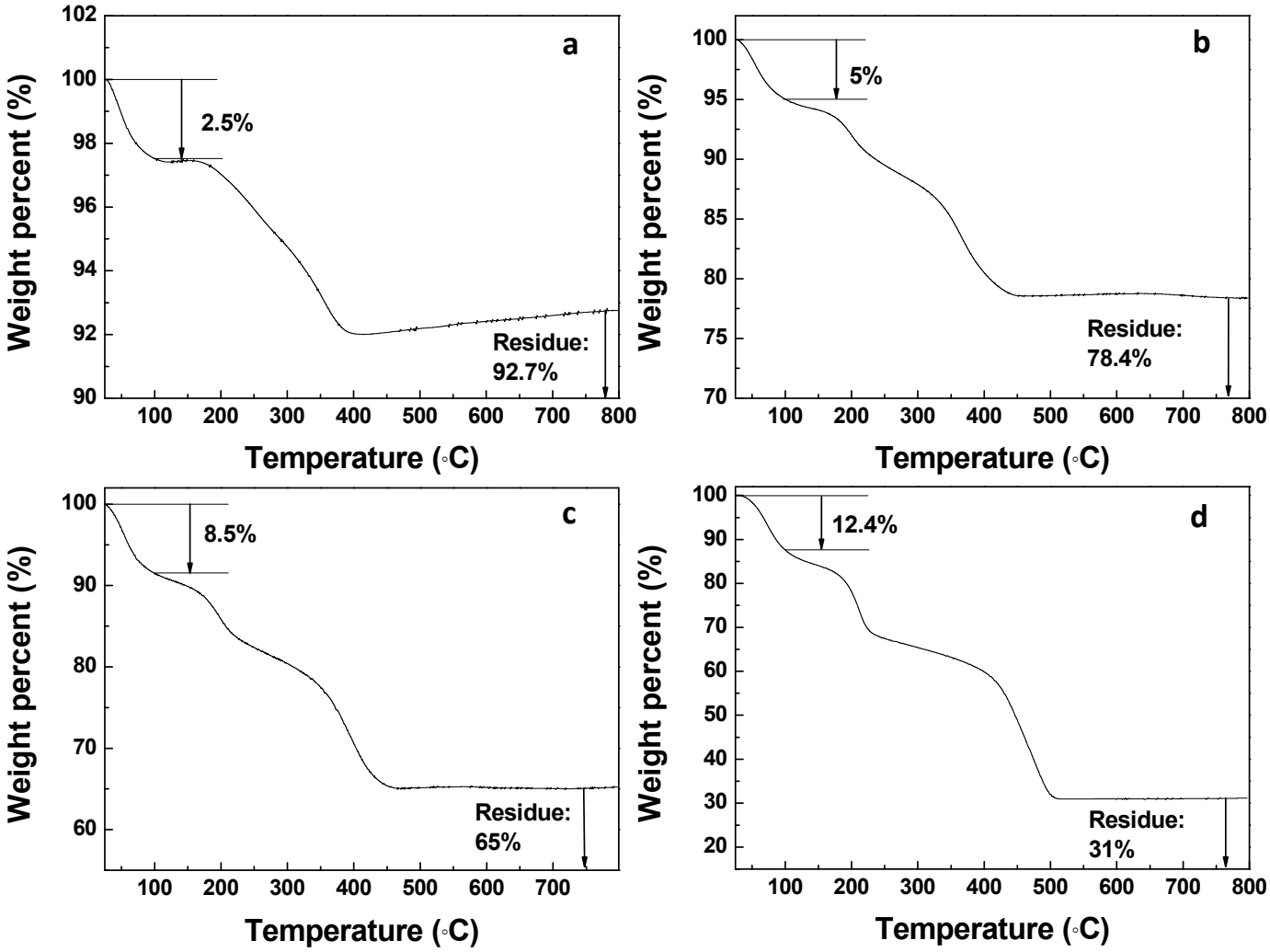

Figure S2 Thermal gravimetric analysis of Fe_3O_4/rGO nanohybrids with different feeding ratios (a) $I_{Fe_3O_4 : rGO} = 19.8$ (b) $I_{Fe_3O_4 : rGO} = 5$ (c) $I_{Fe_3O_4 : rGO} = 2.8$ (d) $I_{Fe_3O_4 : rGO} = 0.8$

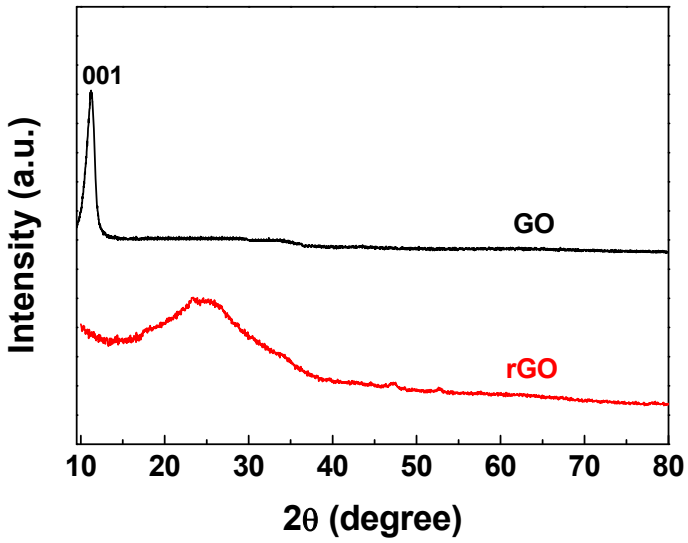

Figure S3 X-ray diffraction patterns of graphene oxide (GO) and reduced graphene oxide (rGO).

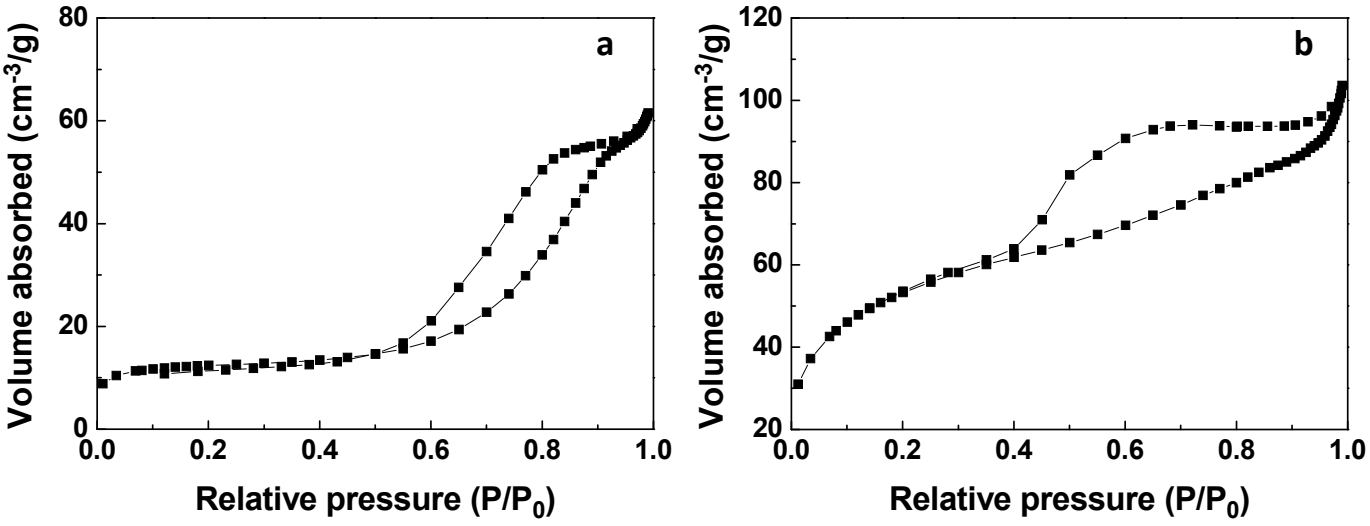

Figure S4 Nitrogen adsorption and desorption isotherms measured at standard temperature and pressure on the (a) Fe_3O_4 nanoparticles (b) Fe_3O_4/rGO nanohybrid with $I_{Fe3O4\,:\,rGO} = 2.8$

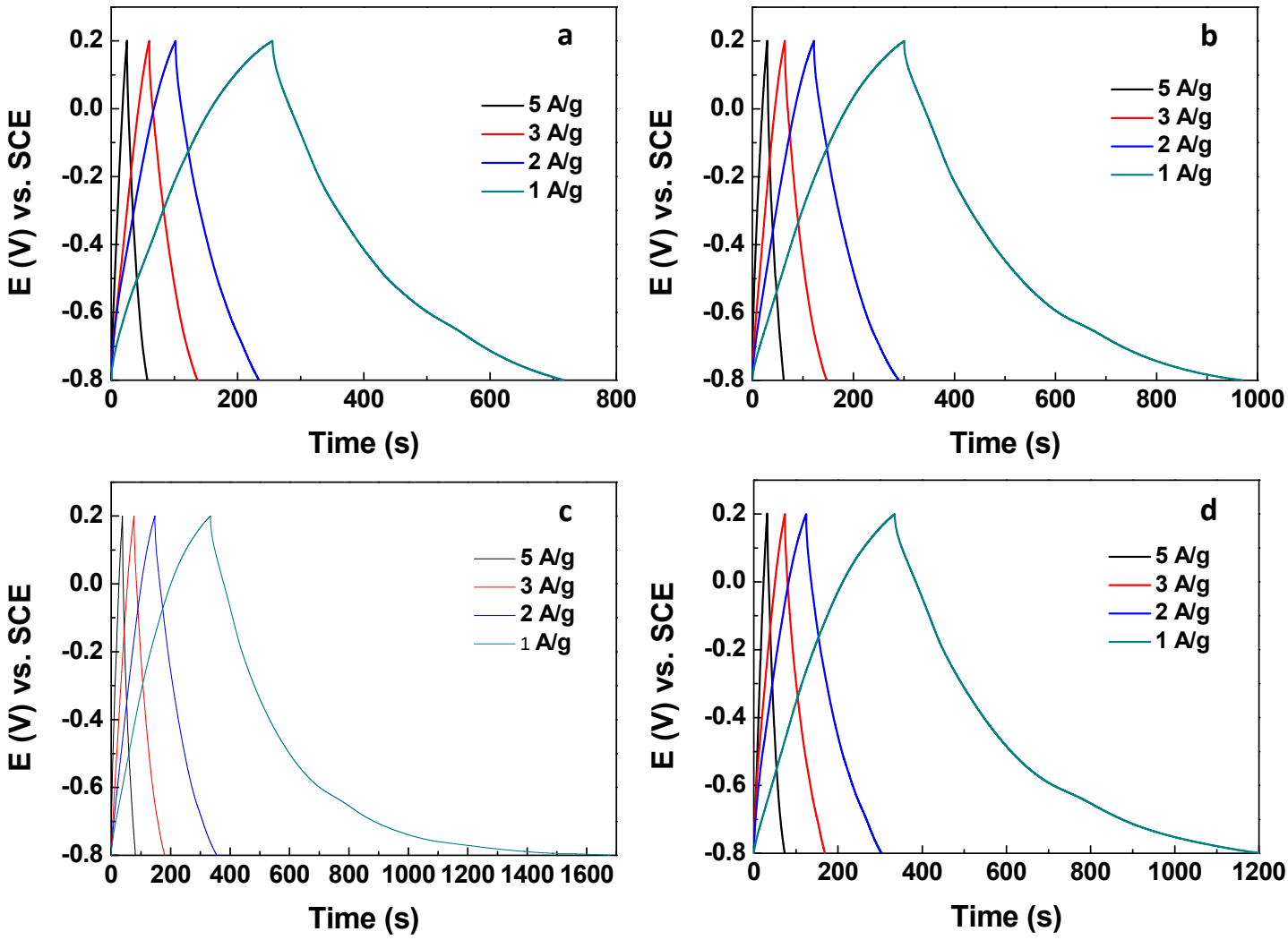

Figure S5 Galvanostatic charge/discharge curves of nanohybrid electrodes with (a) $I_{Fe_3O_4 : rGO}$ = 19.8 (b) $I_{Fe_3O_4 : rGO}$ = 5 (c) $I_{Fe_3O_4 : rGO}$ = 2.8 (d) $I_{Fe_3O_4 : rGO}$ = 0.8 in 1M KOH solution at different current densities from 1 to 5A/g

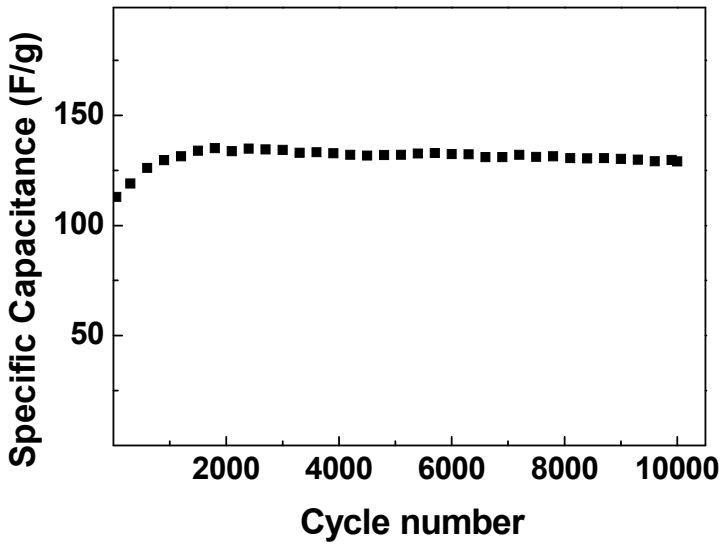

Figure S6 Cycling performance of the Fe_3O_4/rGO nanocomposite electrode with $I_{Fe_3O_4 : rGO} = 2.8$ at a current density of 10 A/g in 1M KOH.

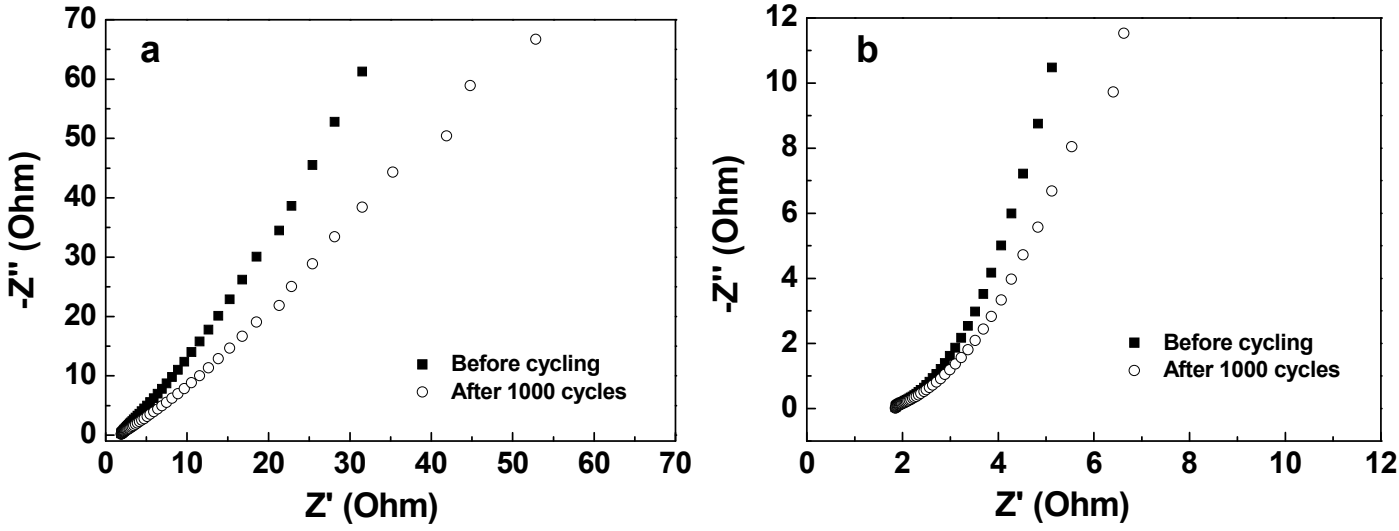

Figure S7 Nyquist plots of experimental impedance data for (a) pure Fe_3O_4 and (b) pure rGO electrodes in the frequency range of 10 kHz- 0.1Hz, respectively.

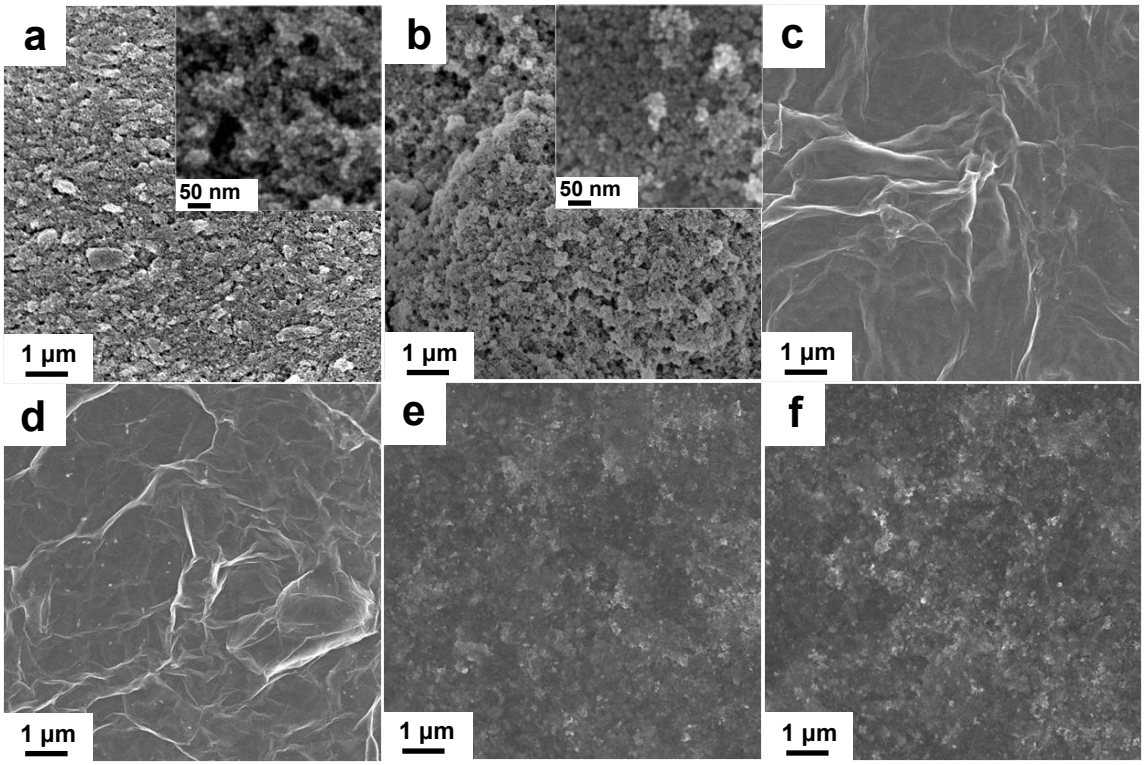

Figure S8 (a and b) SEM images of pure Fe_3O_4 electrodes (a) before and (b) after 1000 cycles (insets are high magnification SEM images); (c and d) SEM images of pure rGO electrodes (c) before and (d) after 1000 cycles; (e and f) SEM images of nanocomposite electrodes with $I_{Fe_3O_4\,:\,rGO} = 2.8$ (e) before and (f) after 1000 cycles.

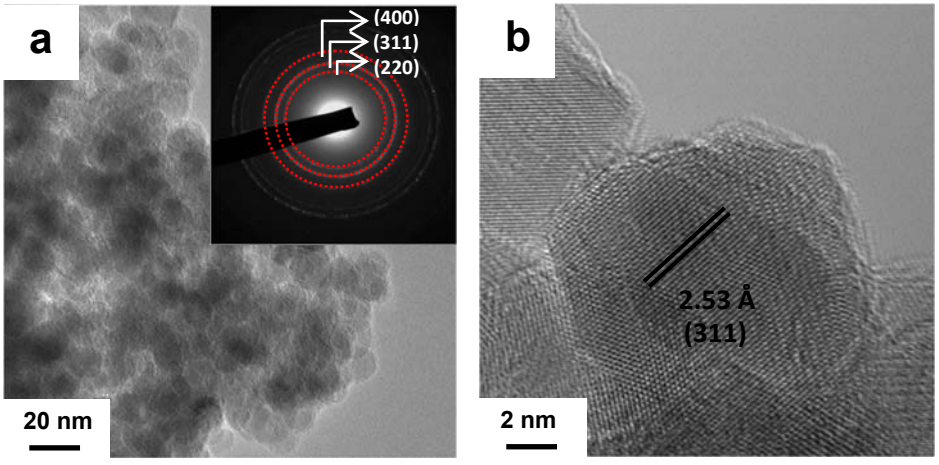

Figure S9 (a) TEM and (b) HRTEM images of the nanparticles in the pure Fe_3O_4 electrode after 1000 cycles. (The inset in a is the corresponding SAED pattern of Fe_3O_4 nanoparticles)