Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supplementary Information

Enhanced properties of porous $CoFe_2O_4$-reduced graphene oxide composite with alginate binder for Li-ion battery applications

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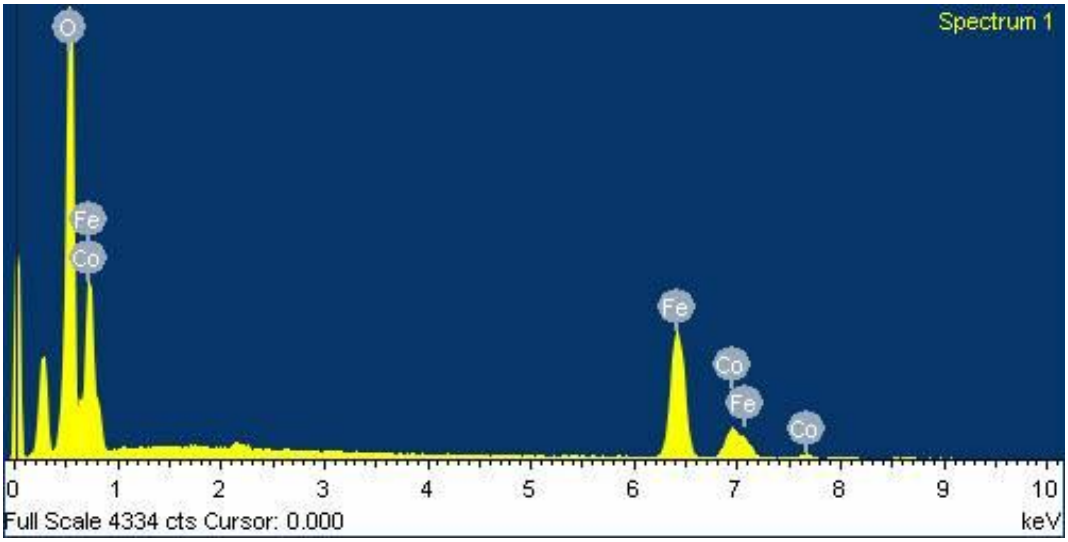

Figure S1: EDS spectrum for the pure $CoFe_2O_4$ sample

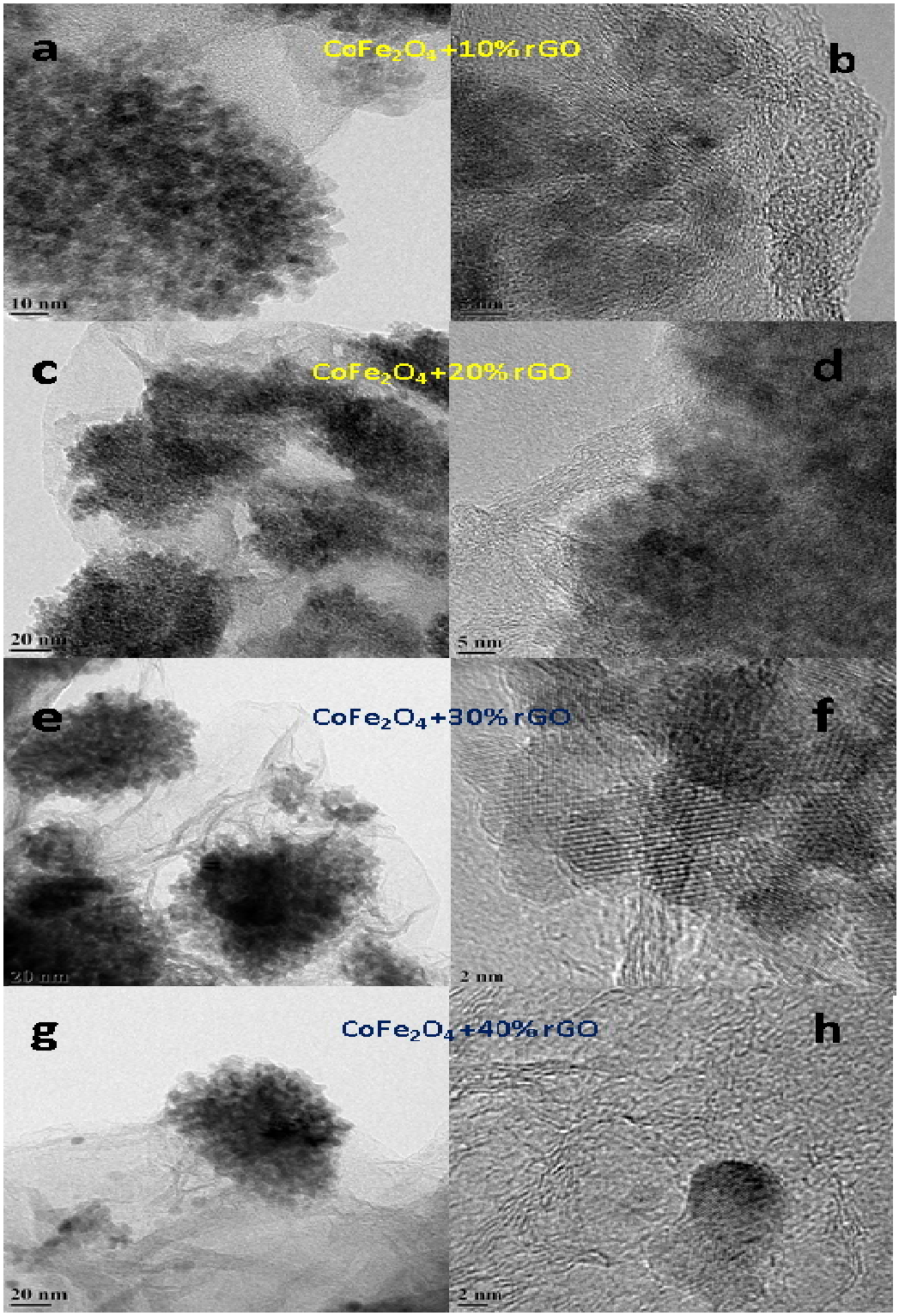

Figure S2. TEM images of $CoFe_2O_4$ +rGO composites at various magnifications.

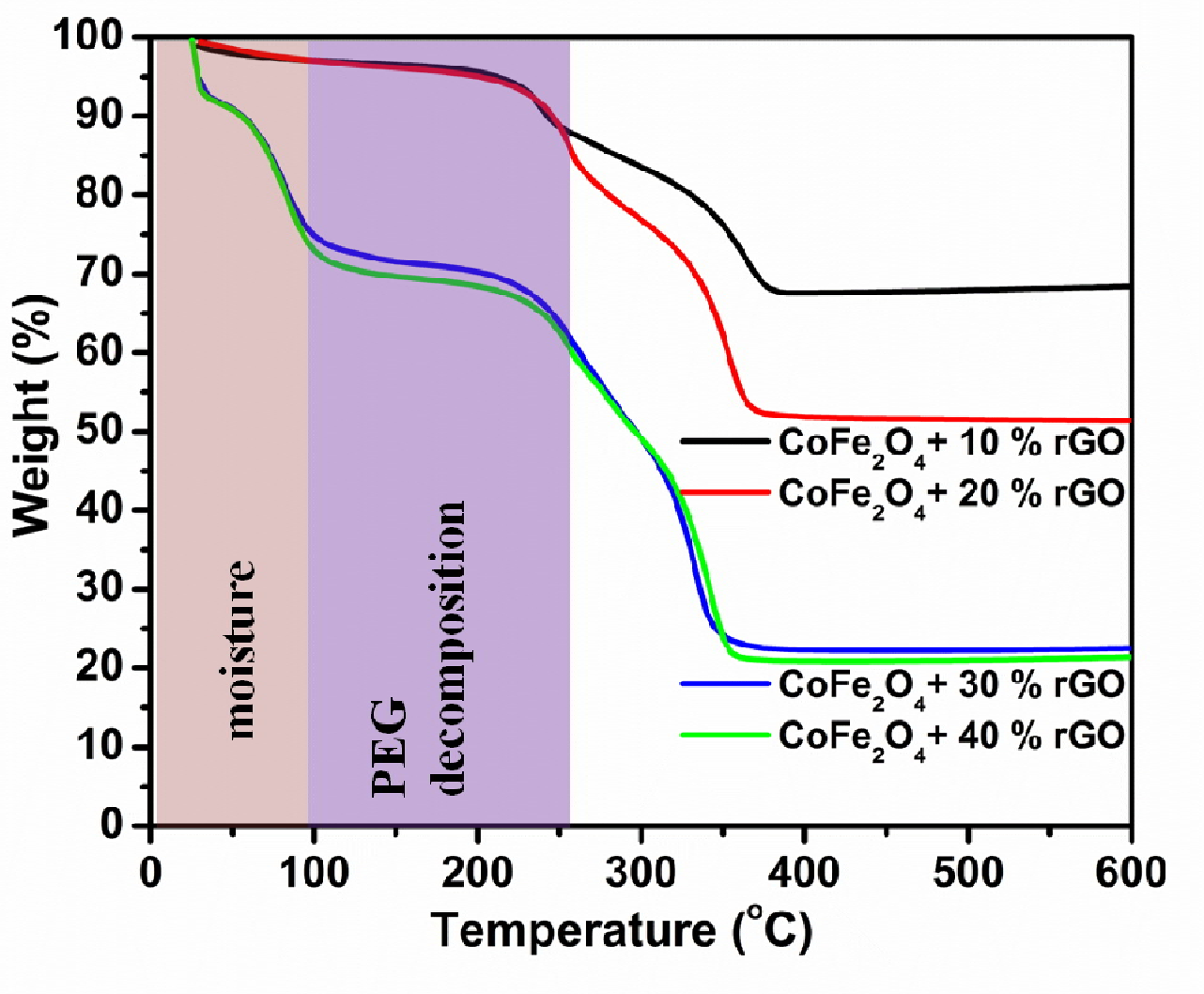

Figure S3: TGA analysis of $CoFe_2O_4$ + rGO composites

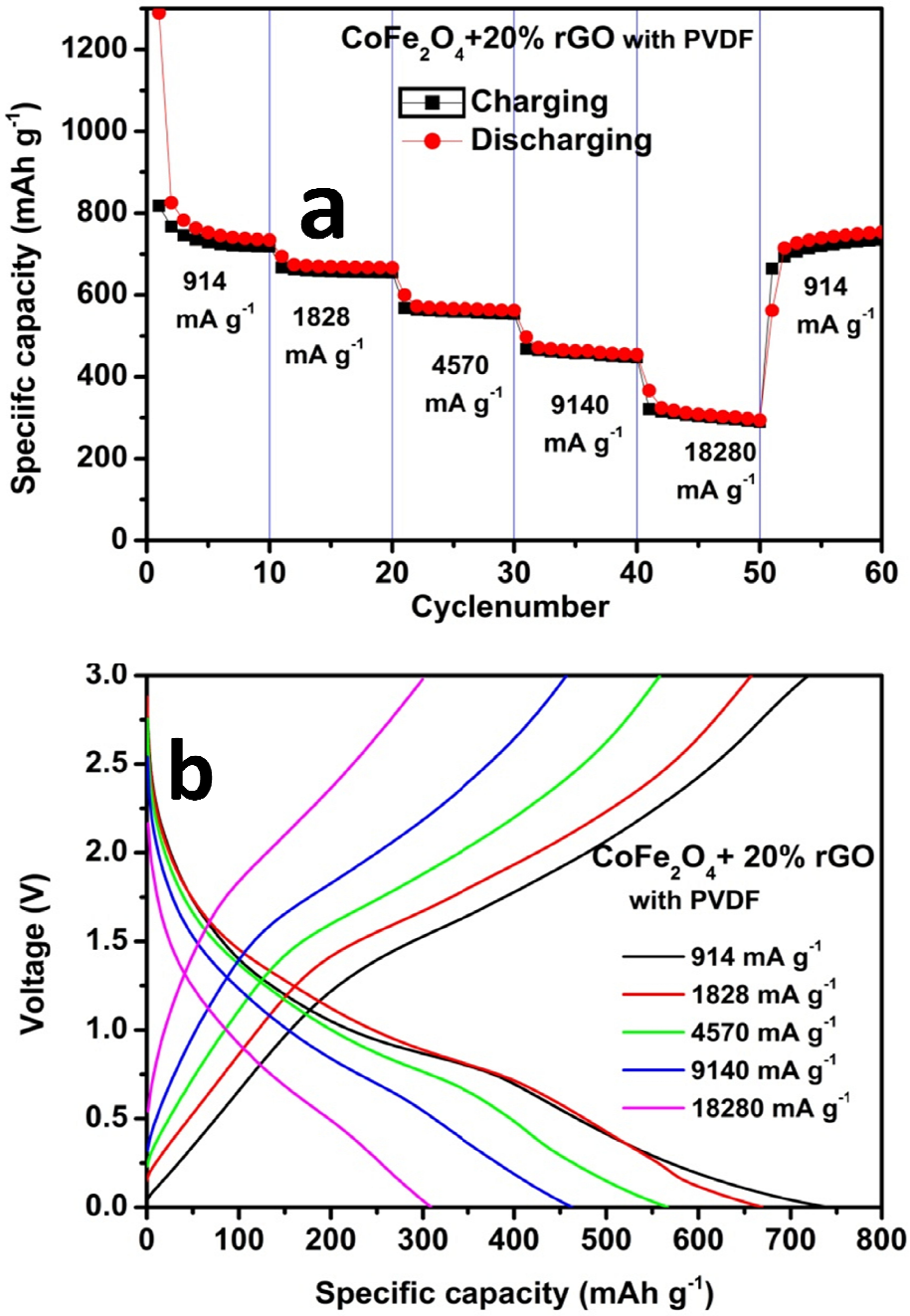

Figure S4 a) Discharge capacity vs. cycle number plots and b) Galvanostatic charge–discharge curves of $CoFe_2O_4$+20% rGO composite with PVDF binder at 0.1C rate.

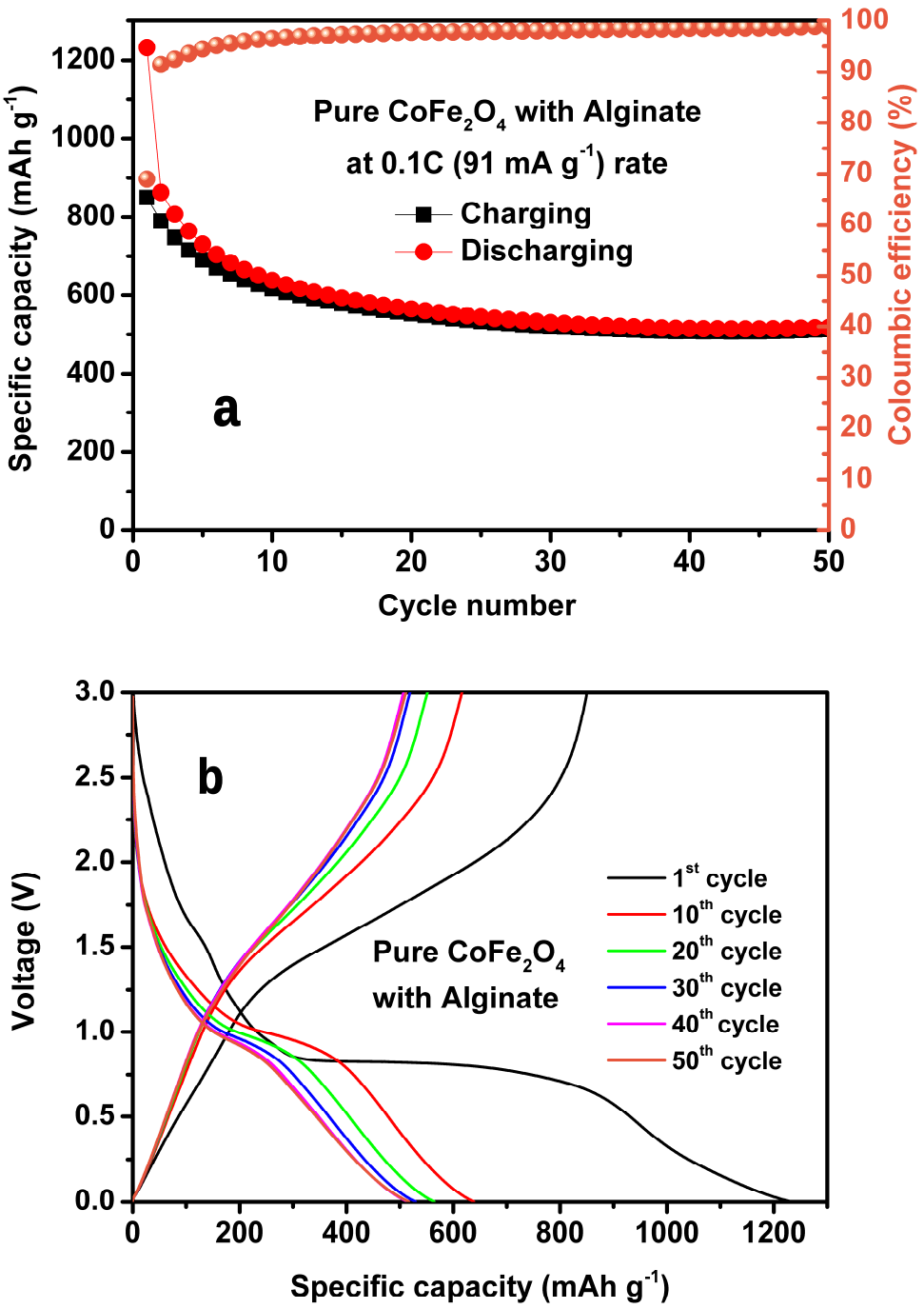

Figure S5: a) Specific capacity function of cycle number and b) charge-discharge curves for the pure $CoFe_2O_4$ nanoclusters with alginate binder.

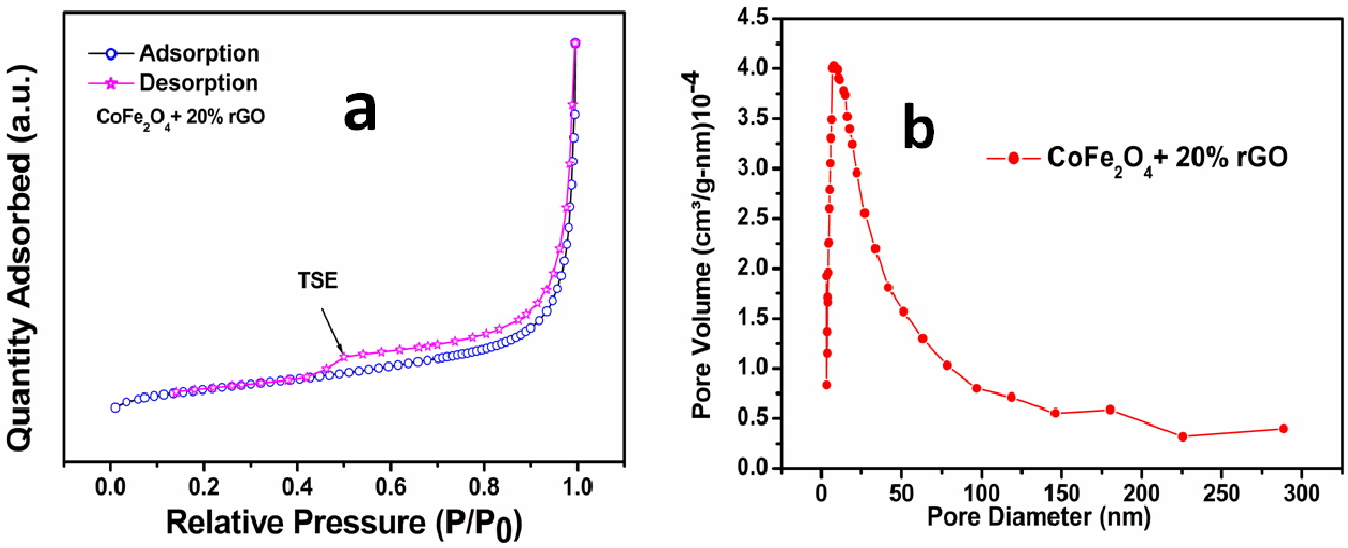

Figure S6: (a) N_2 adsorption–desorption isotherm and (b) dV/dD pore volume vs. pore diameter curve of $CoFe_2O_4$ + 20% rGO.

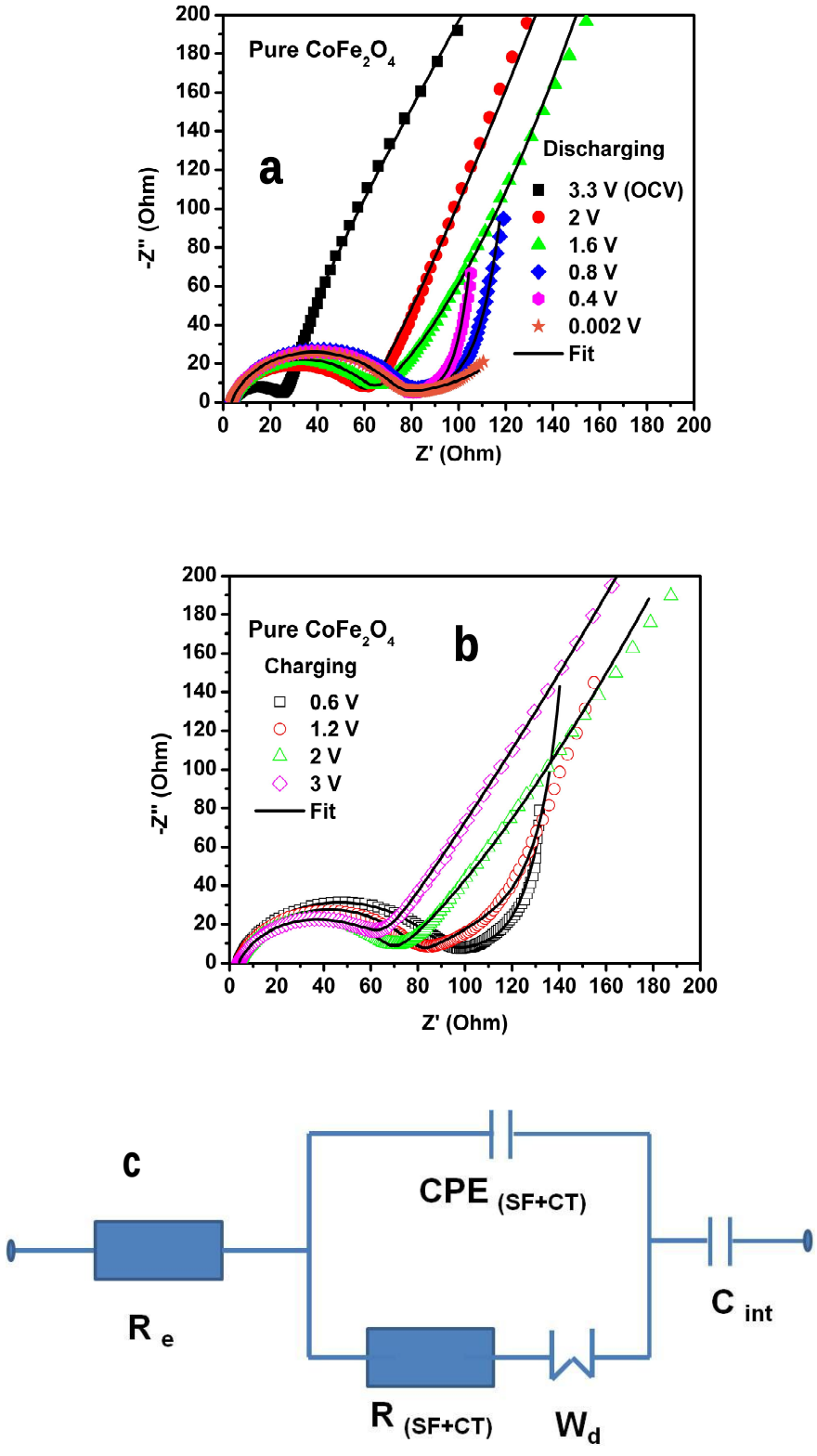

Figure S7: Nyquist plots for the pure $CoFe_2O_4$ nanoclusters sample while a) 1st discharging, b) 1st charging state and c) equivalent circuit for impedance plots.

Table S8: Impedance parameters of the pure $CoFe_2O_4$, $CoFe_2O_4$ + 20% rGO with PVDF and alginate binders during the 1st discharge–charge cycles at various voltages.

Voltage (V)	Pure $CoFe_2O_4$				$CoFe_2O_4$+20% rGO with PVDF				$CoFe_2O_4$+20% rGO with alginate			
	R_e (Ω)	$R_{(SF+CT)}$ (Ω)	W_d	CPE (F)	R_e (Ω)	$R_{(SF+CT)}$ (Ω)	W_d	CPE (F)	R_e (Ω)	$R_{(SF+CT)}$ (Ω)	W_d	CPE (F)
Discharging												
OCV	3.4	23	0.8	0.007	3.8	33.8	0.77	0.017	4.5	30.2	0.7	0.05
2	3.3	57	0.7	0.05	3.5	54	0.83	0.015	4.6	76.2	0.8	0.04
1.6	3.3	58	0.7	0.03	3.4	69	0.81	0.017	4.7	98.0	0.8	0.05
0.8	3.5	68	0.7	0.2	3.8	87	0.82	0.018	4.6	143	0.7	0.22
0.4	3.5	54	0.8	0.2	3.8	82	0.83	0.27	4.4	147	0.8	0.47
0.002	3.5	61	0.8	4.3	3.5	73	0.82	1.2	4.0	156.7	0.8	0.4
Charging												
0.6	3.6	65	0.8	0.2	3.6	89	0.8	0.24	4.0	138	0.8	0.6
1.2	3.5	75	0.8	0.12	3.6	100	0.7	0.16	4.1	91	0.7	0.3
2	3.7	64	0.7	0.1	3.6	74	0.7	0.07	4.0	42	0.7	0.1
3	3.8	64	0.7	0.004	3.3	72	0.8	0.01	4.2	33	0.7	0.01