

Deconvolution of Capacitive and Diffusive Charge/Lithium Storage in Lyophilized $\text{NiCo}_2\text{S}_4\text{-NiCo}_2\text{O}_4$ Composite for Supercapattery and Lithium-ion Battery

Kalidoss Kannadasan¹, Vaithiyanathan Sankar Devi¹, Suresh Archana¹, Paramanandam Thomas²
and Perumal Elumalai^{1*}

¹Electrochemical Energy Storage Lab, Department of Green Energy Technology, Madanjeet School of Green Energy Technologies, Pondicherry University, Puducherry – 605014, India

²Dielectric Materials Division, Central Power Research Institute, Bangalore – 560080, India

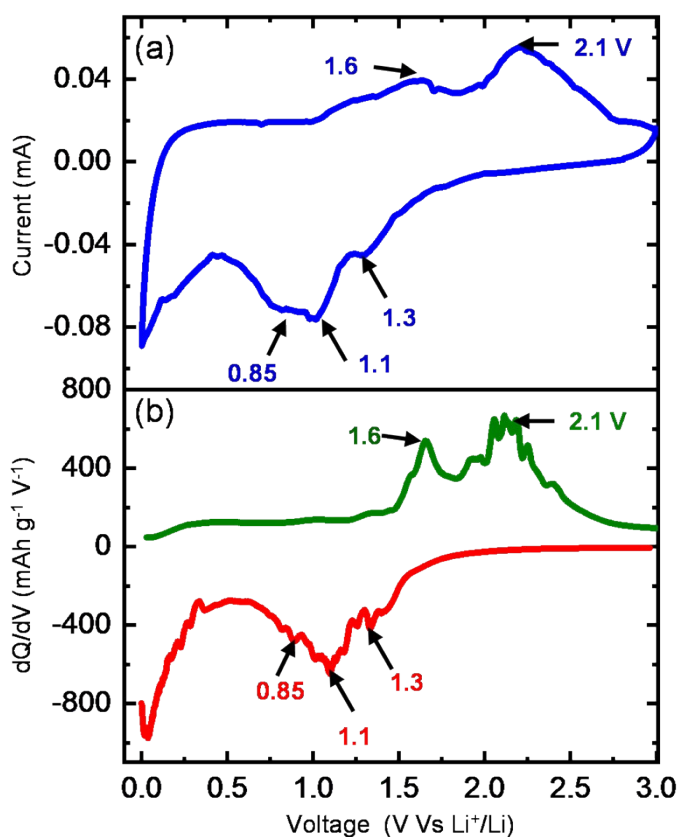


Fig. S1 (a) Conventional CV at 0.001 mV s^{-1} and (dQ/dV) curve of the charge-discharge profile at 0.2C -rate recorded for the NCS-NCO@GO composite.

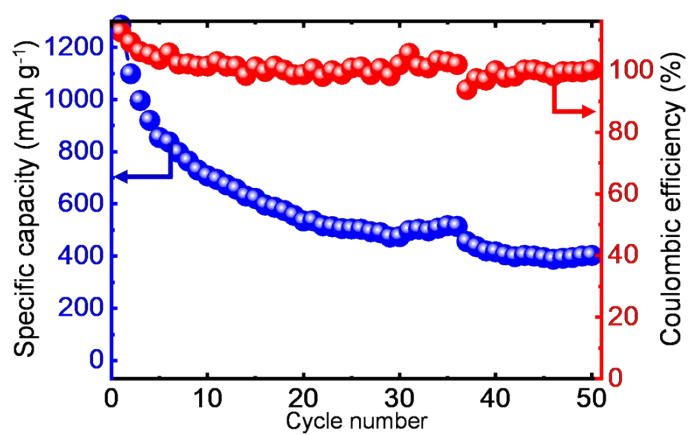


Fig. S2 Cycle-life data as well as Coulombic efficiency at 0.2C-rate recorded for the half-cell containing the NiCo₂S₄-NiCo₂O₄@GO composite anode

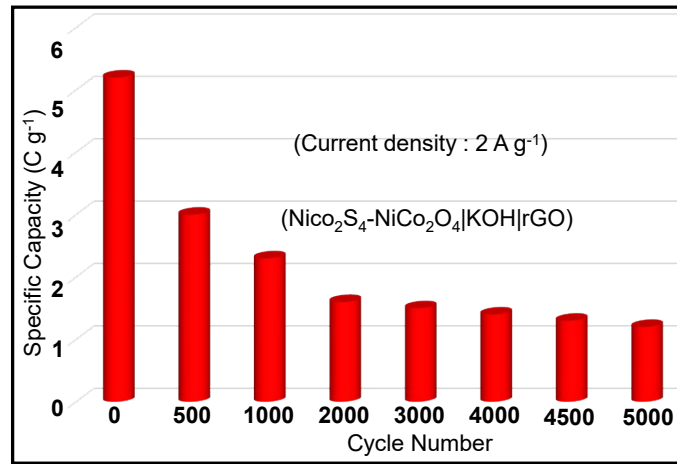


Fig. S3 Specific capacity vs. cycle number of the supercapattery device (NiCo₂S₄-NiCo₂O₄|KOH|rGO) recorded at a current density of 2 A g⁻¹

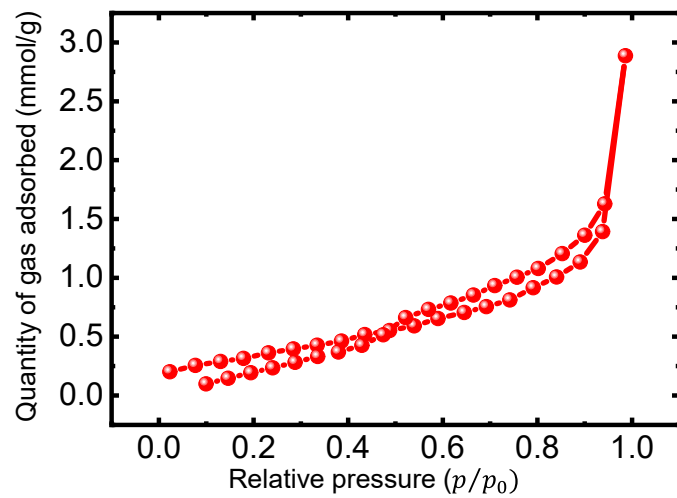


Fig. S4 N₂ adsorption-desorption isotherm recorded for the prepared GO sample.

Table S1 The ICP-OES analysis results of NCS-NCO composite

Samples	Ratio n(Ni): n(Co)	Contents of Ni (mg L ⁻¹)	Contents of Co (mg L ⁻¹)
NCS-NCO	1:2	1.00	1.863

Table S2: Fit values obtained from the Nyquist plots recorded for the CR-2032 coin cell before and after cycle-life tests.

Cell state	R_s (Ω)	R_{ct} (Ω)	C (F)	W (Ω s ^{-1/2})
Before cycle-life test	7.9	86	2.76×10^{-6}	276
After cycle-life test	74.6	215	1.72×10^{-6}	408