Supporting information

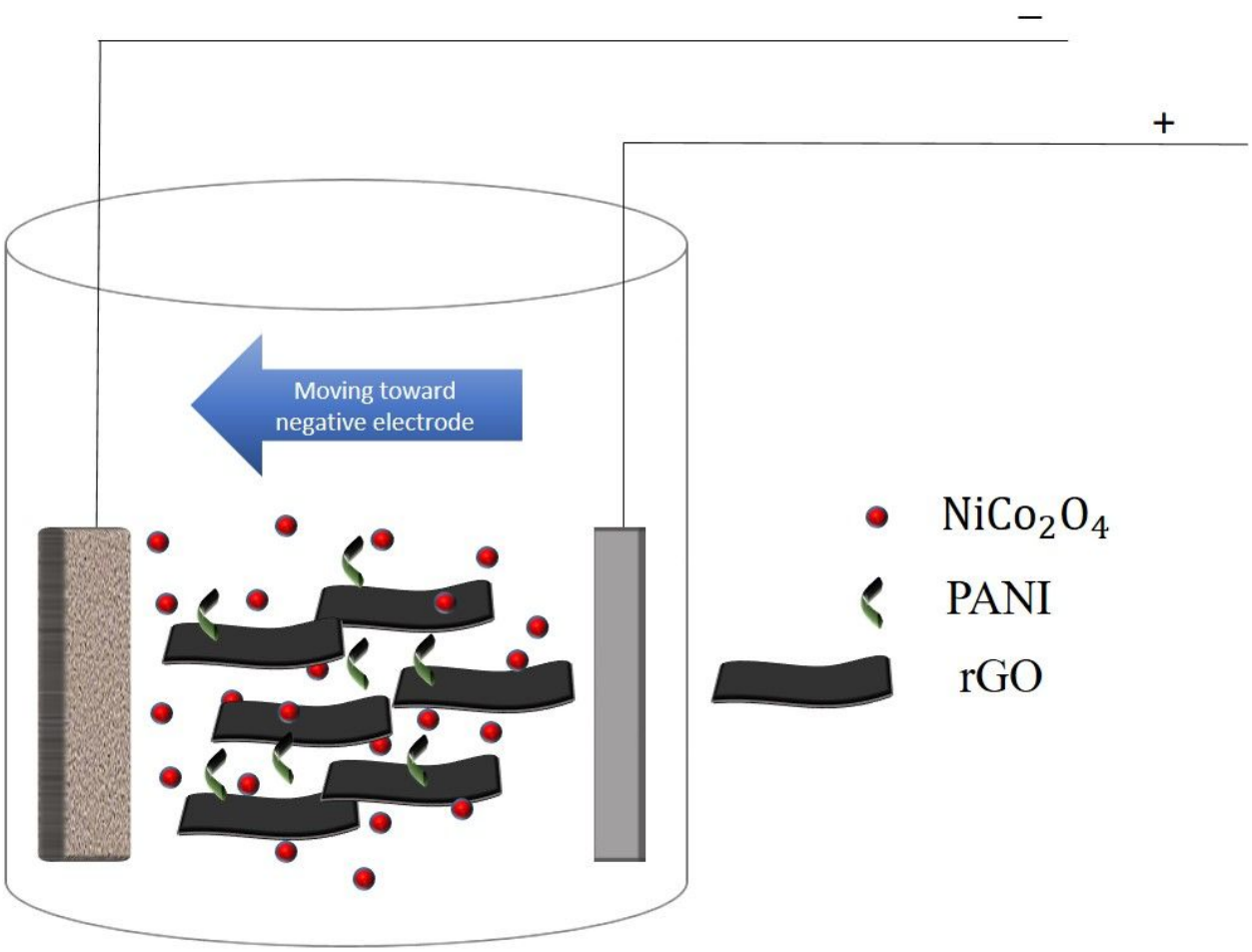

Figure SI 1. Schematic of multicomponent EPD process.

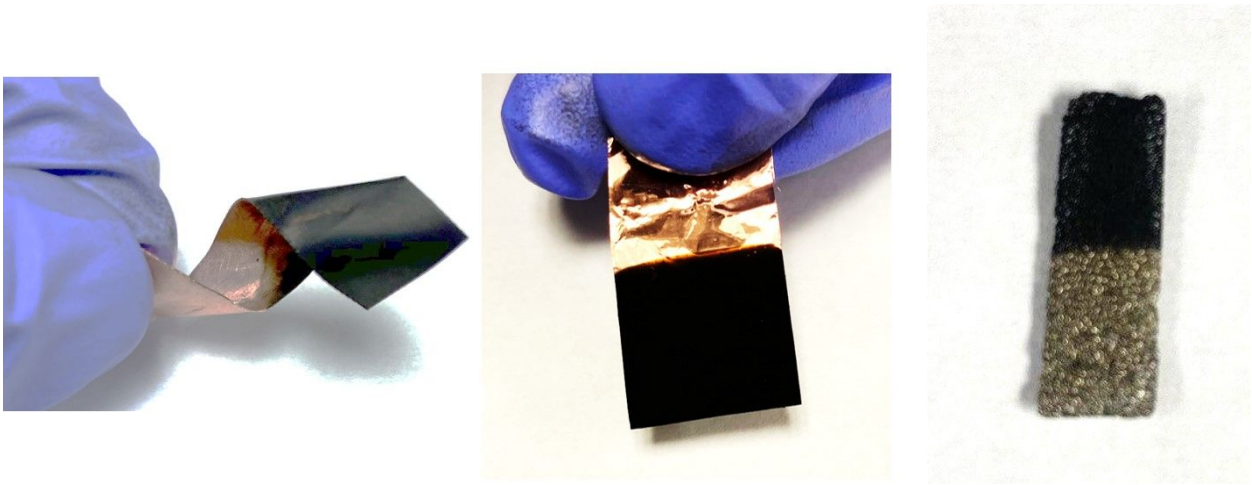

Figure SI 2. Optical images of NCO composite electrodes prepared using different morphologies and substrates showing EPD versatility.

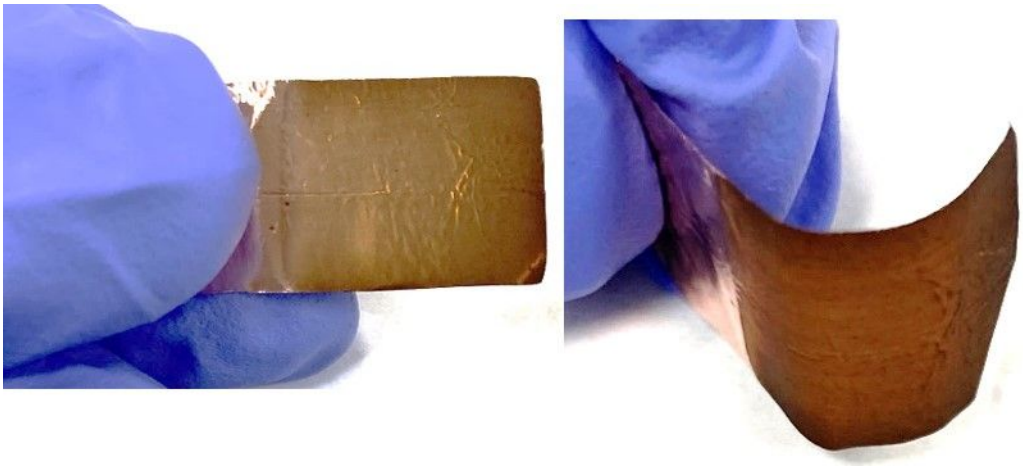

Figure SI 3. As-prepared $NiCo_2O_4$ composite on Cu foil, showing flexibility of final electrode even after bending 45°.

Determining components mass ratio after EPD

To determine the mass ratio of each component on as-prepared composite electrodes and investigate the co-deposition of each component during EPD, EPD suspensions were prepared using each component separately while keeping the concentration similar to final mixture that was used for composite fabrication. Then, samples were prepared using the above-mentioned

suspensions and the deposited mass was measured separately. Eventually each component's deposited mass was compared to the sum of the masses of the deposited materials on all three electrodes to determine a deposited mass ratio. The results are presented below in figure SI 4, showing similar mass ratio deposition for different EPD conditions, proving co-deposition during multi-component EPD fabrication.

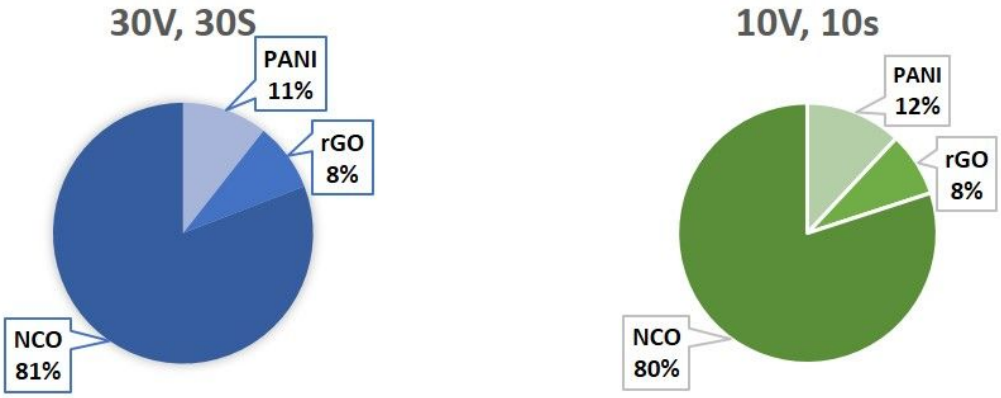

Figure SI 4. Mass ratio determination of $NiCo_2O_4$ (NCO), PANI and rGO deposited on Ni foam at different EPD conditions.

Controlling component mass ratio for supercapacitor electrode

We tested 3 component mass ratios, 20:1:1, 10:1:1 and 5:1:1 NCO/PANI/rGO, to find the desirable ratio. 10:1:1 ratio composite showed the best supercapacitor performance.

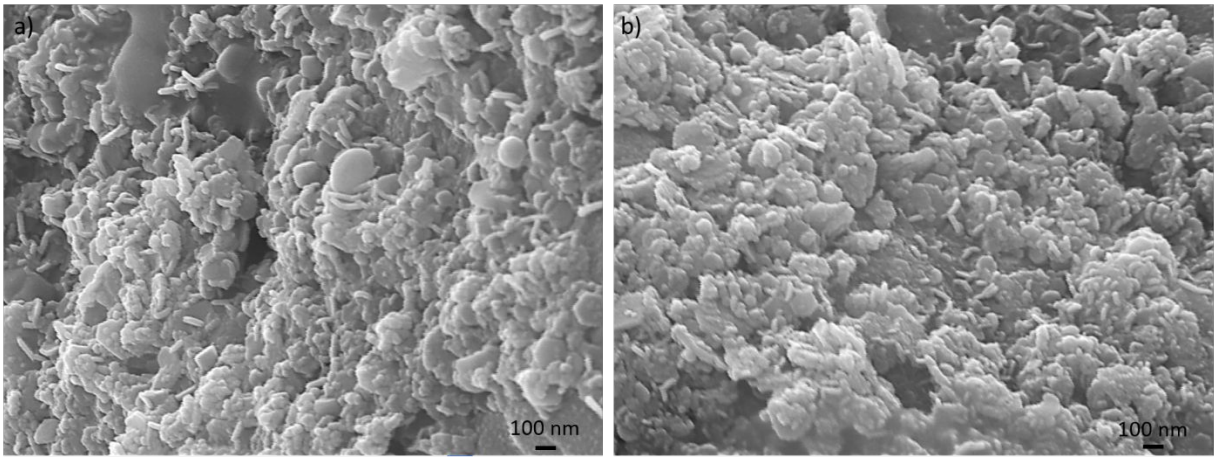

Figure SI 5. SEM images of $NiCo_2O_4$/C-PANI/rGO composite electrode on Ni foam showing how C-PANI is attached to NCO platelets, preventing aggregation of the particles.

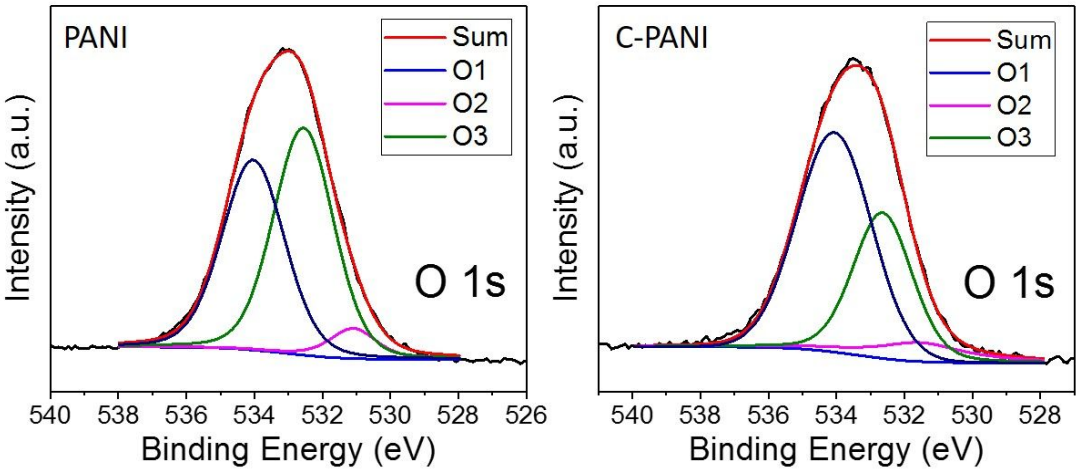

Figure SI 6. XPS O1s spectrum of PANI (left) and C-PANI (right).

PANI

Species	BE	%
Pyridinic Nitrogen N-6	398.9	60.6
Pyrrolic Nitrogen/Pyridone Nitrogen N-5	400.3	26
Quaternary Nitrogen N-Q	400.8	11.8
Pyridine-N-oxide N-X	402.9	1.6

C-PANI

Species	BE	%
Pyridinic Nitrogen N-6	398.9	15.8
Pyrrolic Nitrogen/Pyridone Nitrogen N-5	400.1	36.3
Quaternary Nitrogen N-Q	401.1	25.3
Pyridine-N-oxide N-X	402.9	22.6

Table SI 1. XPS N 1s survey deconvolution for PANI and C-PANI.

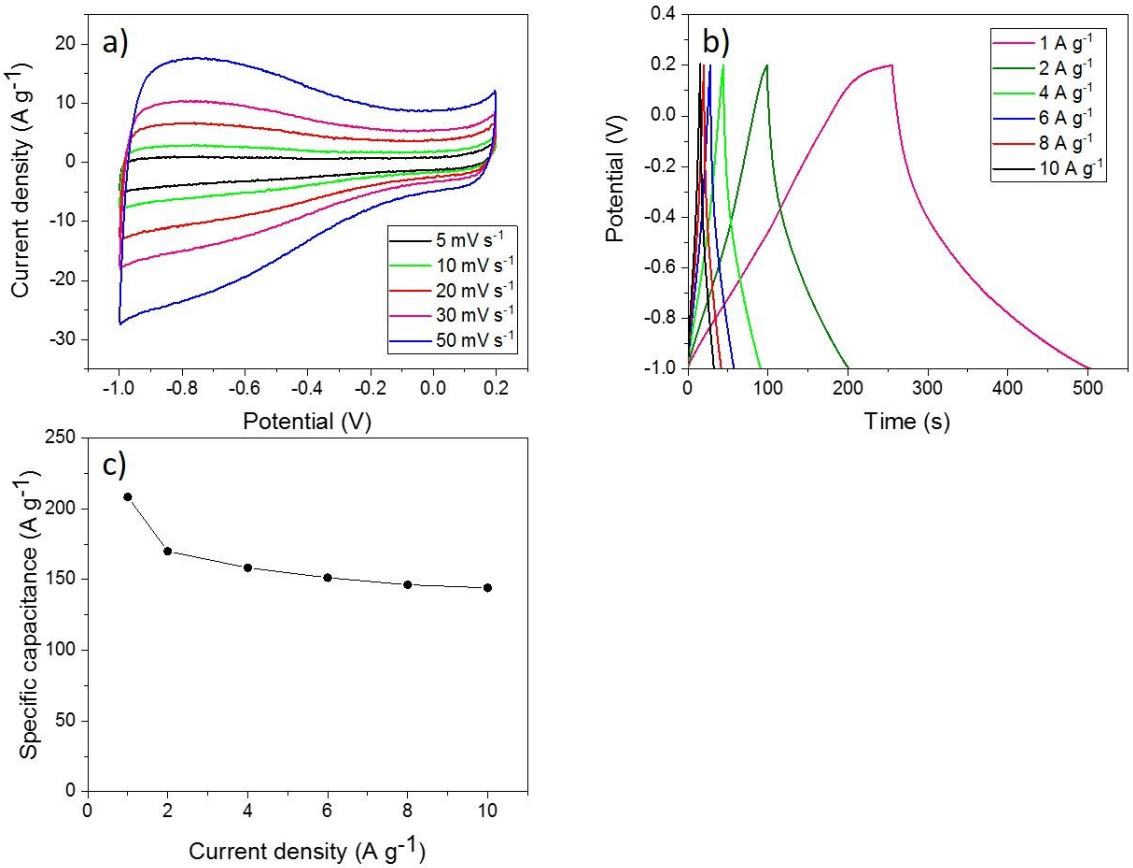

Figure SI 7. a) CV curves of AC at different scan rates. b) Charge-discharge curves of AC at different current densities. c) Specific capacitance of AC at different current densities.

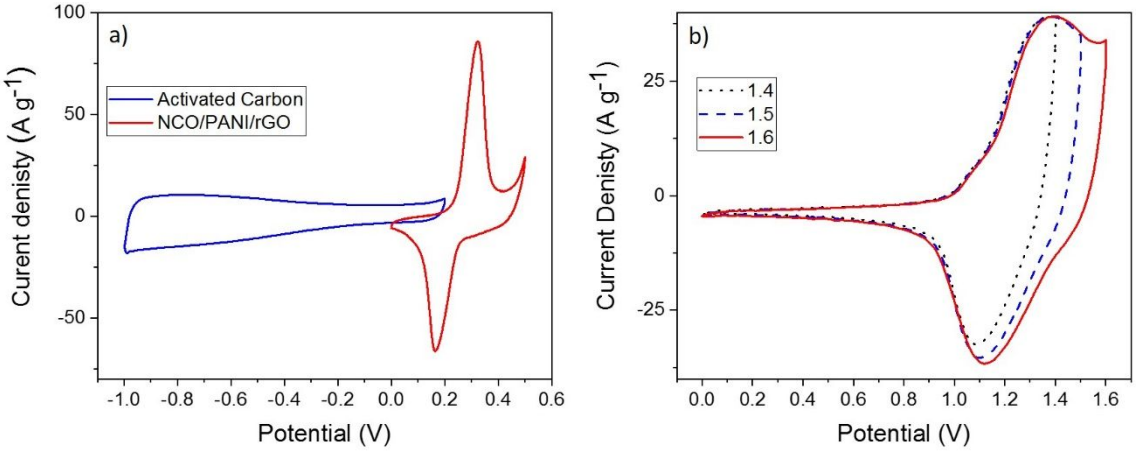

Figure SI 8. a) CV curves of AC and NCO/PANI/rGO electrodes at 20 mV s^{-1}. b) CV curves of NCO/PANI/rGO//AC ASC at different potential windows at 20 mV s^{-1}.