

Electronic Supporting Information

Fully printed energy storage devices on consumer paper substrates: An eco-friendly approach for low-cost and disposable smart electronics system

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In Figure S1 flow curves of Na-Alginate electrolyte and interlayer are reported.

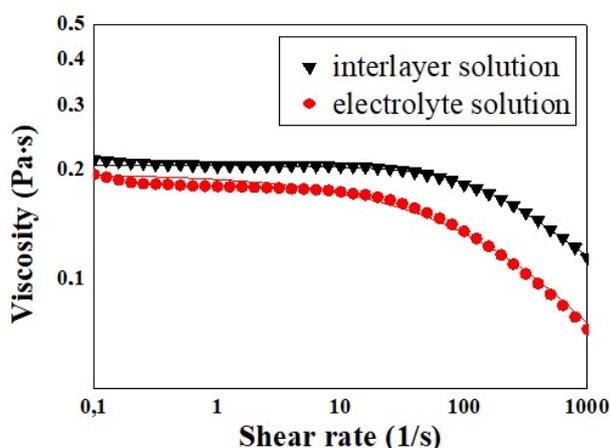


Figure S1: Flow-curves for Na-Alginate electrolyte solution and interlayer solution.

In Figure S2 we reported the SEM micrograph of carbon electrodes deposited on different type of paper substrates. As discussed in the main text the typical carbon morphology is observed in all cases, along with salts and other paper impurities.

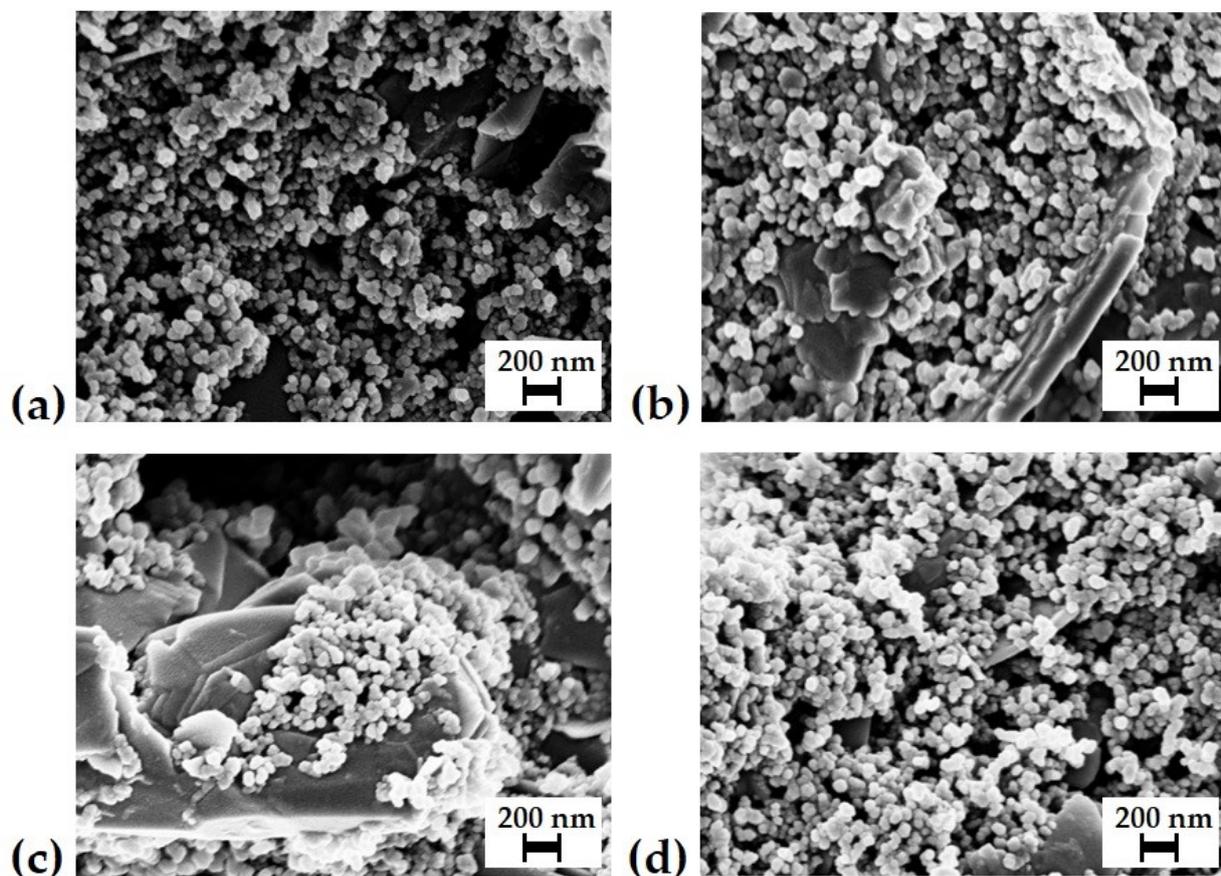


Figure S2: SEM micrograph of carbon electrode deposited on (a) Copy paper, (b) Cleaning cloth, (c) Kitchen paper FLORALYS (d) Napkin TORC.

In Table S1 the thickness measured for alginate-based material and carbon-based electrode is reported.

Table S1: Thickness of the different materials

<i>MATERIALS</i>	<i>AMOUNT</i>	<i>THICKNESS (μm)</i>
<i>EL</i>	600 μl	20 \pm 10
<i>I1+EL</i>	600+200 μl	50 \pm 1
<i>I2+EL</i>	600+400 μl	70 \pm 10
<i>Carbon</i>	70 μm wet	60 \pm 12 dry

We compared the behaviour of device with the three configurations: only electrolyte, and electrolyte + interlayer at two different thicknesses.

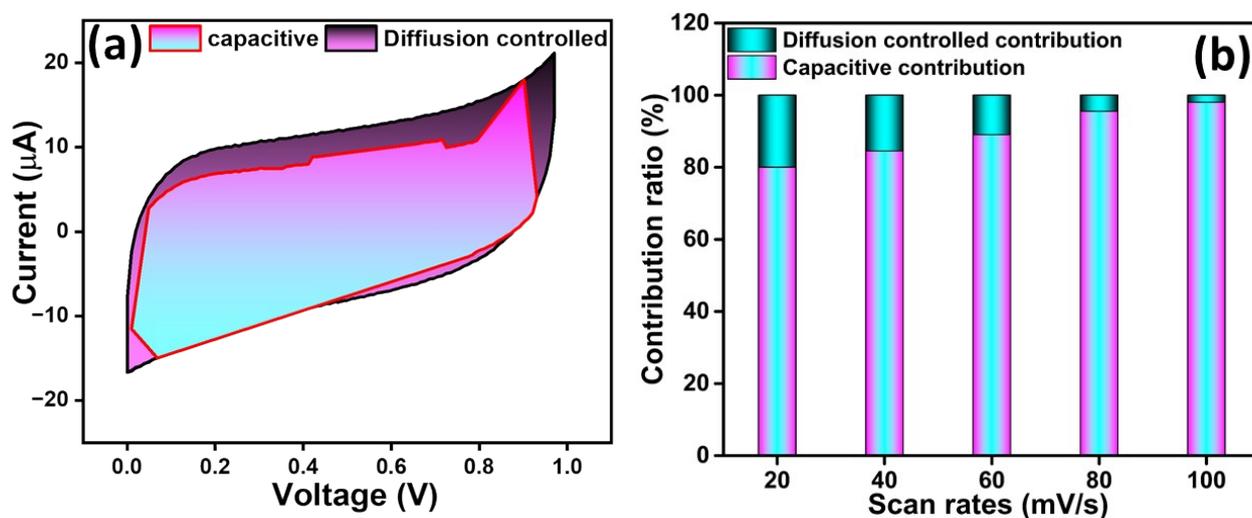


Figure S3: (a) Capacitive and diffusion-controlled contribution calculation for 40 mV/s scan rate and (b) bar graph showing the same contributions for other scan rates.

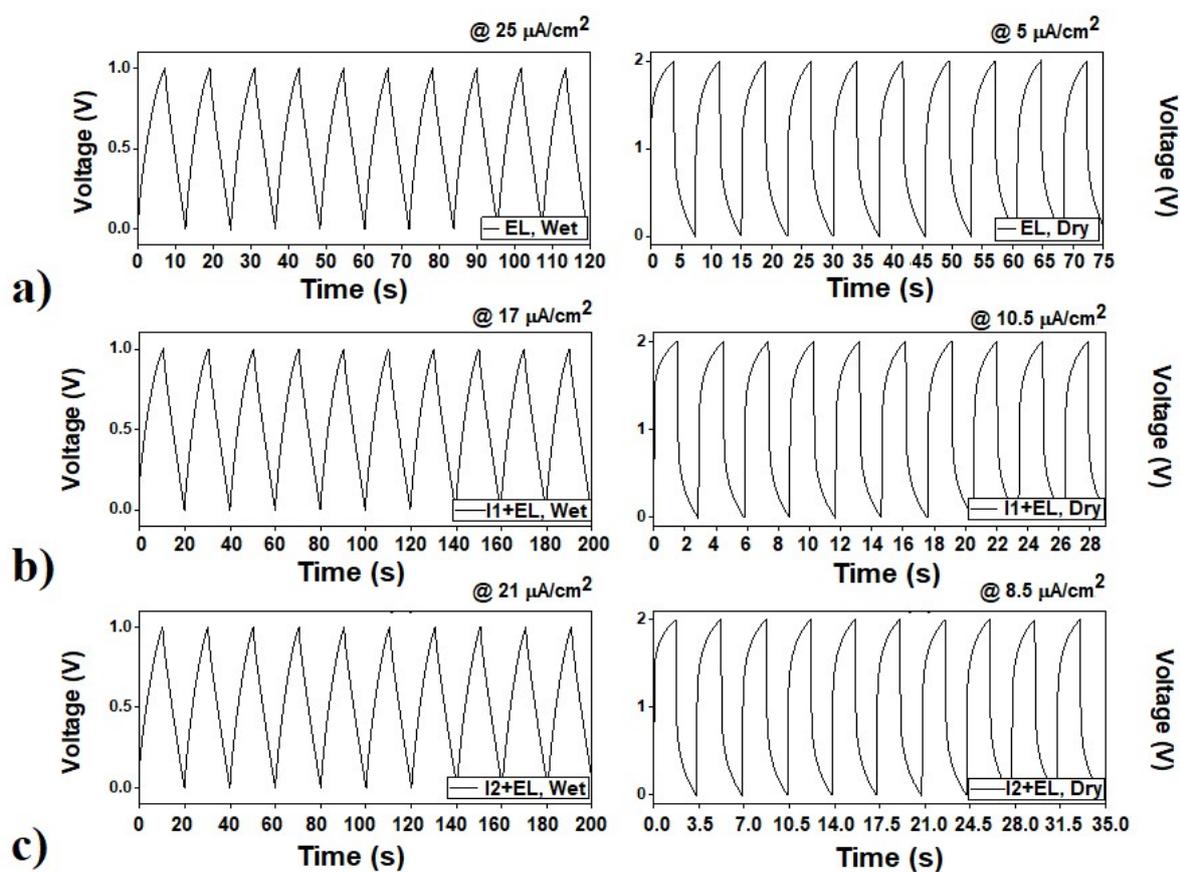


Figure S4: Charge discharge comparison for copy paper in the case of (a) EL configuration, Wet and Dry, (b) I1+EL configuration, Wet and Dry (c) I2+EL configuration, Wet and Dry.

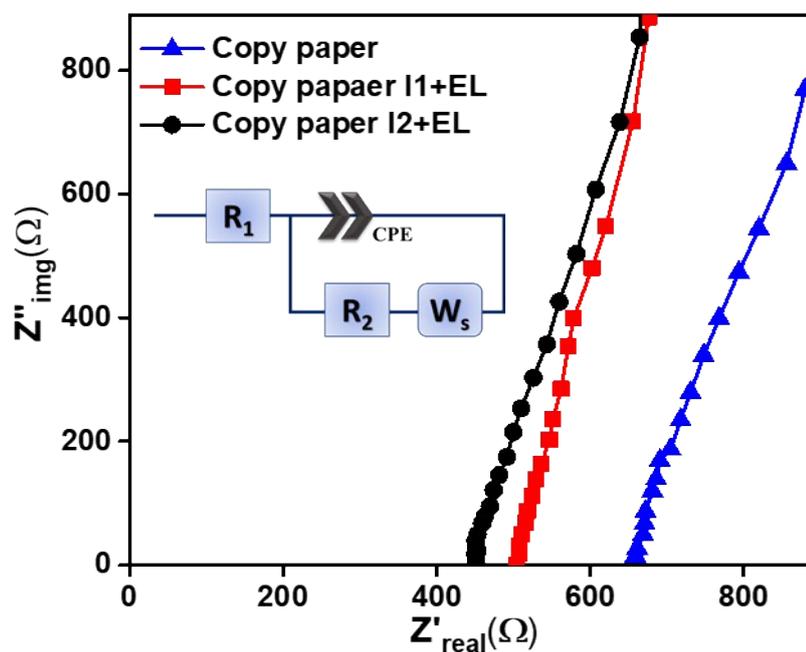


Figure S5: Nyquist plot comparison of the devices alongside the equivalent circuit.

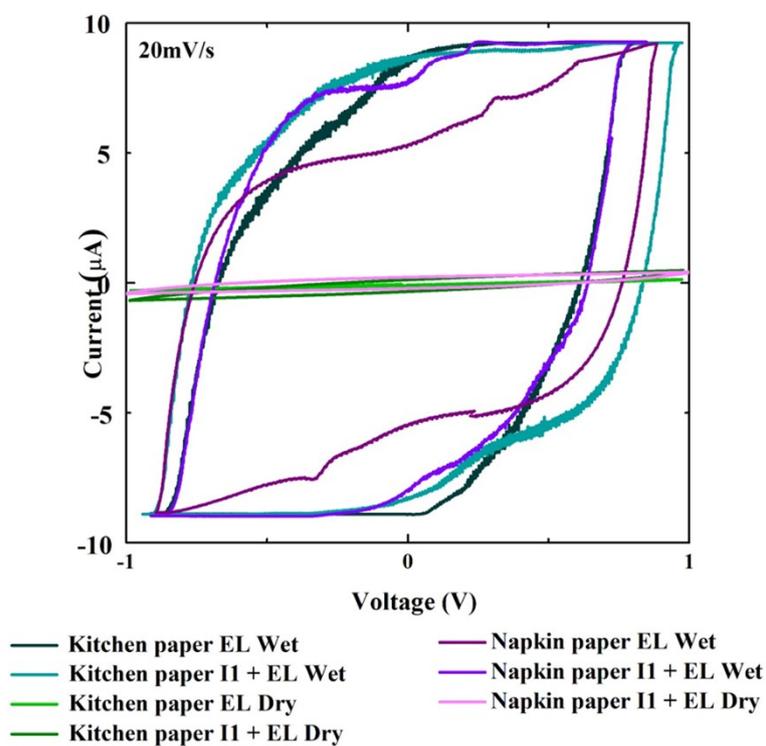


Figure S6: CV at 100 mV/s for Kitchen paper and Napkin paper at EL (Wet and Dry) and I1+EL (Wet and Dry) configurations.

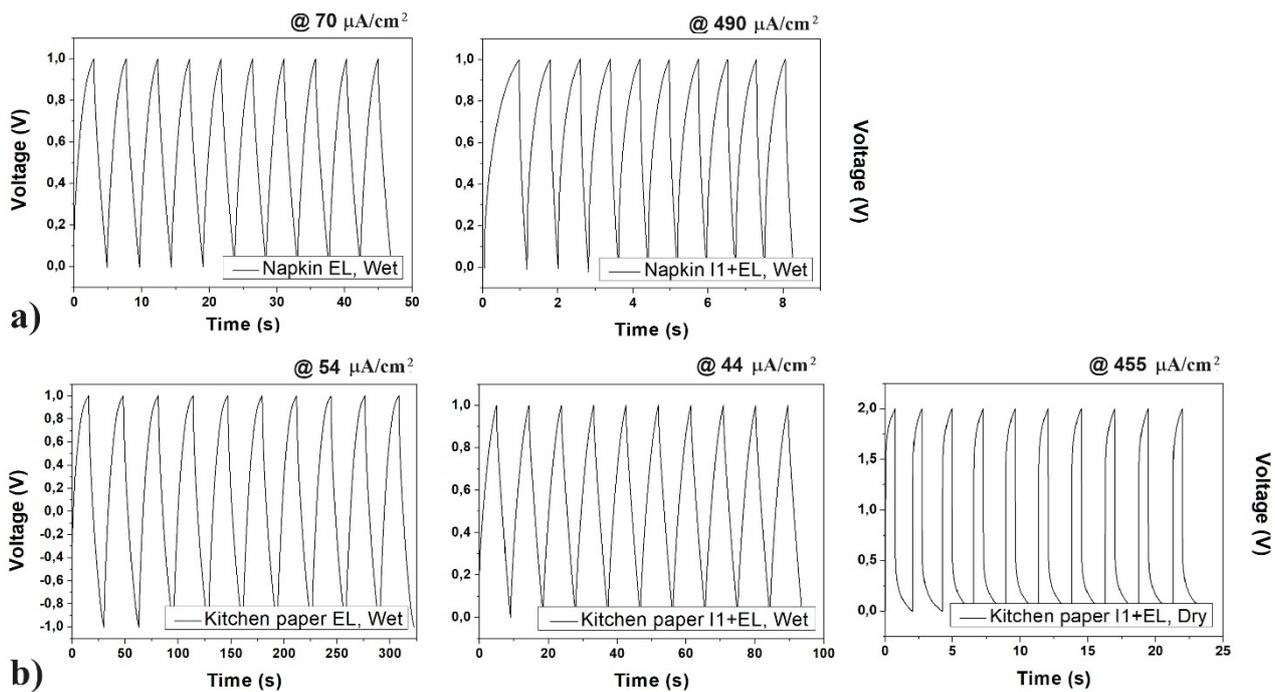


Figure S7: Charge discharge comparison for devices prepared on (a) Napkins TORK (b) Kitchen paper Floralys

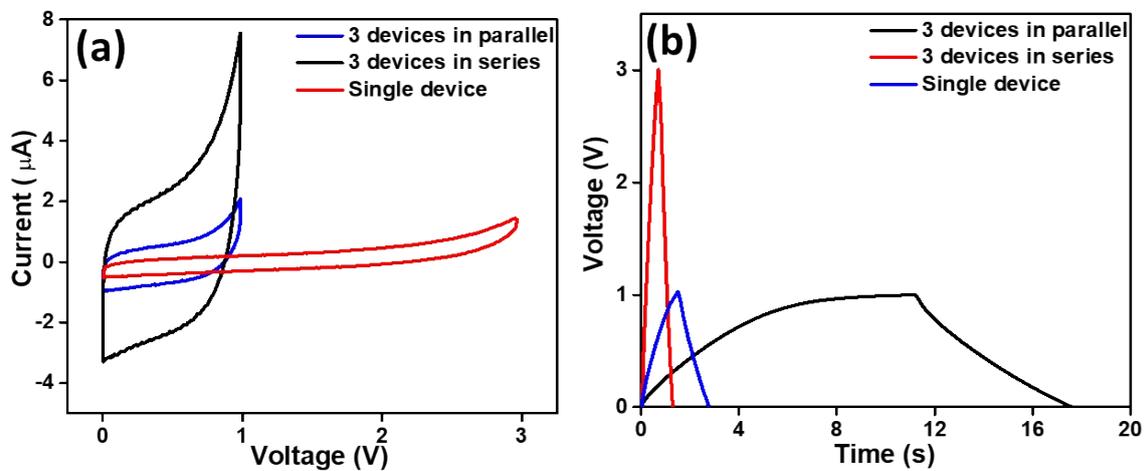


Figure S8: (a) CV curves and (b) GCD curves of the devices connected in series and parallel configurations

Table 2: Comparative table of the electrodes and their performance compared with the current work

Electrode	Substrate	Electrolyte	Capacitance	Energy density	Power density	References
Nanodiamond	Electronic paper	HPC+Na ₂ SO ₄	319 $\mu\text{F}/\text{cm}^2$	-	24 $\mu\text{W cm}^2$	[1]
Nanodiamond@MnO ₂	Boron doped diamond	Na ₂ SO ₄	406 $\mu\text{F}/\text{cm}^2$	-	-	[2]
VGN/ECR-CVD	Silicon	PYR ₁₃ TFSI	2 mF cm^{-2}	4 $\mu\text{Wh cm}^{-2}$	4 mW cm^{-2}	[3]
Carbon screen printed	Flexible	PVA/H ₃ PO ₄	3.1 $\mu\text{F cm}^{-2}$	-	-	[4]
CNT fibers	Silicon	NH ₄ F+H ₂ O+ethylene glycol	0.6 mF/cm^2	0.15 $\mu\text{Wh cm}^{-2}$	-	[5]
Polymer	Self-standing	Alg-PVA-HNO ₃	80.7 $\mu\text{F cm}^{-2}$	-	-	[6]
Carbon paste	paper	Sodium alginate	70 $\mu\text{F cm}^{-2}$	62 nWh/cm^2	251 $\mu\text{W}/\text{cm}^2$	This work

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