

Tailored Mesoporous Carbons for High-Stability Supercapacitors with Optimized Ion Transport

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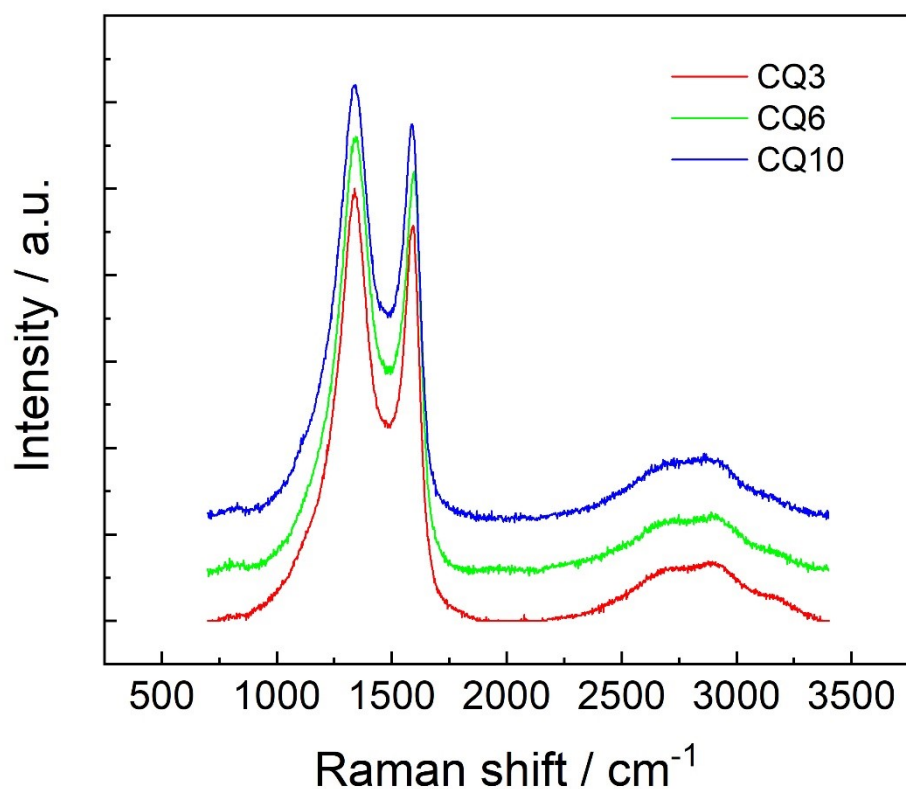


Figure S1: Raman spectra of CQ3, CQ6 and CQ10 carbons, normalized to the intensity of the D band for comparison. Spectra were recorded with 532 nm excitation and correspond to the average of four measurements acquired at a laser power of 2 mW.

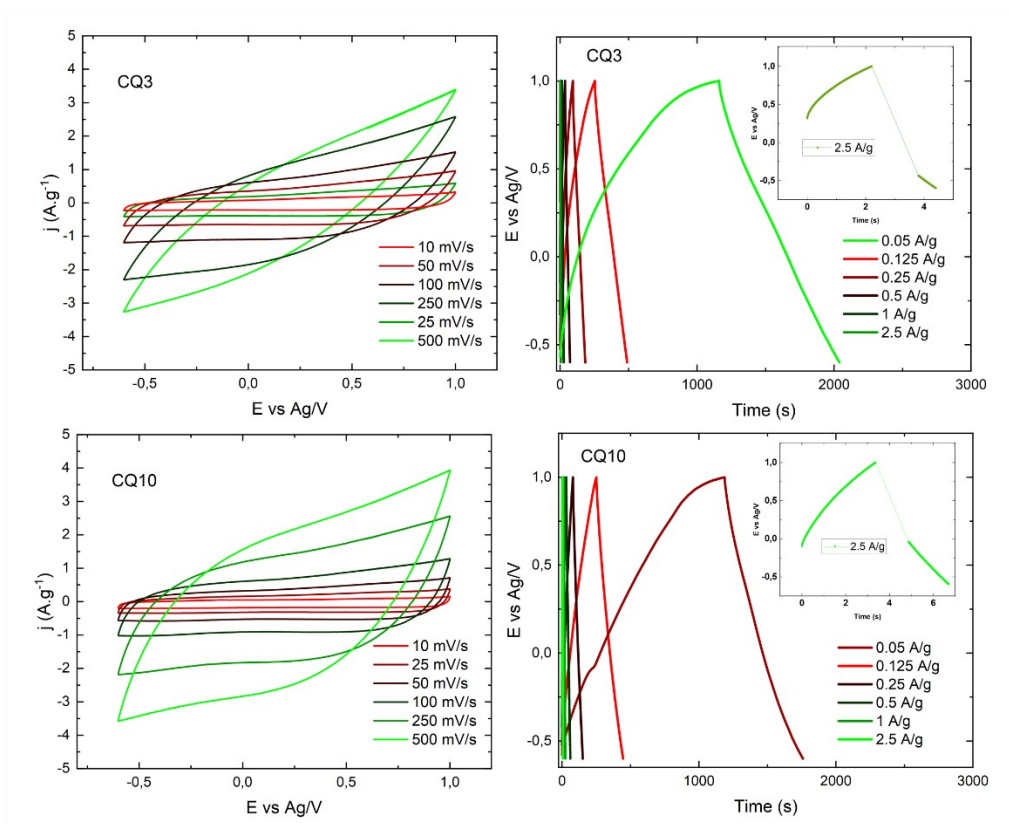


Figure S2: Upper: CV for CQ3 at different scan rates (left panel) and GCD curves for CQ3 at different current densities (right panel). Lower: CV for CQ10 at different scan rates (left panel) and GCD curves for CQ10 at different current densities (right panel). All measurements performed in 0.1 M Bu₄NPF₆ in acetonitrile.

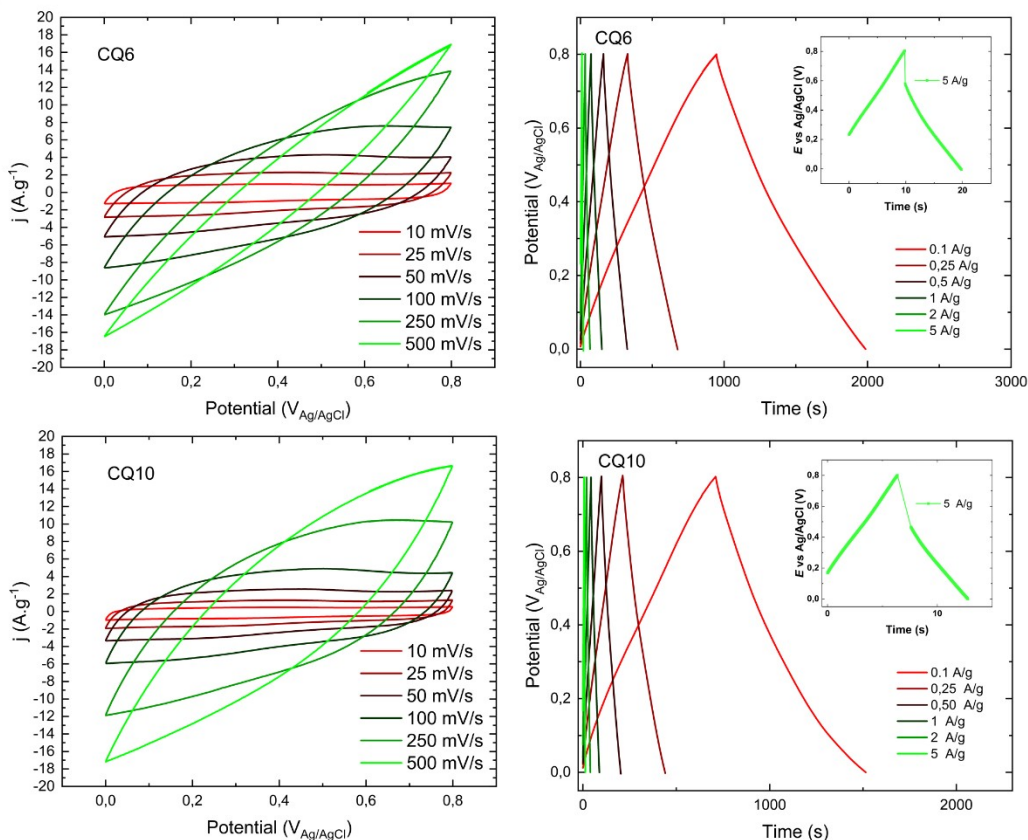


Figure S3: Upper: CV for CQ6 at different scan rates (left panel) and GCD curves for CQ6 at different current densities (right panel). Lower: CV for CQ10 at different scan rates (left panel) and GCD curves for CQ10 at different current densities (right panel). All measurements performed in aqueous 0.5 M H_2SO_4 .

Table S1: Equivalent circuit results from fitting of EIS experiments at OCP in 0.5 M H_2SO_4 aqueous solution and 0.1M Bu_4NPF_6 in acetonitrile.

Carbón	Organic medium			Aqueous medium		
	R_s (Ω)	Y_0 ($\text{mS}\cdot\text{s}^n$)	n	R_s (Ω)	Y_0 ($\text{mS}\cdot\text{s}^n$)	n
CQ3	1129 ± 8	1.1 ± 0.02	0.766 ± 0.009	510.9 ± 0.8	0.006 ± 0.04	0.920 ± 0.003
CQ6	1042 ± 7	0.598 ± 0.008	0.765 ± 0.006	215.2 ± 0.4	0.006 ± 0.03	0.937 ± 0.002
CQ10	935.8 ± 7	0.414 ± 0.006	0.789 ± 0.007	375.3 ± 0.7	1.49 ± 0.006	0.924 ± 0.002

Table S2: Experimental setup and electrochemical performance parameters for the symmetric supercapacitors based on CQ6 in organic medium and CQ3 in aqueous medium before and after long-term galvanostatic charge-discharge (GCD) cycling.

	Organic	Aqueous
Active material	CQ6	CQ3
Total mass loading (mg)	12	10.75
Positive electrode (mg)	5	5.75
Negative electrode (mg)	7	5
Binder	PVDF	PVDF
Electrolyte	0.25 M nBu ₄ NPF ₆	1 M H ₂ SO ₄
Current collector	Expanded graphite (GRAFILIT® SF)	Expanded graphite (GRAFILIT® SF)
Separator	Glass microfiber filters (Whatman)	Glass microfiber filters (Whatman)
Voltage range (V)	2.7	0.8
Current (mA)	2	4
Current density (A/g)	0.17	0.37
Number of cycles tested	10000	20000
Number of activation cycles	1000	500
Capacitance retention after	85% / 9000	96% / 19000
Energy Density before (Wh kg)	3.775	1.69
Energy Density after cycling (Wh kg)	2.835	1.55
IR drop before testing (V)	0.134	0.0424
IR drop after testing (V)	0.0989	0.0493
Power density before testing (W/kg)	522.7	152.1
Power density after testing (W/kg)	425.2	146.84
Coulombic efficiency (%)	97	99

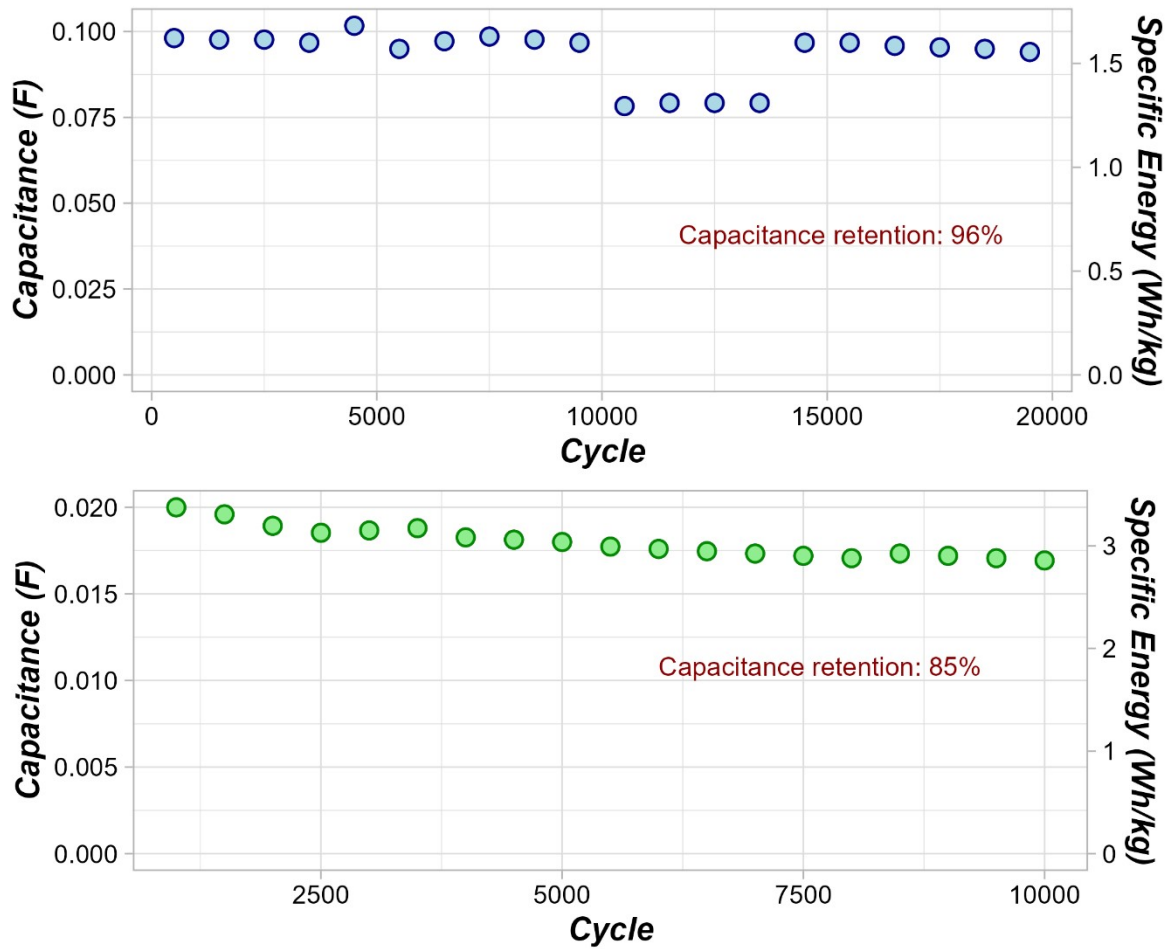


Figure S4: Capacitance vs. Cycle number for the two-electrode configuration. Top: in 0.1M Bu_4NPF_6 in acetonitrile. Bottom: in 0.5 M H_2SO_4 aqueous solution