Supplementary Information

Enhanced adsorptive properties and pseudocapacitance of hybrid Polyaniline-activated carbon cloth composites synthesized electrochemically in a filter-press cell

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Table S1. Elemental surface composition (in at.%) of a fresh activated carbon cloth and hybrid PAni-ACC composite materials formed by galvanostatic electropolymerization at different electrolysis time.

Time (min)	%C	%O	%N	%S
0 [1]	90.9	7.7	1.2	0.2
Side in contact to anode				
10	80.4	14.6	2.4	2.6
20	80.1	14.1	3.0	2.8
40	81.7	13.2	2.9	2.2
60	83.8	11.1	3.0	2.2
120	68.2	16.5	9.4	5.9
Side exposed to electrolyte				
10	84.3	10.4	1.9	2.6
20	82.9	11.7	2.8	2.6
40	80.9	14.2	2.7	2.2
60	83.8	11.9	2.0	2.4
120	71.2	15.5	7.7	5.6

[1] Average of analyses conducted on both sides of the fabric.

Table S2. C1s and N1s peak positions and relative abundance (in at.%) after peak fitting.

Time (min)	C1 (–C=C–/–C–C–)		C2 (C–O/C–N/C=N/C=N$^+$)		C3 (C=O/C–N$^+$)	
	BE (eV)	%	BE (eV)	%	BE (eV)	%
0	284.8	83.2	286.4	14.0	288.2	2.9
10	284.5	71.3	285.7	23.1	287.9	5.6
20	284.5	66.1	285.7	27.4	287.9	6.5
40	284.6	67.9	285.8	25,7	288.0	6.4
60	284.6	68.6	285.6	25,5	287.8	5.9
120	284.7	62.7	286.0	27.6	287.7	9.7

Time (min)	N1 (pyridine, =N–)		N2 (pyrrolic/pyridone, –NH–)		N3 (quaternary N, N$^+$ delocalized)		N4 (pyridinic N-oxide, N$^+$ localized)	
	BE (eV)	%	BE (eV)	%	BE (eV)	%	BE (eV)	%
0	398.1	23.4	399.9	25.8	400.7	41.9	401.7	8.9
10	398.1	6.2	399.6	28.8	400.8	46.2	402.1	18.8
20	398.4	4.9	399.7	31.2	400.6	50.3	402.2	13.5

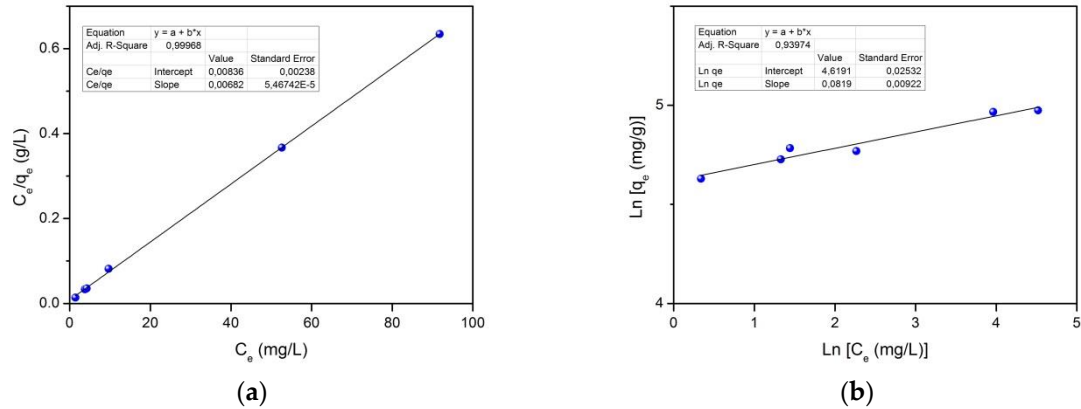| 40	398.2	10.2	399.7	34.6	400.8	34.2	402.3	21.0
60	398.4	13.4	399.8	29.4	400.5	34.8	401.8	22.4
120	398.3	4.0	399.4	40.1	400.2	49.3	401.9	6.6

Figure S1. Isotherm linearized fittings for Acid Red 27 adsorbed on activated carbon cloth (adsorbent dose: 0.04 g, liquid phase volume: 50 mL, temperature: 25 °C) (**a**) Langmuir isotherm; (**b**) Freundlich isotherm.
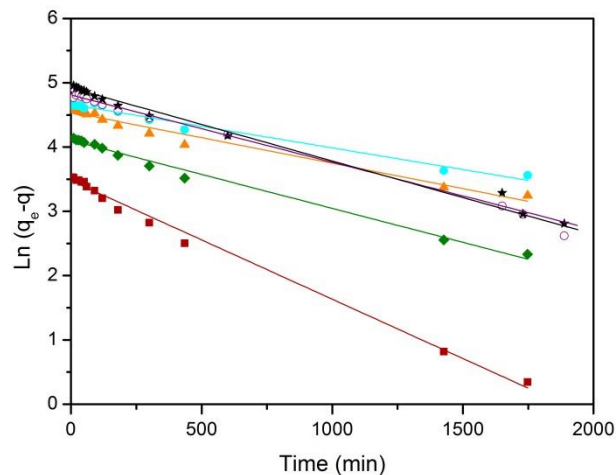

Figure S2. Pseudo-first order ln (q_e–q) vs. t plots for the adsorption of Acid Red 27 on activated carbon cloth at different initial dye concentrations: 25 mg/L (■), 50 mg/L (◆), 75 mg/L (▲), 100 mg/L (●), 150 mg/L (○), 200 mg/L (★); adsorbent dose: 0.04 g, liquid phase volume: 50 mL, temperature: 25 °C.
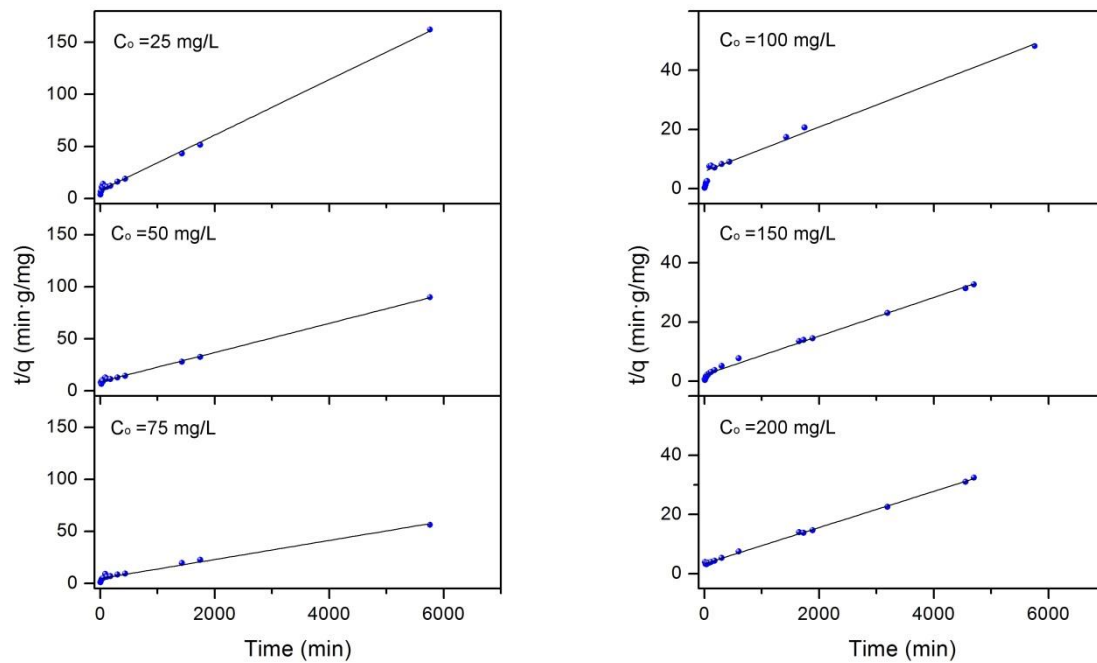
Figure S3. Pseudo-second order *t/q* vs. *t* plots for the adsorption of Acid Red 27 on activated carbon cloth at different initial dye concentrations; adsorbent dose: 0.04 g, liquid phase volume: 50 mL, temperature: 25 °C.
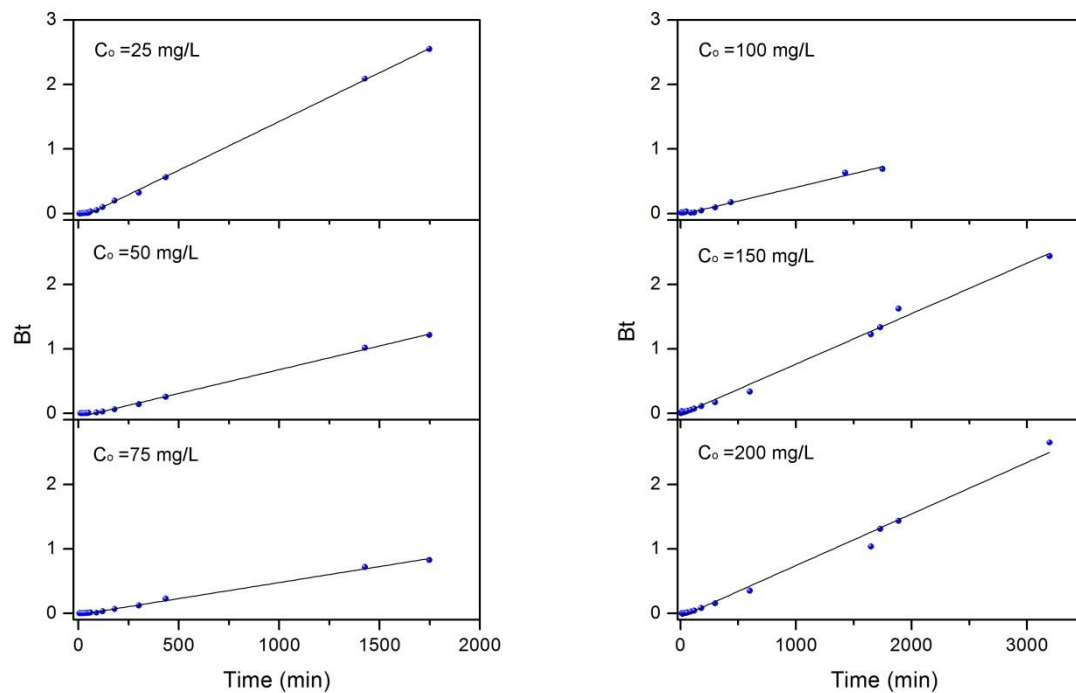

Figure S4. Boyd plots for the adsorption of Acid Red 27 on activated carbon cloth at different initial dye concentrations; adsorbent dose: 0.04 g, liquid phase volume: 50 mL, temperature: 25 °C.
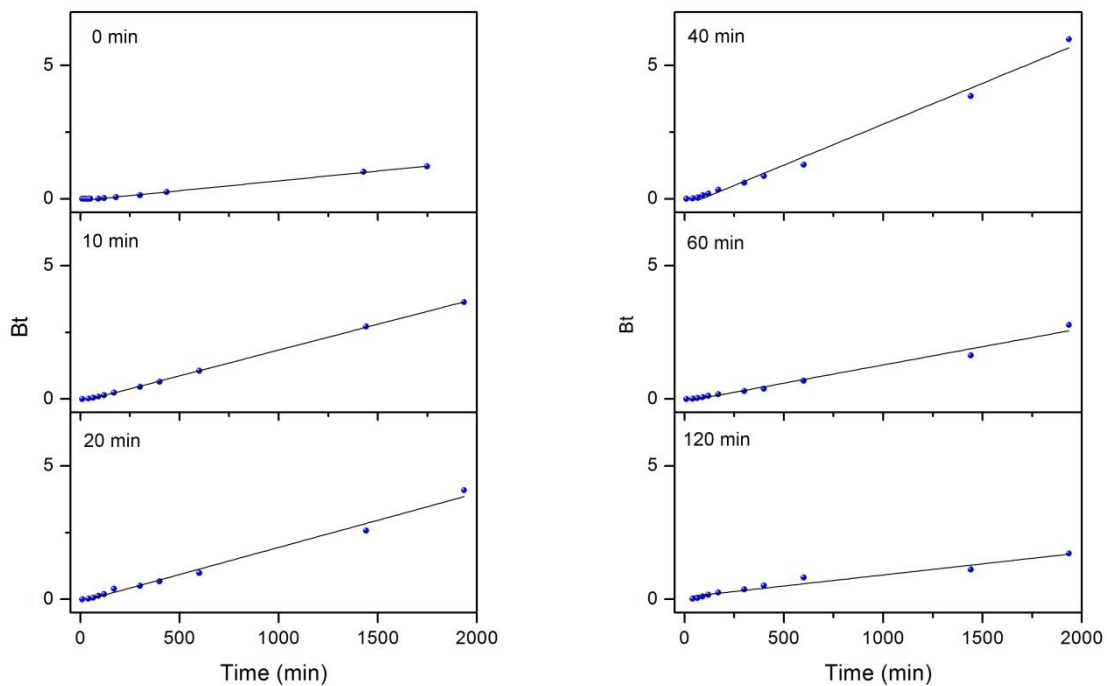
Table S3. Boyd plot parameters for the adsorption of Acid Red 27 on ACC (C_0: mg·L^{-1}; B: min^{-1}; D_e: m^2 s^{-1}).

C_0	B ($\times 10^3$)	Y-intercept	R^2	D_e ($\times 10^{17}$)
25	1.51	−0.084	0.999	6.34
50	0.74	−0.066	0.999	3.14
75	0.52	−0.025	0.998	2.20
100	0.43	−0.027	0.993	1.82
150	0.78	−0.017	0.994	3.30
200	0.80	−0.057	0.990	3.38

Figure S5. Boyd plots for the adsorption of Acid Red 27 on hybrid PAni-ACC composites formed at different electropolymerization time; initial dye concentrations: 50 mg L^{-1}; adsorbent dose: 0.04 g, liquid phase volume: 50 mL, temperature: 25 °C.

Table S4. Boyd plot parameters for the adsorption of Acid Red 27 (50 mg L^{-1}) on hybrid PAni-ACC composites synthesized at different electropolymerization time (time: min; B: min^{-1}; D_e: m^2 s^{-1}).

Time	B ($\times 10^3$)	Y-intercept	R^2	D_e ($\times 10^{17}$)
0	0.74	−0.066	0.999	3.14
10	1.93	−0.096	0.999	8.16
20	2.04	−0.087	0.989	8.59
40	3.06	−0.262	0.990	12.9
60	1.37	−0.086	0.983	5.77
120	0.08	0.087	0.957	–