Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

SUPPORTING INFORMATION

Insights on the influence of pore size and surface area of activated carbons on the energy storage of electric double layer capacitors with a new potentially universally applicable capacitor model.

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Table S1. Surface area normalized capacitance for the different models and the relative permittivity dependent on their respective pore size.

pore width L nm	<2 nm slit + >2 cylinder $F \cdot m^{-2}$	ESDCC $F \cdot m^{-2}$	ESDCC modified $F \cdot m^{-2}$	ESDCC factor	ε_r for ESDCC models
0.66	0.0849				1.81
0.69	0.0849	0.263	0.109	0.414	1.93
0.72	0.0849	0.225	0.374	1.661	2.06
0.75	0.0849	0.199	0.336	1.684	2.19
0.79	0.0849	0.180	0.177	0.984	2.34
0.82	0.0849	0.166	0.163	0.986	2.48
0.86	0.0849	0.154	0.0913	0.593	2.64
0.90	0.0849	0.144	0.1965	1.360	2.80
0.94	0.0849	0.0559	0.0662	1.185	2.97
0.98	0.0849	0.0566	0.0695	1.228	3.14
1.00	0.0849	0.0570	0.1065	1.870	3.24
1.10	0.0849	0.0582	0.0871	1.498	3.60

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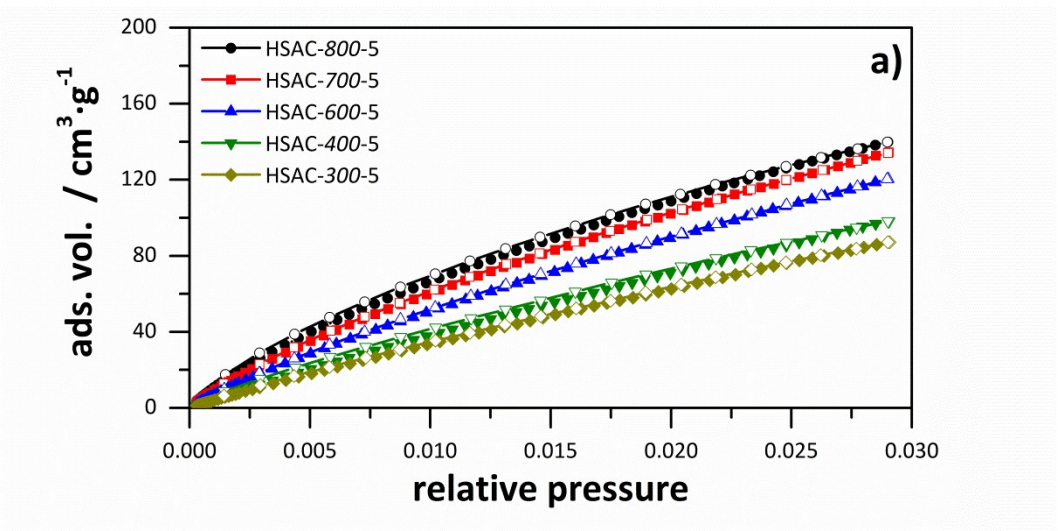
1.19	0.0849	0.0593	0.0585	0.986	4.00
1.30	0.0849	0.0604	0.0524	0.868	4.43
1.41	0.0849	0.0613	0.0458	0.747	4.91
1.54	0.0849	0.0622	0.0378	0.607	5.42
1.68	0.0849	0.0631	0.0504	0.799	5.99
1.83	0.0849	0.0638	0.0572	0.896	6.61
2.00	0.0849	0.0376	0.0377	1.001	7.28
2.18	0.0297	0.0468	0.0515	1.100	8.03
2.38	0.0378	0.0565	0.0681	1.209	8.84
2.60	0.0437	0.0665	0.0855	1.286	9.73
2.84	0.0483	0.0483	0.0550	1.137	9.73
3.10	0.0522	0.0522	0.0520	0.996	9.73
3.39	0.0556	0.0556	0.0249	0.448	9.73
3.70	0.0585	0.0585	0.0234	0.400	9.73
4.04	0.0611	0.0611	0.0460	0.753	9.73
4.41	0.0634	0.0634	0.0593	0.937	9.73
4.82	0.0654	0.0654	0.0658	1.006	9.73
5.27	0.0672	0.0672	0.0683	1.016	9.73
5.76	0.0688	0.0688	0.0704	1.023	9.73
6.30	0.0703	0.0703	0.0712	1.013	9.73
6.88	0.0716	0.0716	0.0716	1.000	9.73
7.52	0.0728	0.0728	0.0727	0.998	9.73
8.23	0.0739	0.0739	0.0742	1.004	9.73
9.00	0.0749	0.0749	0.0753	1.006	9.73
9.84	0.0758	0.0758	0.0783	1.033	9.73
10.76	0.0766	0.0766	0.0766	1.000	9.73

Relative permittivity (ε_r) for the combined sandwich + double-capacitor model was 9.73 and taken from ref. 1. The relative permittivity for the ESDCC models was adapted from ref. 1.


a)
HSAC-800-5
HSAC-700-5
HSAC-600-5
HSAC-400-5
HSAC-300-5
ads. vol. / cm3·g-1
relative pressure
0
40
80
120
160
200
0.000
0.005
0.010
0.015
0.020
0.025
0.030

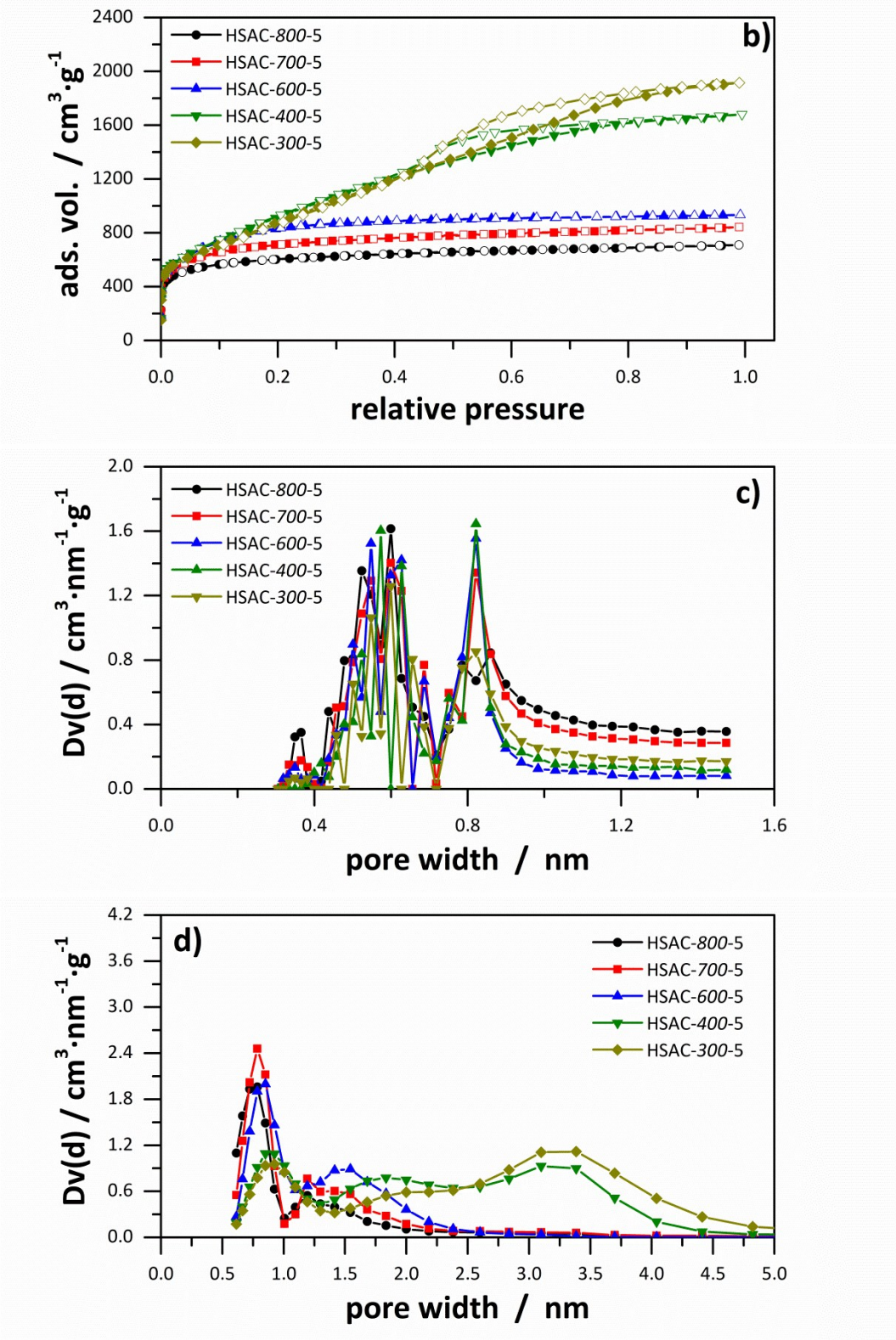


Figure S1. Physisorption data from HSAC-*800*-5, HSAC-*700*-5, HSAC-*600*-5, HSAC-*400*-5 and HSAC-*300*-5; (a) CO_2 adsorption-desorption isotherms (273 K); (b) N_2 adsorption-desorption

isotherms (77 K); (c) pore size distributions derived from CO_2 desorption isotherms calculated by the NLDFT method; (d) pore size distributions derived from N_2 desorption isotherms calculated by the QSDFT method.

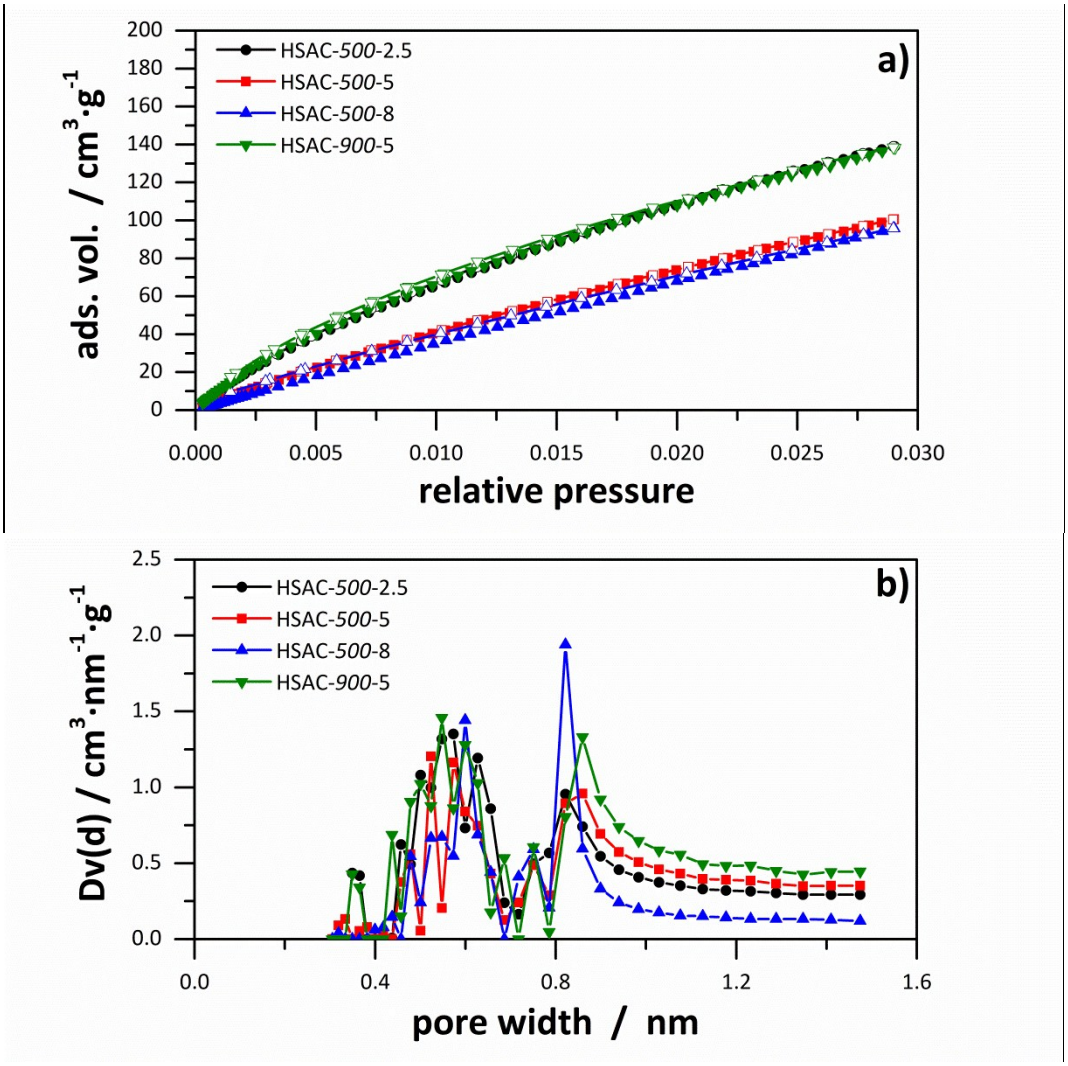


Figure S2. Physisorption data from HSAC-*500*-2.5, HSAC-*500*-5, HSAC-*500*-8 and HSAC-*900*-5; (a) CO_2 adsorption-desorption isotherms (273 K); (b) pore size distributions derived from CO_2 desorption isotherms calculated by the NLDFT method.

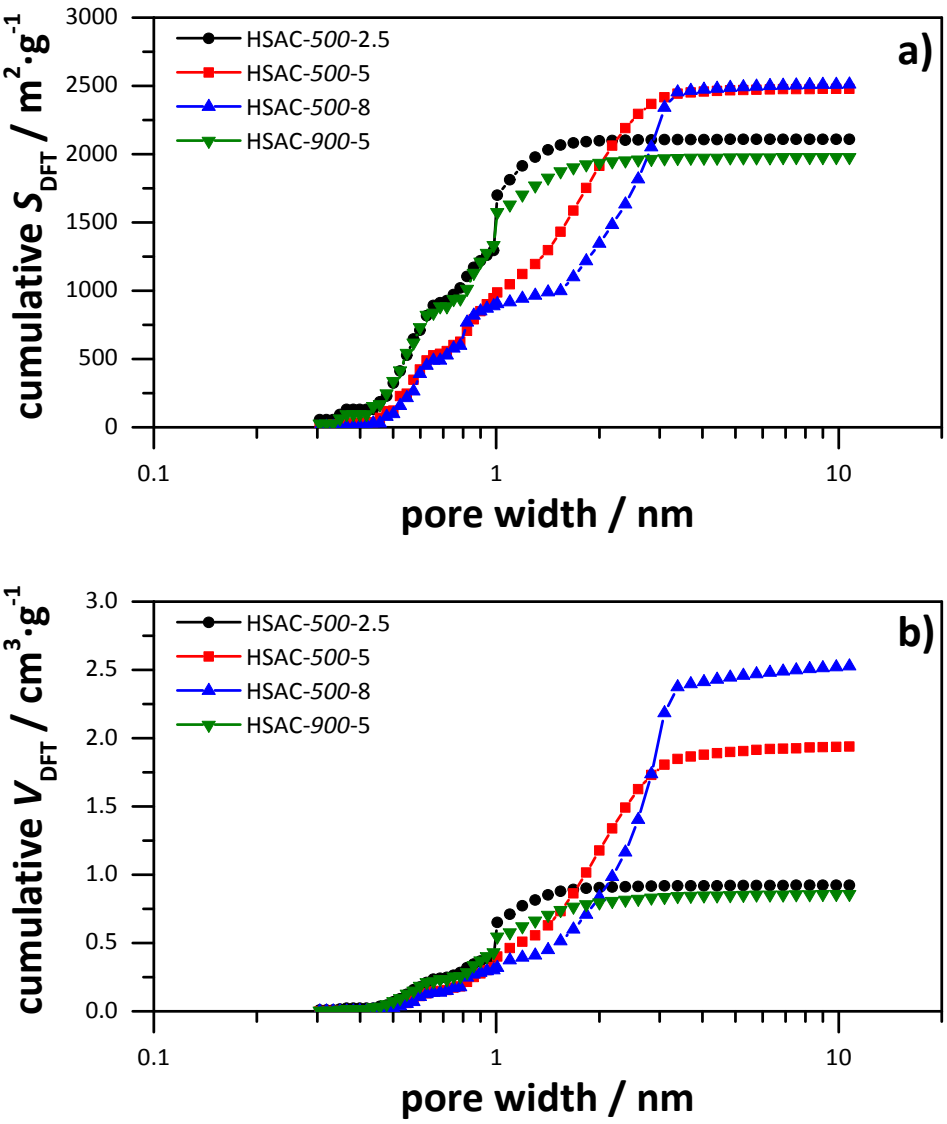


Figure S3. Combined cumulative specific surface area (a) and cumulative specific pore volume (b) derived from carbon dioxide and nitrogen physisorption data of the prepared HSAC with different ratios of KOH and carbon as well as HSAC-*900*-5.

References

1 W. Hsieh, T.-L. a. Horng, H.-C. Huang and H. Teng, *J. Mater. Chem. A*, 2015, **3**, 16535-16543.