About OMICS Group

OMICS Group International is an amalgamation of Open Access publications and worldwide international science conferences and events. Established in the year 2007 with the sole aim of making the information on Sciences and technology 'Open Access', OMICS Group publishes 400 online open access scholarly journals in all aspects of Science, Engineering, Management and Technology journals. OMICS Group has been instrumental in taking the knowledge on Science & technology to the doorsteps of ordinary men and women. Research Scholars, Students, Libraries, Educational Institutions, Research centers and the industry are main stakeholders that benefitted greatly from this knowledge dissemination. OMICS Group also organizes 300 International conferences annually across the globe, where knowledge transfer takes place through debates, round table discussions, poster presentations, workshops, symposia and exhibitions.

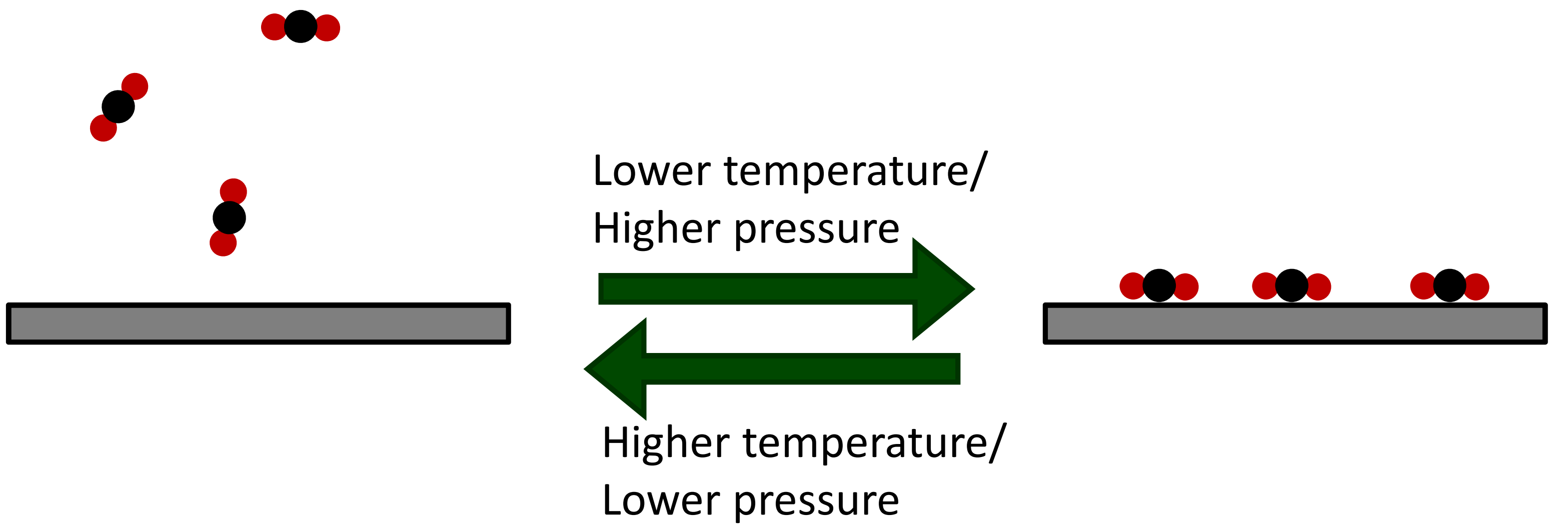
About OMICS Group Conferences

OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Phrama scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

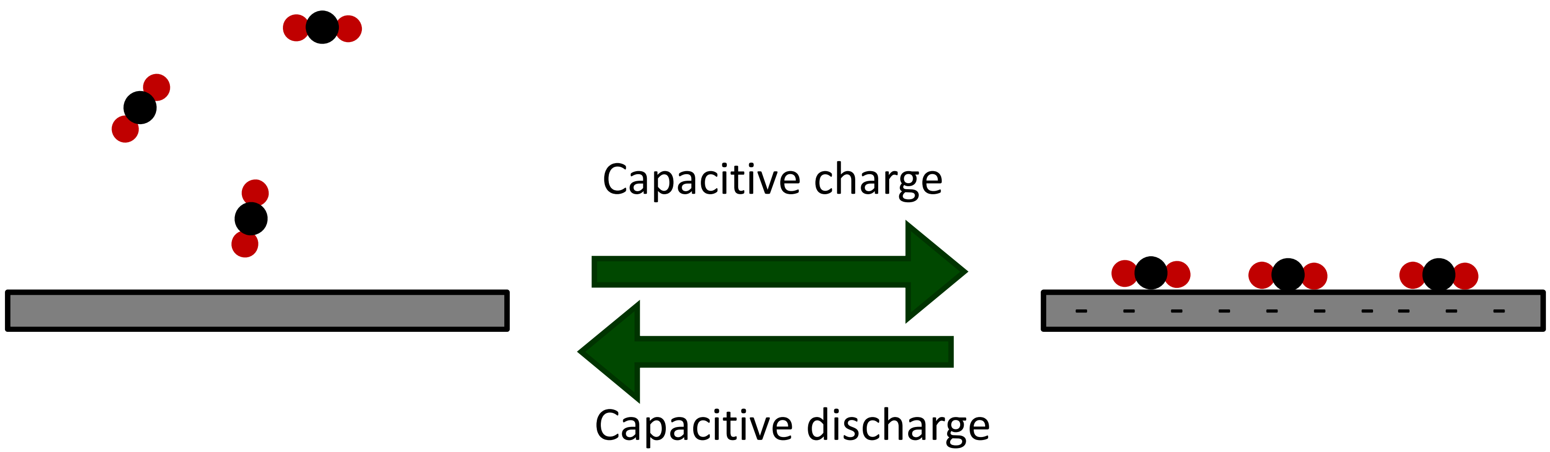
Supercapacitive Swing Adsorption

Concept of conventional pressure and temperature swing adsorption (PSA and TSA)



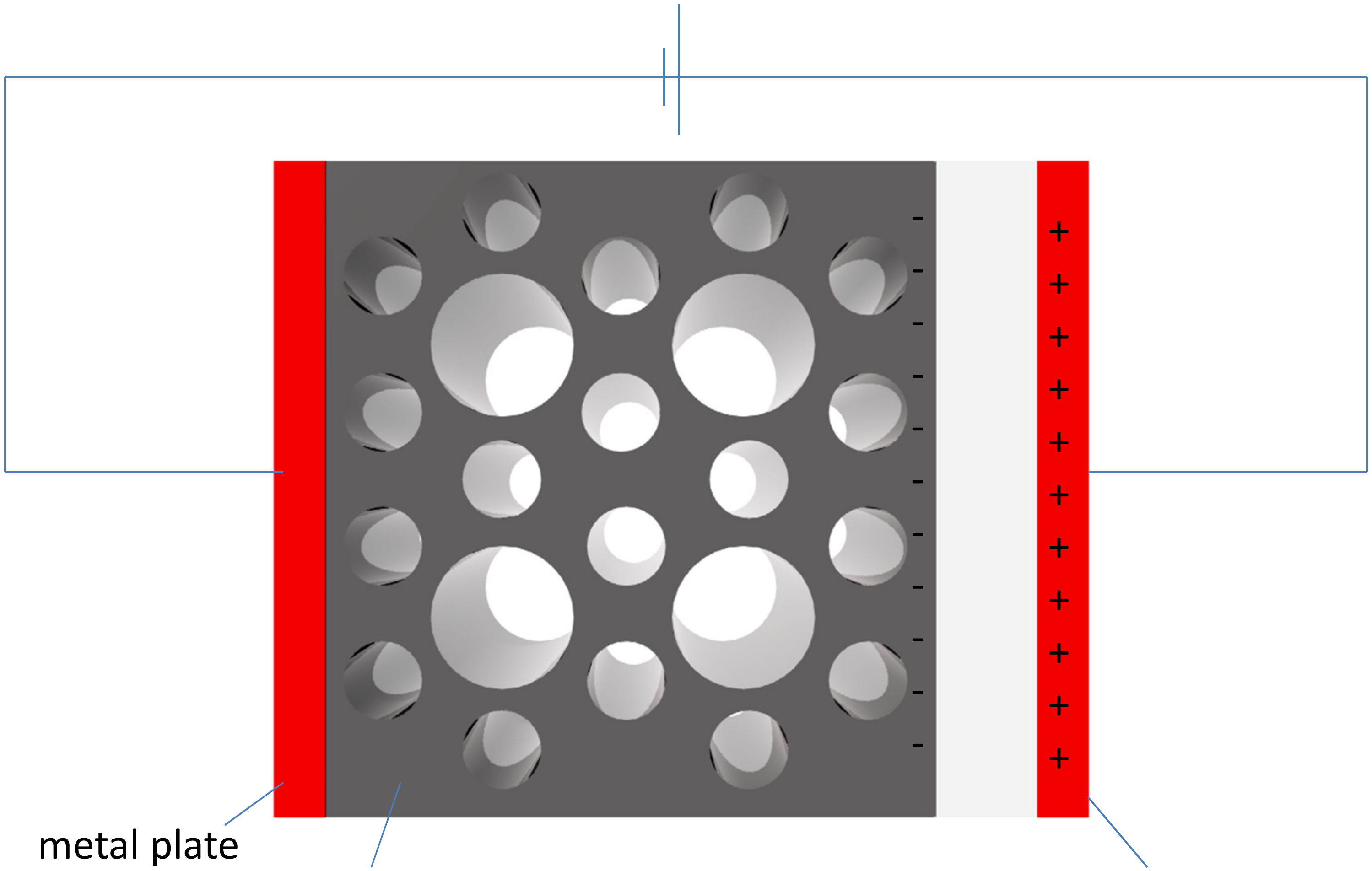
Reversible adsorption of gas molecules to porous adsorbents or molecules is achieved by reversible pressure and temperature changes.

Concept of capacitive swing adsorption



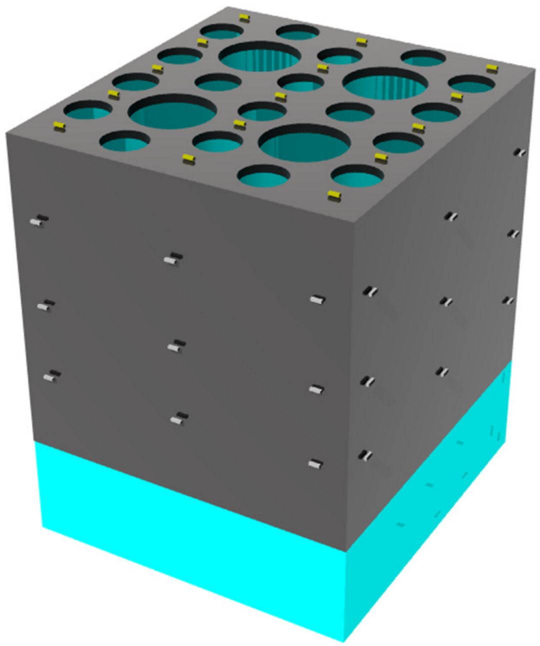
Reversible adsorption and desorption is achieved by capacitive charge and discharge of high-surface area carbons.

Capacitive Swing Adsorption

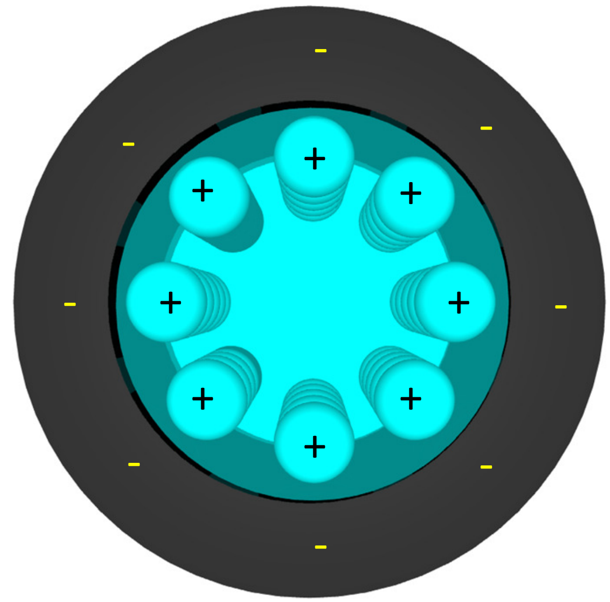


No change in gas sorption properties were observed up to 5 kV.

Supercapacitors

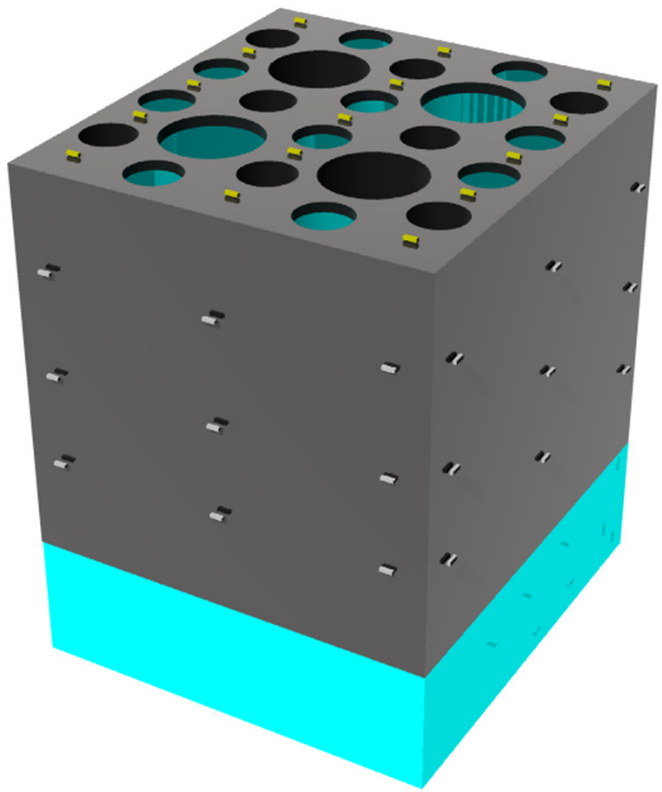


Electrode in contact with electrolyte, e.g. H_2SO_4 , NaCl.

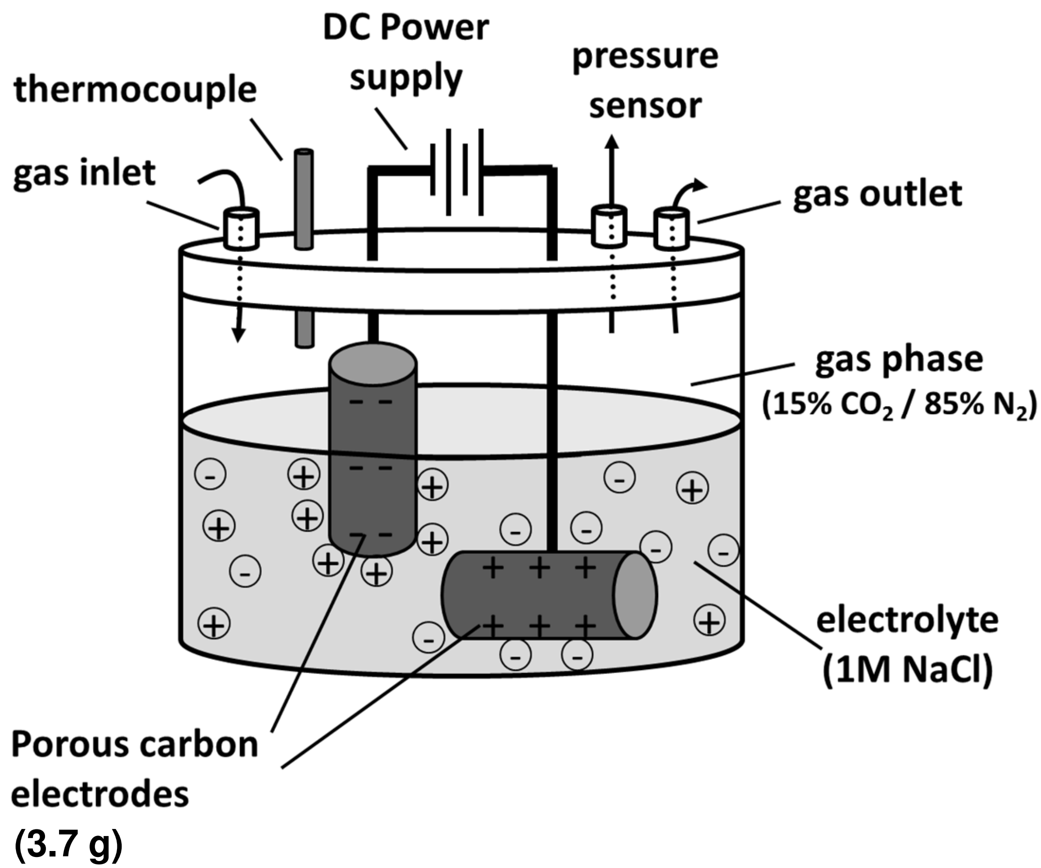


Electric double layer

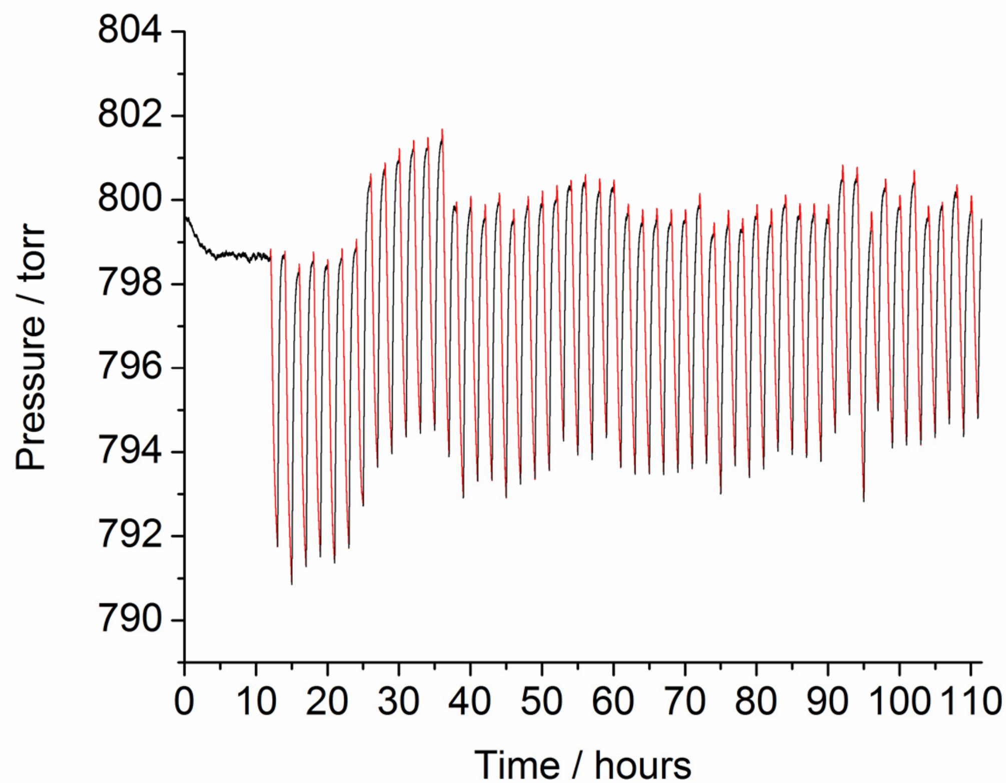
Supercapacitive Swing Adsorption (SSA) with aqueous electrolytes



Design of a Supercapacitive Swing Adsorption (SSA) experiment

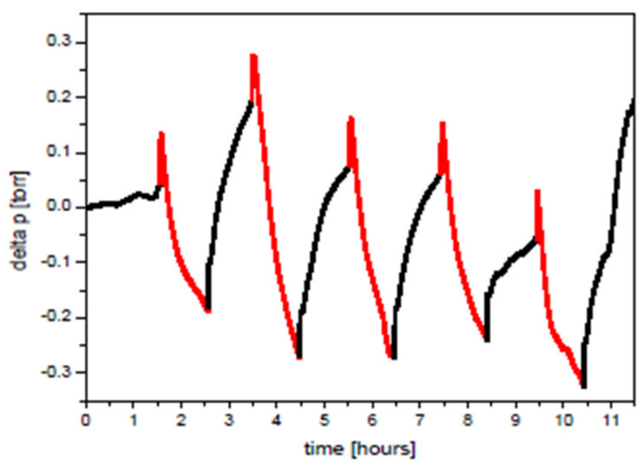


Multicyclability

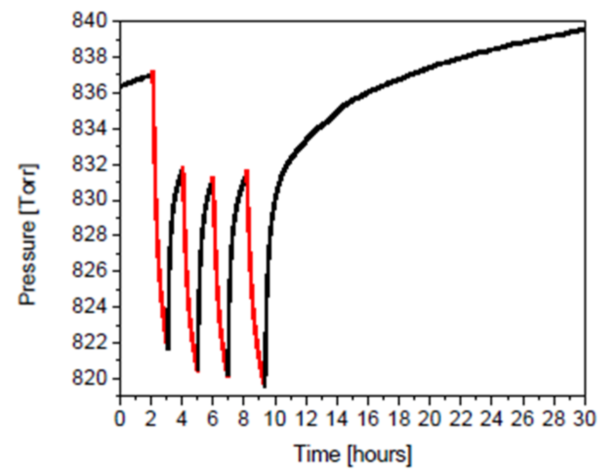


Voltage source: Constant voltage power supply (1V).
Electrode mass: 3.7 g

Scalability



Electrode mass: 0.2 g

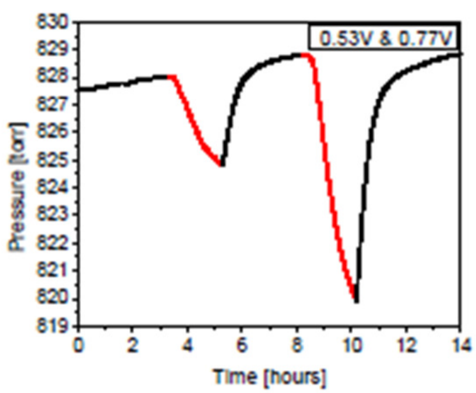


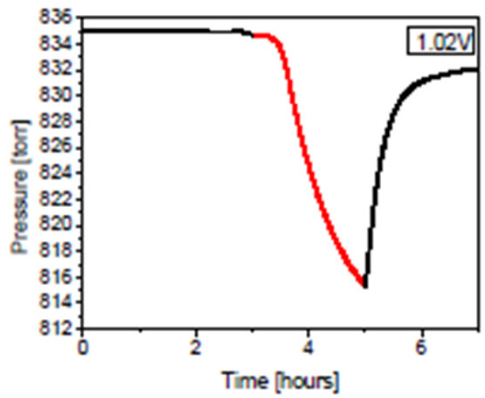
Electrode mass: 7.5 g

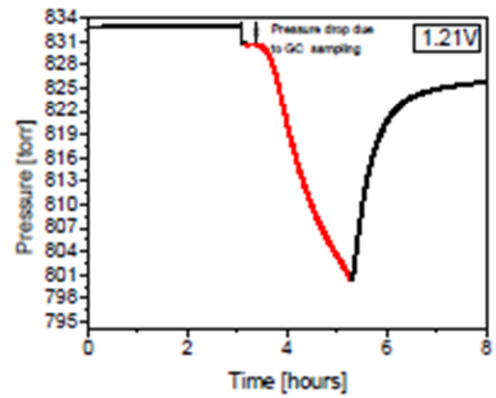
The SSA effect is proportional to the mass of the electrodes.

Voltage dependence

Voltage [V]	Pressure change [Torr]	Energy used for charging [mWh]	ΔP/E [Torr/mWh]
0.53 V	3.2 torr	3.6 mWh	0.87
0.77 V	8.9 torr	7.2 mWh	1.22
1.02 V	19.4 torr	13.4 mWh	1.44
1.21 V	30.4 torr	17.7 mWh	1.71

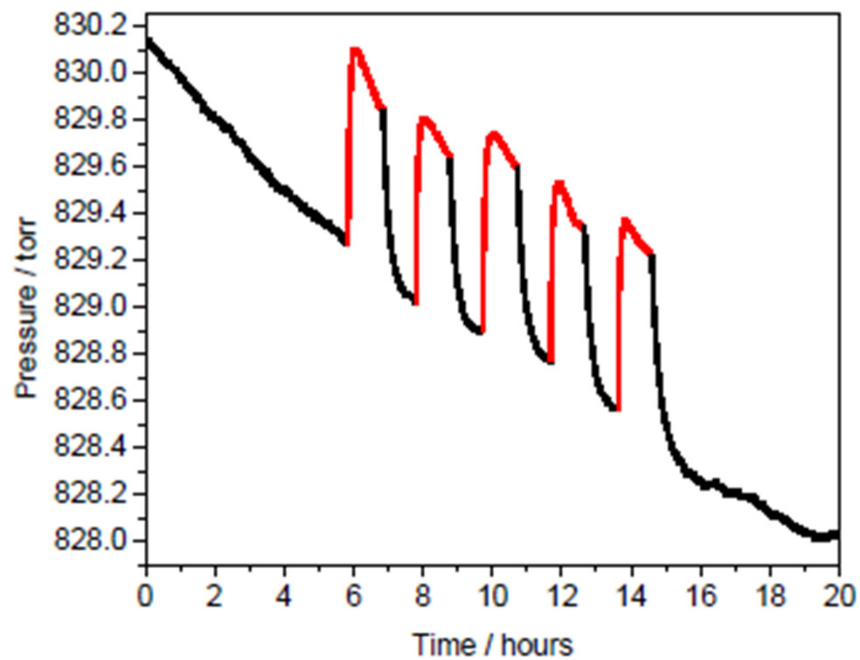






Gas selectivity

Cycle number		Capacitance [F]	Pressure change [torr]	Change in composition of CO_2 [%]	Pressure change (expected) [torr]
1	charge step	160.2	- 47.6	-6.5%	- 54.6
	discharge step	119.0	+ 46.1	+6.1%	+ 51.2
2	charge step	134.6	- 42.6	-6.0%	- 50.4
	discharge step	122.2	+ 42.0	+5.9%	+ 49.6
3	charge step	133.6	- 40.3	not measured	N/A
	discharge step	124.2	+ 40.3	not measured	N/A
4	charge step	133.8	- 39.1	-5.5%	- 46.2
	discharge step	125.8	+ 38.9	+5.4%	+ 45.4
5	charge step	134.5	- 38.3	not measured	N/A
	discharge step	127.3	+38.0	not measured	N/A

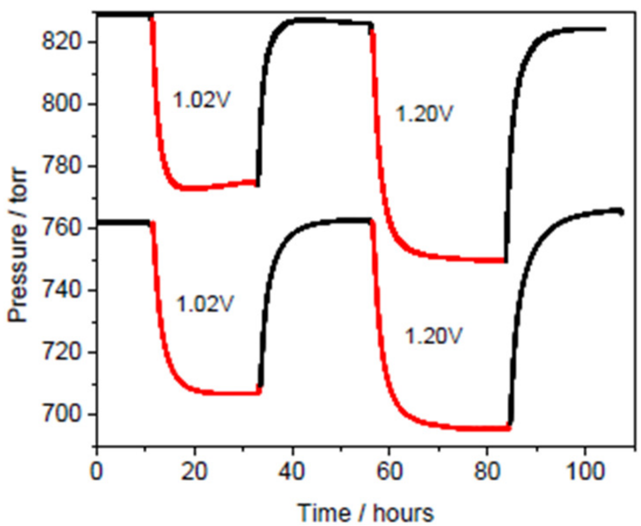


Electrode mass: 7.5 g
Voltage 1.2 V

SSA experiment in pure N_2.

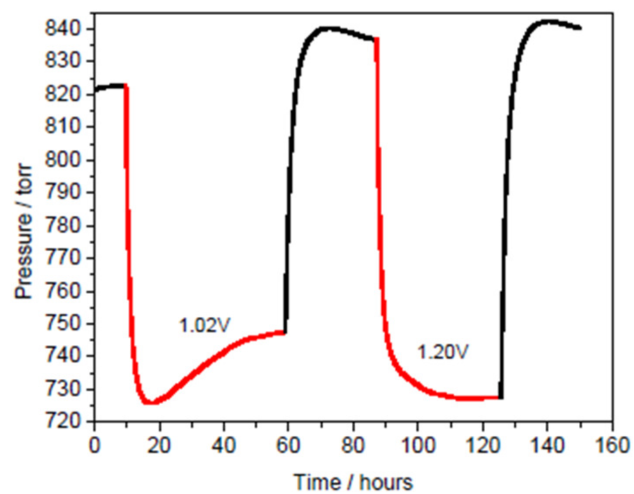
SSA effect in equilibrium

15% CO_2 / 85% N_2



ΔP = 55 Torr (1.0 V)
ΔP= 70 Torr (1.2 V)

Pure CO_2



ΔP = 97 Torr (1.0 V)
ΔP = 109 Torr (1.2 V)

Amount CO_2 adsorbed / kg sorbent:

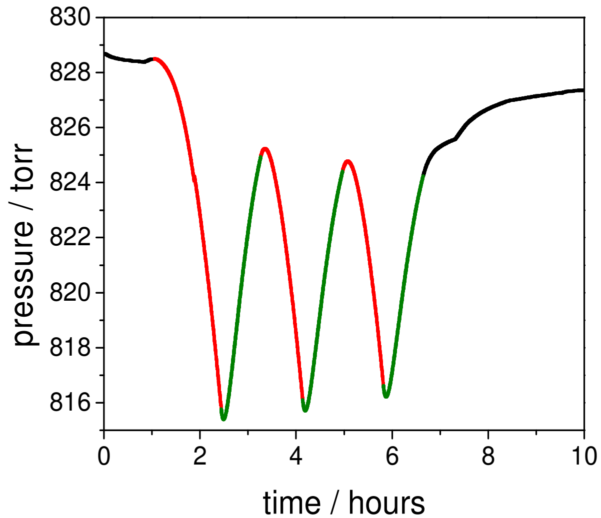
40 mmol/kg (1V)
50 mmol/kg (1.2V)

70 mmol/kg (1V)
80 mmol/kg (1.2V)

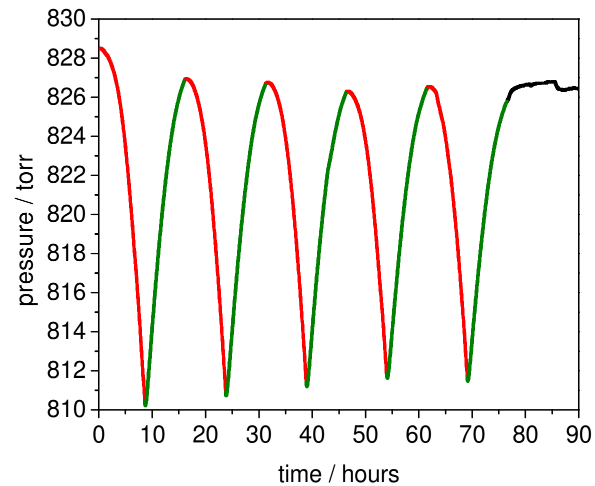
“Native” capacity of BPL carbon: 240 mmol/kg (0.15 atm CO_2)

SSA – GCD coupled experiment

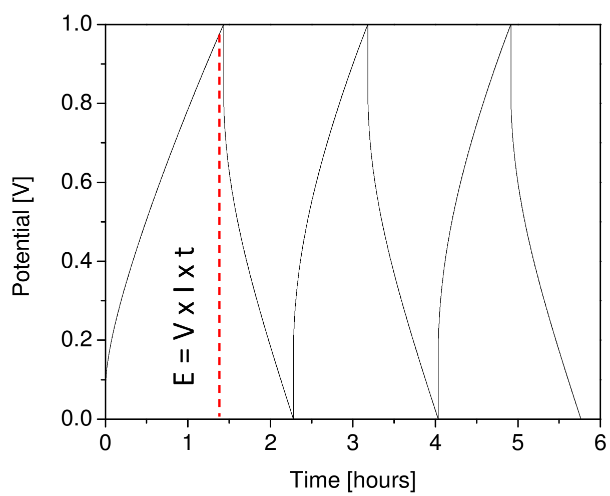
10 mA



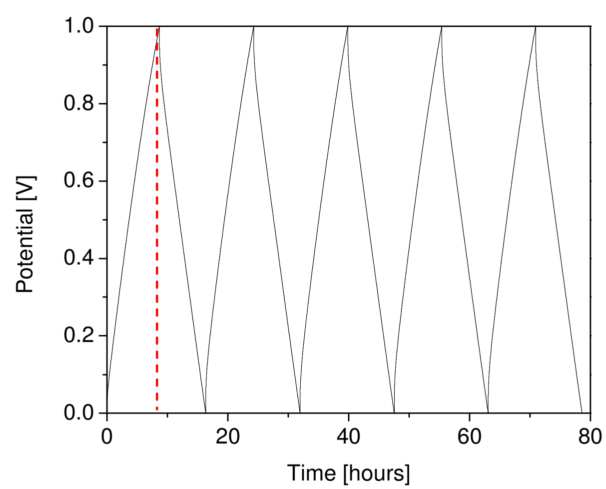
2 mA



15% CO_2 / 85% N_2



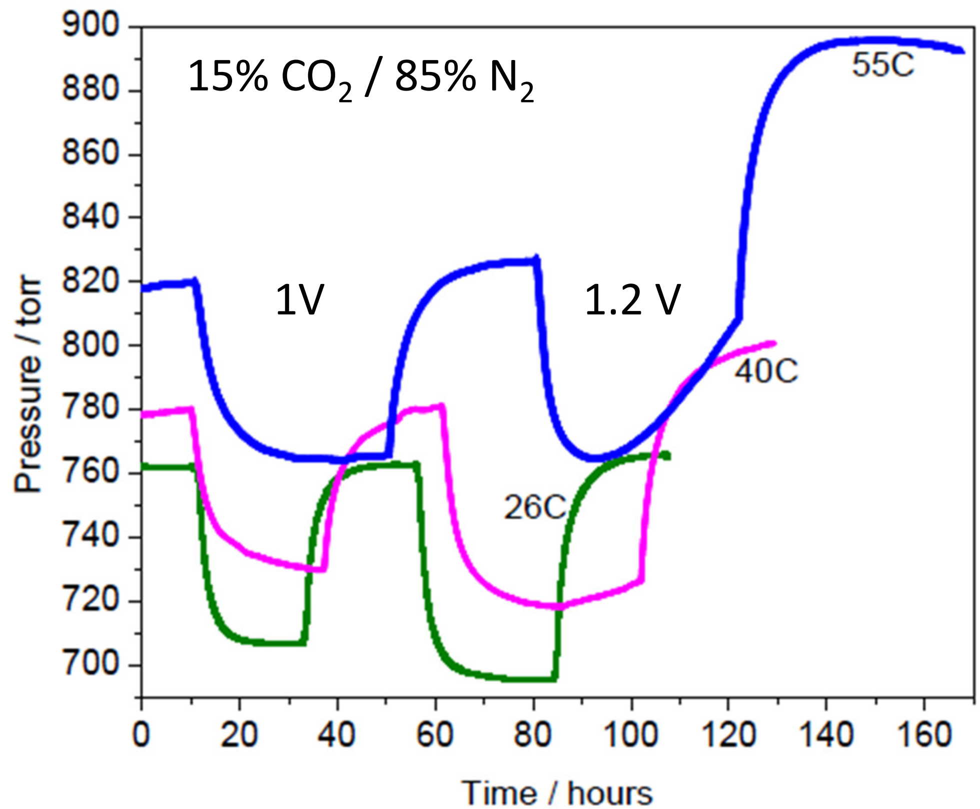
42% energy efficiency



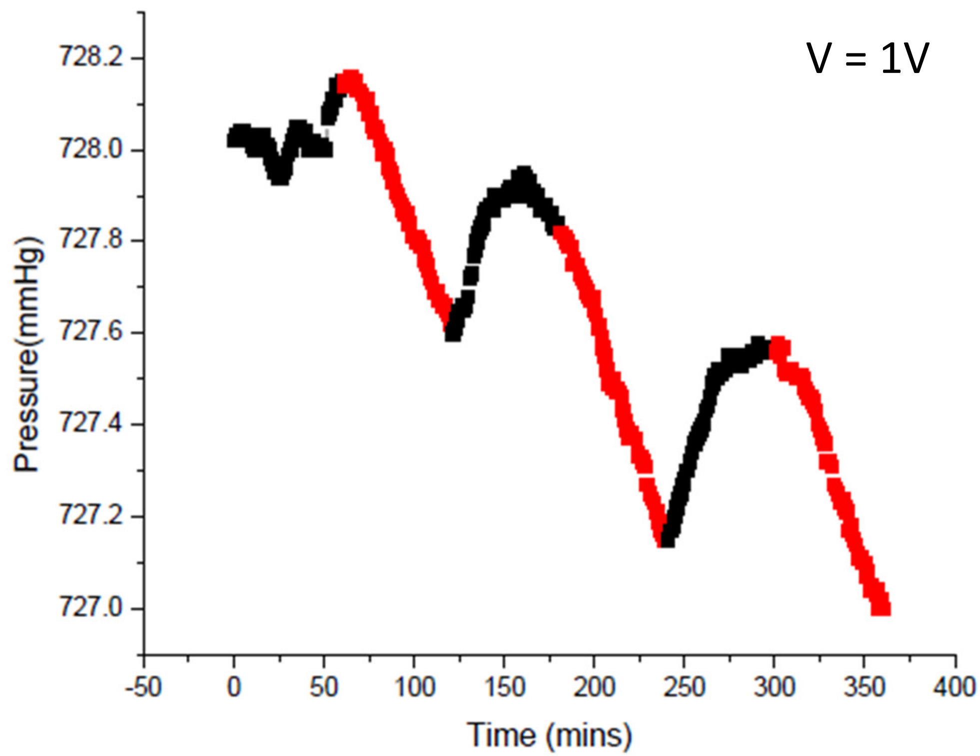
74% energy efficiency

Amount of energy required to adsorb 1 mol CO_2: 104 kJ/mol CO_2

Temperature dependence



SSA effect in ionic liquids



Conclusions

- A fundamentally new electrical effect has been discovered.
- The SSA effect is able to separate CO_2/N_2 gas. Potentially, other gas mixtures can be separated.
- The SSA effect can be observed for different electrolyte systems.
- The SSA effect increases with voltage.
- The SSA effect increases disproportionally with the CO_2 partial pressure.
- The SSA effect barely decreases with temperature.

Acknowledgements

- DOE ARPA-E
- PA Nanocommericalization Center

- Dr. David T. Moore
- Dr. Paritosh Mohanty
- Berenika Kokoszka
- Cong Liu
- Nina K. Jarrah

Let Us Meet Again

We welcome you all to our future conferences of OMICS Group International

Please Visit:

www.omicsgroup.com

www.conferenceseries.com

www.pharmaceuticalconferences.com