

Debunking the “supercapacitor battery” and “golden goose egg” myth

Eureka or back to the drawing board for “supercapacitor batteries”?

Battery technology is the foundation for alternative and mobile energy storage. However, like any scientific race to market, the race for the most effective storage medium does tend to cause confusion when one prematurely shouts “Eureka” from the rooftop, but the reality is more “off the roof chum, back to the drawing board”. At this point a true scientist will label the findings honestly, find a possible application and keep searching for the energy storage solution for the ages. Sadly, some mislabel the findings. We will show how, and we can only speculate as to why.



Enter the “alternative scientist”, the wolf in sheep’s skin

When the scientific approach to research is bypassed, and scientists allow for the bending and manipulation of language to “will the misapplication of the results” – we are walking into a world of scientific and engineering chaos. Enter the “Supercapacitor battery”.

Supercapacitors are a marvel of science. They have application across a wide range of electronic applications. They are however not batteries, and by extension, there is no such thing as a “supercapacitor battery” at this very point in the history of science. There are supercapacitors, there are batteries and there are hybrids. However, labelling “supercapacitors” (ultracapacitor in the US or [electrochemical capacitors](#)) as “supercapacitor batteries” by assigning all the properties of a supercapacitor to the battery is quite simply “alternative science”.

THE CLAIM!

**Supercapacitor
Batteries anyone?**



There is simply no such thing!

Buyer beware, the Wolf in Sheep's skin.

Selling mislabeled science as the next best thing is preying on the market. Disguising the truth in language is a disservice to green technology advancement and the behaviour of a wolf in sheep's skin.

The golden goose claims – is there such a thing as a “supercapacitor battery”?

The search for a way to increase the energy density of a supercapacitor, so it acts as a “supercapacitor battery” is the proverbial search for “the golden goose”. He or she who finds the goose can lay claim to its fortunes. However, some scientific quarters have been wrapping ordinary goose eggs in gold foil and selling the science as solid gold “supercapacitor batteries”. Yes, language and layman’s observations will tell you it’s a golden egg, but the reality below the surface is it’s just not so. Here’s why.

On the surface, yes, a supercapacitor battery “acts like a super battery”. Imagine a battery with up to a million cycles. This is off the charts for batteries. Imagine a charge time of seconds; this too is beyond any existing battery capability out there. Imagine 40 to 50 years storage life and a discharge rate of 2 to 5% per month. It’s what we need and aim for, but alas, below the surface, these properties do not “a supercapacitor battery make”. While the above properties apply to a supercapacitor, you cannot simply proxy those values to a battery, no matter how good it is. One cannot ‘relabel’ a supercapacitor a battery or classify it as a battery. It’s as absurd as passing gold coated eggs for solid gold.



Supercapacitor Batteries **do not work as promised?**

There are supercapacitors and there
are batteries but there is no such
thing as a supercap battery
It's quite simply
GOOSE EGGS

So, has the golden goose been discovered? Absolutely not! Anyone peddling it as such is blatantly misconstruing the truth – it's goose eggs.

A supercapacitor is just not a battery or "supercapacitor battery" – it is scientifically misleading and dishonest to call it so.

Scientists, please label your chemistries correctly for engineers!

So, what are the facts and properties of supercapacitors and batteries?

Dr Farshad Barzegar*, Kian Ostvar, University of Pretoria author of the paper **Supercapacitor or Battery** clarifies the difference between supercapacitors and batteries. "Batteries are the solution for high energy density applications, whereas supercapacitors are used in high power density applications where long cycle life and fast charge-discharge rates are needed." [1]

He also points out that three technical characteristics determine which specific energy storage technology should be selected for a particular application, namely - energy density, power density and the physical size of the storage system.

Available Performance	Supercapacitor	Hybrid electrochemical capacitor	Lithium Ion Battery
Operating Voltage per cell	Max: 2.7V Min: 0.0V	Max: 4.0V Min: > 0.0V	Max: 4.2V Min: 3.0V
Charge/Discharge Time	0.3 to 30 s	-	0.5 to 10 hrs
Energy Storage	W-Sec of energy	W-Min of energy	W-Hr of energy
Energy (Wh/kg)	1 to 5	-	100 to 200
Cycle Life	100000s to millions	1000s to 100000	100s to 1000s
Specific Power (W/kg)	> 10000	-	1000 to 3000
Charge/discharge efficiency	0.85 to 0.98	< 0.98	0.70 to 0.85

Table 1. Comparison of lithium-ion batteries, Supercapacitors and hybrid electrochemical capacitor [1]

The above table outlines the key technical differences between the two technologies as well as Hybrid electrochemical capacitors.

From the above table, it is clear that one cannot assign the values of the supercapacitor to the batteries. There are fundamental differences in build materials, properties and chemistries.



How Supercapacitors Could Make Batteries a Thing of the Past [4]

Should science combine the performance properties of a supercapacitor and a battery in the future – this would be a remarkable breakthrough – a discovery of the ages. This is however not currently the case, and any claims to it are quite simply – goose eggs.

The energy density of supercapacitors to match that of batteries are in the exploratory stages with some applications already on the market. For example, Zhouzhou Electric Locomotives can be charged in 10 seconds for a limited range. There are electric trains that take 30 seconds to charge and offer a range of 2km. [2]

When combined with a battery, the battery can store the required energy for the capacitor's high energy pulses. Pairing supercapacitors with batteries in hybrid arrays can offer the best of both worlds, but they cannot claim each other's properties. [3]

To quote Dr Farshad Barzegar analogy, a supercapacitor is like a sprint athlete, quick bursts over short distances. On the other hand, a battery is like a long-distance runner who discharges his or her energy more slowly, but over a much longer distance. Granted, Hussein Bolt is fast, but he has no chance against Mohamed Farah in a long-distance race. [2]

State and shareholder pressure have no place in the lab

Scientists and engineers are responsible for keeping their respective communities above reproach. Scientists who genuinely serve the sciences are not afraid of being proven wrong. It merely means more needs to be done. However, when outside pressures, including shareholders, be they state and or private investors influence the results the outcomes can be catastrophic. The misrepresentation of scientific facts almost always sets off a chain of events that lead to financial loss and worse if not checked.

Misapplication and mislabeling can have fatal results

A misapplied technology (supercapacitor battery) if accepted by the market at face value can be unknowingly used in life-threatening applications. Capacitors and batteries are used in aircraft. If the expected supercapacitor battery properties are applied to models on paper and designed into the craft with the anticipated outcome of, for example, one million battery cycles out of the "supercapacitor battery" it's no longer the twisting of language, it's now culpable homicide and unnecessary death because the reality is battery cycles are a tiny fraction of that.

If transported as 100% safe batteries and the reality is it contains volatile chemicals and materials, this mislabeling can cause catastrophic accidents. Air freighted counts on the correct declaration of goods in transit. Misleading transporters is illegal and dangerous.

The list goes on. If applied to critical medical applications, lifts, trains, cars, etc. here too, the outcome can be fatal.

The Myth – There is no supercapacitor battery available – buyer beware and be warned

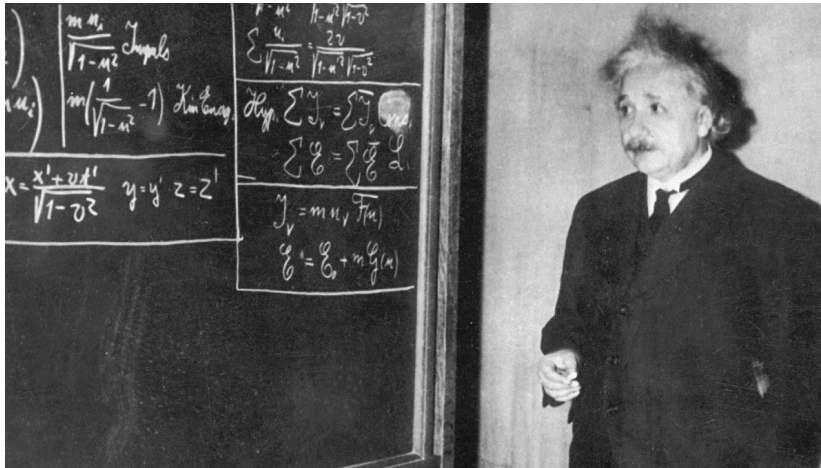
As has been shown in this article, there is no such thing as a supercap battery, supercapacitor battery, ultracapacitor battery or whatever other label is being put on supercapacitors by unscrupulous suppliers. Language has been manipulated, datasheets have been tweaked and properties have been left out to fit the claims.

Science is about the pursuit of truth in nature and shaping the finding to drive civilisation forward. Reframing the truth sets civilisation back and can be catastrophic.

Should we give up the quest for an actual supercapacitor battery, the golden goose and golden eggs? Absolutely not! Let's label what we have discovered correctly and continue to search for that next best thing, it's out there.



True scientists and honest engineers advance civilisation. Keep searching and let the community that goes astray know – "it is just wrong to lay claim to the golden goose and peddle coated goose eggs".



"The only way to escape the corruptible effect of praise is to go on working." A. Einstein

References

- [1] [Dr-Farshad-Barzegar-Kian-Ostvar-University-of-Pretoria-paper.pdf](#)
- [2] [Dr-Farshad-Barzegar-University-of-Pretoria-presentation.pdf](#)
- [3] [Supercapacitor vs Battery - Ultracapacitor Pros & Cons](#)
- [4] [How Supercapacitors Could Make Batteries a Thing of the Past](#)