

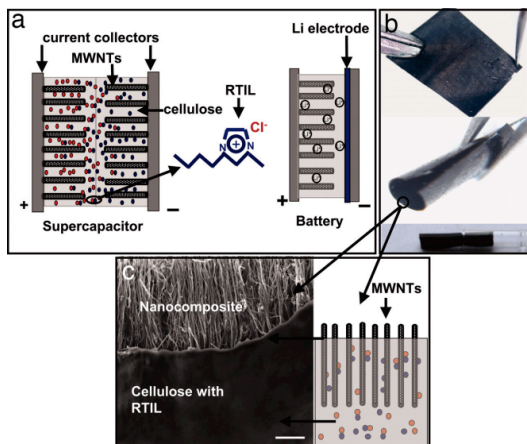
“Blood Batteries”

Brandon Brunelle

BME 482

The term “blood batteries” is used brings to mind batteries that run off of blood. As abstract as this concept may sound it is in fact a reality. Through the use of super capacitors, batteries can be made that will deliver renewable energy from bodily fluids such as blood or sweat. This technology can be greatly utilized by medical devices.

The key to these batteries is the use of a super capacitor. A super capacitor differs from that of a typical capacitor in a few ways. A typical capacitor simply has “dry space” between the parallel plates. This means that there is no desired medium between the two plates. A super capacitor has either an aqueous or non aqueous medium between the two plates of the capacitor. This characteristic alone is what makes this device so useful. An example is that the capacitance is measured in farads as opposed to micro or nanofarads. That’s an order of 10^6 to 10^9 better.



A specific super capacitor has been designed and tested with very good success at MIT. This design features cellulose as the insulator for the capacitor. Multiwalled nanotubes that act as electrodes are combined with the cellulose. The final component is the electrolyte. This can be an ionic aqueous solution such as blood or a non aqueous ionic electrode. The end result is an extremely flexible energy source that can withstand a wide range

in temperature with no fade characteristics over repeated discharge.

The more important point to focus on is the future use of this design. Due to the flexible nature of the cellulose and nanotubules, this power source can be easily modified or placed in the body or various medical devices. The need for surgery to replace batteries on internal medical devices would be nonexistent. This is because super capacitor does not show a loss in power dissipation over time like normal chemical batteries do. Patients with implanted medical devices will also benefit from the flexibility and bend ability because previous devices may cause discomfort for person due to a larger solid power source. As this technology is adapted it will prove to be extremely useful and could even save not only cost but lives also.

Published online before print August 15, 2007, doi: 10.1073/pnas.0706508104 *PNAS August 21, 2007 vol. 104 no. 34 13574-13577*
<http://www.pnas.org/content/104/34/13574.full>
<http://www.howstuffworks.com/framed.htm?parent=blood-battery.htm&url=http://news.rpi.edu/update.do?articlekey=2280> <http://batteryuniversity.com/partone-8.htm>