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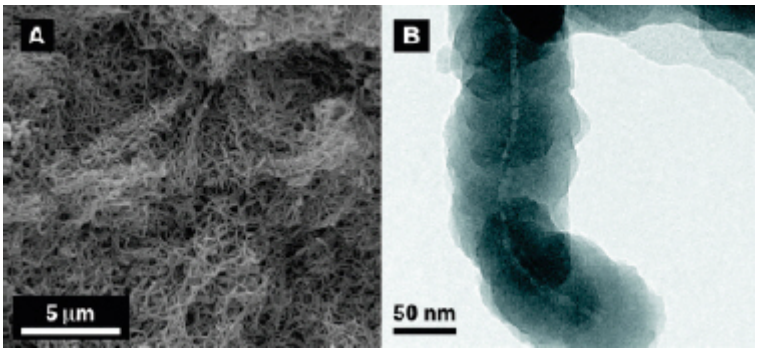
Polymer battery breaks new records

Researchers in Sweden have designed a simple polymer battery that has the highest ever reported charge capacity and charging rate. The device, which is made of cellulose fibres of natural origin coated with a 50 nm polymer layer, is environmentally friendly and might find use in "smart" packaging and other paper-based products and textiles.



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Batteries made from conducting polymers could be used in a variety of new applications, like smart clothing and textiles. However, such batteries suffer from slow charging rates – partly because thick layers of polymer are needed to achieve high charge capacities.

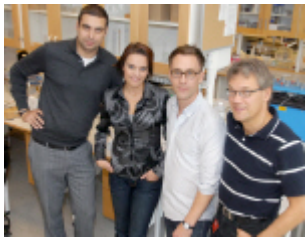
Now, Maria Strømme and colleagues of Uppsala University have made a novel nanostructured high-surface-area electrode material for energy-storage applications composed of cellulose fibres extracted from algae coated with a 50 nm layer of polypyrrole.

(http://images.iop.org/objects/nano/news/8/9/20/090920-2.jpg)

Cladophora algae (http://images.iop.org/objects/nano/news/8/9/20/090920-2.jpg)

The battery can be charged within just 11 seconds and has a capacity of about 38–50 Ah/kg – the highest values reported to date for a polymer paper-based battery. The paper has a surface area of 80 m^2/g and batteries based on the material can be

charged with currents as high as 600 mA/cm^2. What's more, they only lose 6% of their capacity after being charged and discharged more than 100 times.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The team (http://images.iop.org/objects/nano/news/8/9/20/090920-3.jpg)

The battery opens the way to making environmentally friendly, cost efficient, scalable, lightweight energy-storage systems, say the researchers. The device might be used in smart packaging and other paper-based products and textiles, such as electronic sheets.

"Although our charge capacities are much higher than those previously reported for polymer-based batteries, the main advantage is also their cycling performance," team member Leif Nyholm told *nanotechweb.org*. "Indeed, our batteries can cycle at much higher rates without significant loss of capacity."

Spurred on by these preliminary results, the team now plans to optimize its device.

The work was published in *Nano Letters*.

About the author

Belle Dumé is contributing editor at *nanotechweb.org*