

Researchers find ordinary pen ink useful for building a supercapacitor

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Credit: Adv. Mater. doi: 10.1002/adma.201202930

(Phys.org)—A research group in China has discovered that the ink in an ordinary pen makes for a good coating when building a supercapacitor. The team, from Peking University (Beijing National Laboratory for Molecular Sciences) describe in their paper published in *Advanced Materials*, how they used pen ink to coat carbon fibers as part of a process in creating a supercapacitor that was not only bendable but able to cover a large surface area.



Supercapacitors are <u>energy storage devices</u> that are able to be charged and more importantly, discharged much more quickly than conventional capacitors. They serve as a sort of bridge between conventional capacitors and batteries and are used in applications where a quick change in load is required, such as in balancing electrical grids. The focus of most ongoing research involving supercapacitors centers around trying to bring down costs. Most conventional systems use carbon to carbon electrodes or in some cases metal oxide electrodes, both of which tend to cost a lot. More recent research has focused on <u>graphene</u> or carbon nanotubes because of their unique <u>electrical properties</u>. This new research involved looking at ordinary pen ink after the researchers noted that many types of it just happen to contain carbon nanoparticles.

The researchers built the new supercapacitor by applying the pen ink to dual <u>carbon fibers</u> which were then encased, along with a spacer wire, in plastic and filled with a liquid conducting solution, i.e. an electrolyte. The result was a very thin (millimeter) diameter supercapacitor in the shape of a double wire cable, that could be bent to form a full circle and that could also cover a large area; one gram of ink produced enough of the supercapacitor cable to cover twenty seven square meters of material; all this with little to no loss in performance. They also point out that their supercapacitor is able to hold up to ten times more charge than comparable conventional supercapacitors and outperforms them as well.

Because of the unique properties of the <u>supercapacitor</u> they've made, the researchers believe it could be applied to cloth material which would result in wearable electronics such as sensors or even as components in future phones or other handheld devices.

More information: Fu, Y., Cai, X., Wu, H., Lv, Z., Hou, S., Peng, M., Yu, X. and Zou, D. (2012), Fiber Supercapacitors Utilizing Pen Ink for Flexible/Wearable Energy Storage. *Adv. Mater.* doi: 10.1002/adma.201202930



Abstract

A novel type of flexible fiber/wearable supercapacitor that is composed of two fiber electrodes, a helical spacer wire, and an electrolyte is demonstrated. In the carbon-based fiber supercapacitor (FSC), which has high capacitance performance, commercial pen ink is directly utilized as the electrochemical material. FSCs have potential benefits in the pursuit of low-cost, large-scale, and efficient flexible/wearable energy storage systems

via <u>Gizmodo</u>

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