Carbon Aerogels and Ultracapacitors

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Let's recap Carbon Aerogels - they are solid substances similar to gels but where the internal liquid is replaced with air. Aerogels are so porous and lightweight that they are sometimes called "solid smoke" or "blue smoke". Touching aerogel feels like styrofoam.They are typically 50-99.5% air, yet can hold (theoretically) 500 to 4,000 times their weight in applied force. Aerogel can have surface areas ranging from 250 to 3,000 square meters per gram, so in theroy, a cubic inch of aerogel flattened out would have more surface area than an entire football field. Aerogel has 15 entries in the Guinness Book of World Records, including best insulator and lowest density solid.

This technology will improve ultracapacitors by swapping in carbon nanotubes. This greatly increase the surface area of the electrodes and the ability to store energy since the amount of energy ultracaps can hold is related to the surface area and conductivity of electrodes. So.. since they have a extremely high surface area, carbon aerogels are used to create ultracapacitors with values ranging up to thousands of farads.

Currently, Carbon Aerogels represent one of the lowest density solids available on the market and can be produced as thin films, powders, monoliths, or micro spheres. The main problem so far has been the cost. Nano materials tend to be a hundred or thousand times more expensive than conventional dielectric materials.

MIT's Lab has been working on the ability to charge electronic items (phones, ipods, gadgets) in minutes and never having to replace a battery again. Can you imagine fully charging your mobile phone in a couple of minutes? Get ready.. the day is coming...

GregExample of aerogel's insulation properties