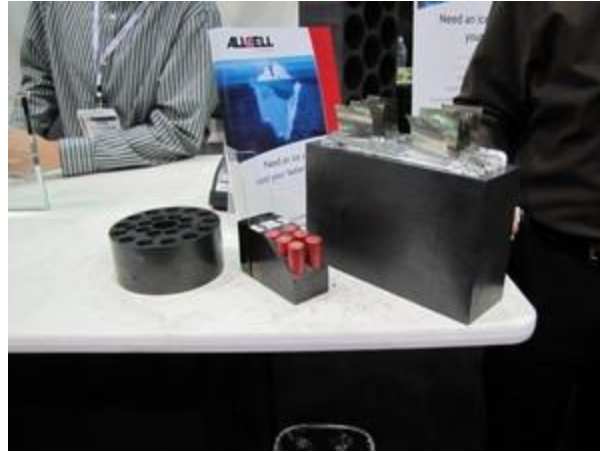




## New Phase Change Material cools Li-ion batteries at SAE in Detroit

April 23, 2:21 PM • [Detroit Automotive Technology Examiner](#) • Frank Sherosky



AllCell Technologies, LLC showed off its Phase Change Material (PCM), saying it's "cool by design."

Photo by author, Frank Sherosky, Detroit Automotive Technology Examiner

Tier-2 suppliers to the automotive industry definitely don't receive enough praise. Yet, that is precisely where much of the real grunt work of product development really goes on. Witness the Phase Change Material (PCM) developed by AllCell Technologies that cools Li-ion batteries.

Funny thing about engineering is that you never know which supplier or inventor might come up with that one cool idea that can bring them into the limelight of the auto industry. And this idea is indeed cool - literally.

Unlike other battery cooling products and systems which use bulky, active-air or refrigerant systems to enable cooling, this material uses passive thermal management. In this case, it enables the use of the latent heat of fusion within a graphite matrix material.

OK, now for that in English. Think about an ice cube in a glass of tea. The graphite is likened unto the glass container. The liquid of tea and water is cooled, because the heat energy of the water is transmitted into the ice cube to change its state or phase from solid to liquid.

That heat energy which changes a material's state is called latent heat of fusion. It is indeed a hidden heat and cannot be measured with a thermometer. It can only be experienced as the material changes state from a solid to liquid or vice versa. In this example, the ice cube remains steady at its melting temperature until all the ice fully changes state into a liquid; hence, ice is a phase-change material.

Now take AllCell's patented PCM product. It cools by using paraffin wax as the phase change material. However, it is micro-encapsulated into a graphite matrix, specially designed to prevent leaking of the melted wax. This, according to AllCell documents, enables best-in-class cooling properties.

Furthermore, apply this product to the cooling of Li-ion battery packs. The AllCell PCM enhances the safety of a battery pack by limiting thermal propagation which can induce a fire hazard. Thus, the natural cooling system increases the durability and efficiency of a battery pack.

### **My Experience Handling PCM**

Immediately upon picking up this material in my hand, I felt the sensation of coolness. The heat from my hand was being transferred into the micro-encapsulated wax. It was amazing.

Then I viewed a few cylindrical-shaped samples of lithium-ion cells inside a block on the display table. They were placed into a block of PCM with holes or pockets for the Li-ion cells. The PCM, from what I understood, has to be machined to get the custom fit needed.

I asked about molding the PCM, but that was not available yet. As a design-engineer, my assumption is that custom molding of the PCM would make a great deal of sense by enabling customization for complex shaped parts. Time will tell if that comes to fruition.

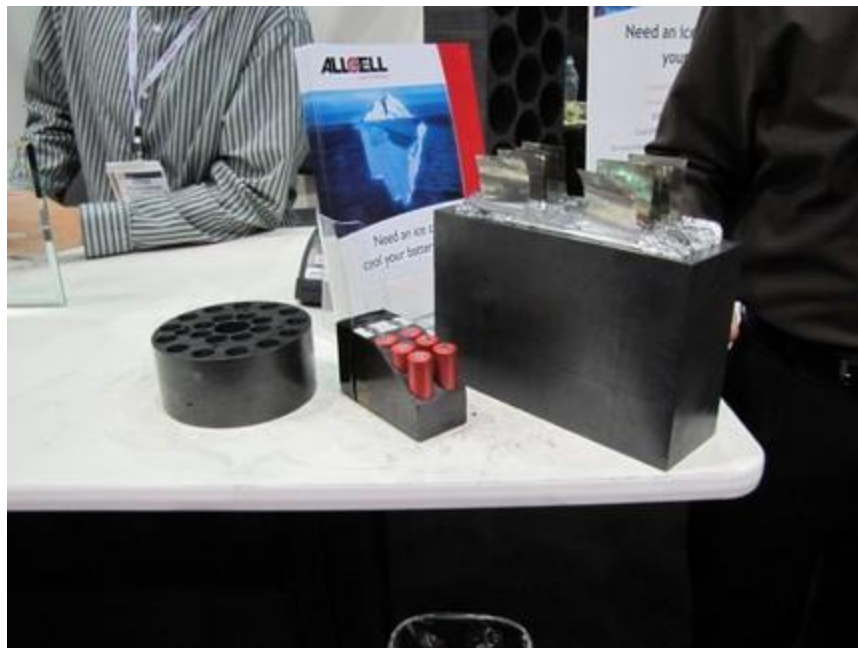
Still, I deem this product to be cost effective and efficient because it has no moving parts. It is definitely light weight, because the material combination is graphite and paraffin wax. The graphite provides the rigidity of the form while the paraffin wax manages the thermal transfer.

### **Examiner Final Comments**

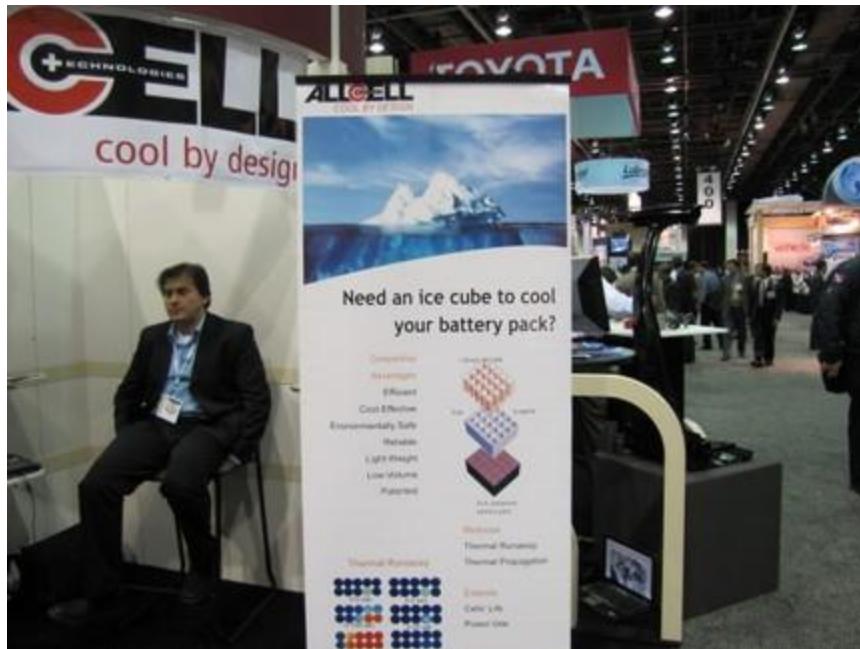
While SAE International says it reinvented the SAE 2010 Congress, AllCell Technologies had already contributed in the form of its technical display. Furthermore, I was thoroughly impressed with this product. AllCell Technologies truly offers customized lithium-ion battery solutions for energy storage and power systems in portable, stationary, and transportation applications. These include plug-in hybrid vehicles, electric automobiles, and light electric vehicles, such as electric bikes and scooters.

Automotive isn't the only industry application. Current applications include air and space, as well as the defense industry.

You may visit their website, <http://www.allcelltech.com> ; and, for now, here are a few pics in a slideshow that I took of the PCM at SAE.



Note the different shapes of the PCM, large, small, rectangular, cylindrical. Those red cylinders are small li-ion cells



Poster at SAE