



Jack Kavanaugh

Courtesy of Nanotech Energy

Building a better battery



CAN SOMEONE MAKE a modern-day advanced solution to the lithium battery? A safer and more durable power source that can change the habits of battery consumption? Dr. Jack Kavanaugh thinks so and the secret comes down to one word: Graphene.

But, what is graphene? It is a single layer of graphite and an allotrope of carbon with a unique atom structure. [Nanotech Energy](#) hopes to find a replacement for the standard lithium batteries most consumers use. Why graphene? Through research, Dr. Richard Kaner, distinguished professor at UCLA College of Chemistry & Biology, realized that because of graphene's unique molecular makeup, the material has special strength and better conductivity properties. He has developed a process that allows graphene to be used in many applications.

Nanotech Energy is a supplier of graphene, graphene super batteries and other graphene-based products. The company started in 2014 and has grown, just completing their Series C funding of \$27.5M and headed into their Series D funding. We sat down with Nanotech Energy CEO, Dr. Jack Kavanaugh, to get some insight from this successful entrepreneur and to find out more about the company.

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– Jack Kavanaugh

How did you make the transition from being a medical doctor to batteries?

I have an MBA which I got at UCLA and spent some time doing mergers and acquisitions at a fairly high level for a number of years. I was founder and CEO of ZetaRX that became Juno. We had a trial while I was there that reported the best results ever in the history of cancer therapy. I have a long history of involvement in chemistry and other businesses, not just medicine.

So, this was less of a transition and more of an evolution of your interests and studies?

Yes. I am very excited about things I have done but am always searching for new innovations. I call them "Gatekeeps." I do not like to do copycats of things that have already been done. I am interested in finding science that has not occurred in a commercial sense before. I am driven to do things that have a positive social impact.

Did you meet Dr. Kaner while at UCLA?

Yes. When I met Dr. Kaner, we ended up doing three spin offs from UCLA including Nanotech. Dr. Kaner was the first person ever to file the patent on graphene technology that's commercializable in 2002 with the use of a chemical process. We're very excited with what he is able to do and it goes back to chemistry.

Did you look at the use of graphene specifically as an alternative to lithium batteries that were already in the market?

Dr. Kaner had done some work with supercapacitors, and we saw limitations in supercapacitors. We saw there were unresolved issues with lithium batteries and saw that lithium batteries are not safe because they do catch fire and explode. We thought this [graphene] could exceed what either one could do individually, and Dr. Kaner had very special potential solutions.

What have the developments been at the company since Series C funding?

There was one company that came to us and challenged us to make high performance, non-flammable batteries. We have six generations of batteries. Each based on different chemistries and with different practical uses. We've developed conductive inks, conductive adhesives, electromagnetic shielding in a spray that can be painted on. We make the best graphene in the world and we do this in a factory in Northern California.

Where does this take the company moving from Series C to D?

In the last month, we have added ten additional PhD scientists with industry experience in individual teams.

Six battery techs plus inks, conductive material, graphene and shielding – so ten arenas. We will add more scientists. We've also built out our capabilities to produce on high levels of the inks, epoxies and the graphene. The next round we'll build out manufacturing capabilities for electrodes and batteries.

Are you looking to expand the factory?

We have prototype labs now but the next step is commercialization. That's a larger project that requires much more capital-intensive investment to be able to manufacture high production levels of electrodes and batteries. We can do all the other products now.

Do companies come to you or are you seeking uses in the lab?

We've been approached by many companies and we've selected one or two to work with in each of the industry applications because it has broad applications. Consumer electronics, things like phones and smart pads and computers and other communication devices. Also, defense, aerospace, solar, wind and bridge stabilization and of course, anything that involves a vehicle - plane, boat or cars. We're selecting very visible companies as the first ones to work with as both potential customers and users.

We're also looking at potential relationships to build out a super factory. It is quite expensive. If there is the capability and a situation that we can trust, we're looking to see how to expand on our own and through relationships. There is a very high, unfilled demand in battery manufacturing. We could raise a certain amount of money and be able to manufacture, but demand far exceeds what we are capable of doing. If we could expand further that could be helpful.

Do you think the curiosity and culture at UCLA has helped benefit you to develop the companies you've founded and run?

UCLA instills innovative thinking and development. It's fertile for new ideas and exploring beyond that what could be possible. UCLA is a great incubator for these types of ideas and encourages the type of thinking that has met many of our parameters. We don't jump into something easily. I think our group has done six spinouts at UCLA. **IM**