

This is the statement on the technology breakthrough Avadain delivered on April 27, 2023

Last year, during our first crowdfunding campaign, we noted that a risk factor to Avadain's success – and the largest risk factor – was our ability to scale manufacturing our graphene flakes to mass production. This has been the focus of intense R&D efforts since the \$3.77 million Department of Commerce/NIST award in April 2022.

As you may recall from some of our Fireside Chats, graphite is composed of millions of atomic layers of graphene flakes bound tightly together. To produce graphene, we need to separate these flakes in a way that preserves their large size...and without introducing defects.

The method Avadain uses to produce high-quality graphene flakes is electrochemical exfoliation and expansion. What this means is that Avadain uses electricity that travels from the anode (which is the positive electrode) through a solvent to the cathode (which is the negative electrode) to separate the atomic layers of graphite into graphene flakes. For this to occur, the graphite must be in physical contact with our cathode, which has a two-dimensional surface.

The challenge we were confronting was that there was no domestic source of industrial-sized cathodes. This was a potential barrier to our ability to scale to mass production.

However, in February, the team at Southwest Research Institute made a major breakthrough. They found a novel, inexpensive material that could serve as an extension of the cathode – and maybe even as a three-dimensional cathode itself. In one of the earliest tests, they placed graphite along and within the porous surface of this material...and it worked! It created the same high-quality graphene flakes as our original process. And what's really exciting is that the three-dimensional surface area was 10 times that of our original two-dimensional cathode...and the exfoliation occurred in about 25% of the time, resulting in a 40 times improvement in throughput.

We are currently working to replicate these results in our new Gen 2 mid-scale reactor that came on-line just this week. We hope to demonstrate production of larger quantities in less time while maintaining high quality.

We believe the last known technical obstacle to scaling to mass production has been overcome. We think this is a game changer.

While the research team needs to do a lot more work over the coming months to optimize this process, we are hopeful that we now have a clear, scalable path to the continuous production of industrial quantities of our large, thin and nearly defect free graphene flakes.

It almost goes without saying that we need to keep the composition of this novel material secret for the time being. We certainly don't want potential competitors to benefit from this hard-earned breakthrough. What I can say is that this novel material is inexpensive and widely used for other purposes. It is non-toxic and available in large sizes.

Finally, I also wanted to let you know that yesterday, our IP law firm, Fish & Richardson, filed two provisional patent applications covering both this novel material and for continuous manufacture of graphene. These patent applications will not become public for one year.

I speak for the entire Avadain team when I say that we are very excited by this major breakthrough. We remain focused on upscaling our technology to mass production and, we hope, entering into our first license agreement by the end of this year.