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Piersica is developing a Battery That Generates more than double the Energy Density of Commercial Lithium-ion Batteries using a New, Highly Conductive and Extremely Light Material



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CEOCFO: *Dr. Bucur, what is the idea behind Piersica?*

Dr. Bucur: The idea for Piersica is to develop a battery that generates more than twice the amount of energy density available in a commercial lithium-ion battery. We provide a product with much higher energy stored in the battery than a commercial battery.

CEOCFO: *What have you figured out that others have not?*

Dr. Bucur: First, it is very difficult to double the energy density of a lithium-ion battery. We are more than 30 years into the commercialization of lithium-ion batteries and from 1990 to 2024, no one has been able to double the energy density. What we want to do is more than double the energy density from today's levels, so it will be a huge increase.

What we have figured out is most of our competitors are attempting to increase the energy density while utilizing existing commercial materials. They started from the engineering step, not from the material development step. However, the primary problem is there are very challenging limitations imposed by these existing materials, the principal one being that these materials are very heavy. With existing materials, it is difficult, if not impossible, to make a light battery and that is what high-energy means, a light battery. Piersica has figured out a way to do that by developing a new, highly conductive and extremely light material that forms a key component of our next-generation battery.

CEOCFO: *Why/how did you start looking at that approach?*

Dr. Bucur: Before I started Piersica, I worked in the battery industry for 15 years, both in the U.S. as well as in Asia. I encountered many of the same problems the industry is currently facing. Eventually, I came to the conclusion that in order to overcome these challenges, a new perspective was required. I left the OEMs and formed Piersica to develop some technical aspects that I thought would address the energy density issues and would be new, different and very valuable.

CEOCFO: *Where are you today in the process?*

Dr. Bucur: We developed a new proprietary material which is extremely light. This was the first step. This lighter material enables us to make a lighter battery, and thus achieve higher energy. You can have more energy stored for the

same unit of weight. We have been working on this new material, which is a newly created polymer, for the past three years.

The next step in the development was the components. From our proprietary polymer material, we made battery components that go inside the battery. Inside the battery cell, you have an anode, a separator, and a cathode; we created new versions of each of these components.

The third milestone on the road to development was to make what I call development cells, which validate the materials and components that comprise the Piersica battery.

The next big thing for us is to make demonstration cells that can be tested by the OEMs. We expect to complete these cells and begin the testing process with OEMs in the next six months.

CEOFCO: *Why does this material work; what is different?*

Dr. Bucur: In commercial lithium-ion batteries the electrolytes are in the form of a flammable liquid, which is the bad part about it. To make a safer battery, our competitors are using solid electrolytes which are not flammable, but they are much heavier than the liquid. In fact, they are five times heavier. This is very significant. Therefore, it is very difficult for them to develop a high energy battery.

The polymer that we developed is almost the same weight as the liquid electrolyte, so it is an extremely light material and it is not flammable. That is a big material differentiation.

"The automotive OEMs tell us that no other start-ups are trying to attain such a high energy density and that we have something unique... The OEMs understand the potential of our technology and they are very interested in it." Dr. Claudiu Bucur

CEOFCO: *Is that something you can patent protect; the material, the process or both?*

Dr. Bucur: Yes, we work to protect this technology from others who may have similar ideas. We have protected all of our innovations via patent filings over the past three years. We now have 22 granted and pending patents in the U.S. and abroad.

CEOFCO: *What has been the interest from the people in the industry who know what you are working on at Piersica?*

Dr. Bucur: This is a very hot area in energy storage. The conventional lithium-ion battery is 30 years old and it is reaching the limit of the chemistry that has been used for those 30 years. Now people are looking for new chemistry. Therefore, many OEMs are seeking new technology. We have talked with most of the automotive OEMs, and every time, they are surprised to hear that we are developing a battery with an energy density of 600 watt-hours per kilogram (Wh/kg), which is more than twice the energy density of a conventional battery.

The automotive OEMs tell us that no other start-ups are trying to attain such a high energy density and that we have something unique. We show them our material and they tell us that they have not seen such light material. We show them our components. We have a unique lithium anode fiber mat and they say they have never seen such a unique component. The OEMs understand the potential of our technology and they are very interested in it.

They realize the advantage. If it is a car manufacturer, they will be able to keep the same size battery they have now but use our cells in their battery packs. With this technology, EV cars will be able to drive twice as long or have smaller batteries, whereas existing EV cars can travel the same distance as they are currently able today. Smaller batteries mean half the cost, so they have choices now. They can bring down the cost of the battery and they can make them go farther.

CEOFCO: *What were some of the challenges in developing the material?*

Dr. Bucur: We proposed an idea to resolve a big problem in polymerization. The problem was that existing materials are not stable, so they decompose quickly. We have developed a unique process to produce our polymer which gives it high stability. Now we have this sort of 'Holy Grail' polymer battery that others have tried to make which is stable. It can be

manipulated. That is the value that we have. Furthermore, the Piersica polymer can be mass-produced at scale without difficulty.

CEO CFO: *What surprised you through the development process?*

Dr. Bucur: The development process is a continuing cascade of surprises. You have to hold onto your hat and try to solve problems every week when they arise. Overall, I would say we moved quite fast; this was a welcome surprise, which I am very happy about because it means that our ideas were very sound from the beginning.

CEO CFO: *Are you looking for funding, investments, or partnerships?*

Dr. Bucur: So far, for every dollar we raised from the investment community, we have won nearly the same amount of money from grants. Our budget is pretty much a 50/50 split between money raised from investors and grants that we have been awarded from the government and private corporations. For example, we recently won a prestigious award from Shell Corporation through the Shell GameChanger program. This award funding was utilized to demonstrate that our polymer functions as expected in our next-generation battery. We also recently won a Phase 2 National Science Foundation (NSF) grant for \$1 million. This is our sixth government SBIR award.

Mr. Jacobs: Adding to what Claudiu stated, we are currently in the process of raising a new round of funding from investors. This round will allow us to continue our growth and development as we work to finalize the demonstration cell.

CEO CFO: *What are the challenges when you talk with investors?*

Mr. Jacobs: The biggest challenge is the development timeline for our industry is longer than for many other industries and transaction opportunities that investors see in the market. Our development to get to a full cell is in the four-year range, and then to commercialize it and bring it to market will take several additional years. Therefore, it is a longer process. Luckily, we are moving quickly through the development process and are now approaching a timeline that is more appealing to investors.

The other big challenge for us is that there are a number of other solid-state competitors that are trying to develop batteries. Many of them have been working to develop batteries for 10 to 15 years without success. This means investors have put money into companies previously that have not lived up to the promise. Therefore, there is a bit of hesitancy with regard to the battery industry which makes it harder to raise capital. However, we believe that this hurdle will be eliminated shortly when Piersica produces a demonstration cell with our target energy density of 600 Wh/kg.

CEO CFO: *Do you see interest in the international community and are there geographic areas that might be more open to you both from the investor and user side?*

Dr. Bucur: We have talked to many international investors. The battery business occurs in Asia, and the largest battery manufacturers are in China. Therefore, there is a lot of interest from China. We are deciding how to navigate this because politically, it is unclear how this will play out.

CEO CFO: *What if anything might people miss or misunderstand about Piersica that they need to know?*

Dr. Bucur: The Piersica battery is general purpose. It addresses the entirety of the existing lithium-ion markets. The Piersica battery will do to lithium-ion what lithium-ion batteries did to the nickel metal hydride battery back in the 1990s. Nickel metal hydride was the previous battery technology before lithium-ion and it has substantially disappeared.

We can make any sort of battery that currently exists. This is not a specialty battery. Our energy density is cheaper and it can be used across the board in all the verticals that lithium-ion goes into and it will even create new uses such as flight.

Mr. Jacobs: The projections for this industry are that by 2030 the battery market will be a \$300 billion industry, which is a tremendously large market that also happens to be growing at a very rapid pace. With the proprietary technology we have developed, we have an opportunity to be a meaningful player in the battery sector.

