



Electricity Conducting, Naturally Occurring Microbes now Available as Biowire for Nano-Electronic Applications, Microchips, Circuit Boards and Sensors



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- Mark Miller

CEOCFO: Mr. Miller, what is the idea behind BioCurrent Technologies?

Mr. Miller: The main idea behind BioCurrent Technologies is to promote environmentally responsible technologies to a variety of industries that are moving toward or using nanotechnology. Our objective is to replace finite carbon nanotubes and nanowires and graphene with sustainable, environmentally preferable biowires.

CEOCFO: Would you give us a more detailed look at how that works?

Mr. Miller: The world is going smaller and smaller, we all want to get more technology and information into, or more information out of, our electronic equipment. Computers, cell phones, smart-wear are all going into the nano scale. Most of these nano products are made with carbon or silicon nano tubes. Conventional nano tubes are made from finite and scarce resources that are mined from the environment and then processed to a great extent in high temperatures while utilizing harsh solvents as part of the purification process. We use naturally occurring microbes whose appendages, known as “Pili”, actually conduct electricity. These are nano sized electric wires, so that you can use them in microchips, circuit boards and other nanoelectronic applications.

CEOCFO: How do you get from microbes to nanotubes?

Mr. Miller: This is technology that has been developed out of the University of Massachusetts at Amherst. Derek Lovley a PhD research microbiologist at the university has been working with the Geobacter microbe for the last 30 years. He is currently finding ways to genetically modify this microbe to do a variety of different things. One of the applications is to control the way these Pili conduct electricity. It has been known for a long time that these microbes can consume things like heavy metals, petroleum hydrocarbons and other soil contaminants, and generate small amounts of electricity. Derrek took it further in understanding the functionality. From finding that Pili conduct electricity, it was a very small step to modify the Pili, increasing their conductivity so they behave just like a conventional carbon nanotube.

CEOCFO: Would you tell us about the steady stream of microbes?

Mr. Miller: The microbe is a Geobacter, which is a common soil microbe. They readily reproduce and what Dr. Lovley and his team were able to do is to modify the microbes down to the DNA level so that the Pili that it creates have variable count and characteristics. The microbes reproduce readily at room temperature and are very durable. These microbes have been used in soil remediation, cleaning out hydrocarbon spills and or heavy metal type of contamination. They are happy little bugs.

CEOCFO: Where are you in going from figuring out it can happen to making it happen? What stage are you at?

Mr. Miller: We have been able to confirm the application within the lab. We know that the Pili conduct electricity. We know that we can modify the microbe to have various levels of conductivity. From an application perspective, we know we can

make it work and now we are introducing it to industries so we can apply it to commercial application. We are also able to modify the microbe and its Pili in order to measure certain types of outputs and characteristics. We have also found that the Pili can give a different response for various PHs. We are looking at having them act as a sensor to determine levels of a wide range of substances, opening up opportunities for utilizing the microbes as “nanosensors”.

CEOCFO: *How do you get attention from the appropriate people?*

Mr. Miller: Hopefully we get it with publications such as yours. So far, there has been a great deal of interest and we are in discussion with several key potential end users. Thus far, my experiences have been that people are excited about the concept because; it is sustainable, because we can control the characteristics of the wires and it is much less expensive than the current technology. It is a significant step and can be a “game changer” as compared to conventional nanotechnology. This is an area where a lot of people have spent time and resources in exploring new ideas and I think this is going to be the next step in terms of sustainable nanotechnology.

CEOCFO: *Will you tell us about your reception at the MABA event?*

Mr. Miller: That was exciting for us. We were excited that MABA and the First Pitch Group selected us to be part of their pitch presentation and we were even more excited when we won both first place as Best Presentation which was a vote in the audience and Most Fundable from the Angel investors. They also were good at giving us feedback on our first pitch and have incorporated that into our next pitches.

CEOCFO: *What happens tomorrow?*

Mr. Miller: We are following two parallel routes. One is we are looking for seed funding so that we can keep the lights on. The second is we are introducing this technology to a range of potential end-users both in the electronic area as well as the medical device area.

CEOCFO: *Do you see more possibility in either of those?*

Mr. Miller: I think there will be wide, short-term acceptance in electronics applications. Our Biowires are a sustainable alternative to carbon nanotubes and are readily modifiable to act as sensors. They are perfectly suited for all sorts of nanoelectric applications including flexible and wearable applications. There are fewer hurdles to getting into a non-invasive applications. The medical devices will take more time. In addition to the performance of the product, there is a significant research required to determine the compatibility with human systems.

CEOCFO: *Where does cost come into play?*

Mr. Miller: We have a good competitive advantage in terms of cost because our microbes reproduce themselves at room temperature and the processing of the microbes into the nanowires is very inexpensive and simple to do as compared to growing carbon or silicon wires and tubes. At the end of the day we are going to be able to produce these at a far lower cost than conventional material.

CEOCFO: *Why pay attention to BioCurrent Technologies?*

Mr. Miller: BioCurrent Technologies is going to be highly disruptive to the nanotechnology space in terms of components, sensors and final applications. Nanoscale materials are here to stay. BioCurrent Technologies Biowires are a cleaner, more sustainable, more controllable and a lower cost alternative to current nano options.

