

Revolutionary Chemical Reactor that Combines 3D Printing, Catalysis and Nanotechnology allowing Oil, Gas and Biofuels Companies to Develop Better Consumer Products



Andrew Jones
Chief Executive Officer & Co-Founder

Activated Research Company
<https://www.activatedresearch.com/>

Contact:
Andrew Jones
612-787-2721
andrew.jones@activatedresearch.com

Interview conducted by:
Lynn Fosse, Senior Editor
CEOCFO Magazine

CEOCFO: *Mr. Jones, would you tell us about Activated Research Company?*

Mr. Jones: We utilize our expertise in catalysis and nanotechnology, and combine that with a knowledge of additive manufacturing, or 3D printing, to develop products that are changing the world. Our first product is the Polyarc system, and it is a product that is improving the ability of scientists to measure the substances, or chemicals, found in everyday items such as foods, fuels, and pharmaceuticals.

CEOCFO: *Would you explain the relationship between nanotechnology and additive manufacturing?*

Mr. Jones: This is the first time commercially, that I am aware of, that these two normally disparate technologies were combined to produce a commercial product. On the one hand we have nanotechnology, which is the design of molecules at a nanometer scale to do functions, such as catalytic reactions, that we require for our technologies. On the other hand is 3D printing, which we use to make solid structures in stainless steel with very specific macroscopic geometries. When we combine nanomaterials with 3D printed devices, we are able to create really cool products that the world has never seen before.

“In general, what Activated Research Company does very well is the ability to combine these two technologies that have never been combined commercially before: 3D printing and catalysis/nanotechnology. Our ability to do that gives us this unparalleled access to a foundational technology that we can use to improve scientists’ and consumers’ lives in many ways. For example, scientists can now measure things they could not measure before allowing them to improve consumer products such as next-generation biofuels.” - Andrew Jones

CEOCFO: *What can you do that could not be done before?*

Mr. Jones: We make chemical reactors, which are devices that actually transform chemicals from one state to another, and these are normally very large devices that you see in refineries or chemical plants. We have shrunk this down into tiny devices, which we can do because of this novel combination of 3D printing and catalysis. The function we perform is a

very fast chemical reaction at a very small scale. The end result is a device that allows scientists to analyze a variety of things such as: food, pharmaceuticals, environmental samples, oils, chemicals and many other products that contain organic molecules.

CEO CFO: *How do we know it works as well as standard methods?*

Mr. Jones: We have done an enormous amount of testing at our facility, but most importantly we have gone to the customer to thoroughly test the product with their methods and samples. The device has been tested at numerous national labs as well as some of the world's largest chemical and oil companies. The proof is in the pudding and our customers have shown for a wide variety of different industries and different samples that this device is operating very well and doing exactly what we are saying it can do.

CEO CFO: *Would you explain the device physically?*

Mr. Jones: The device is called the Polyarc reactor, and it is a 2 inch x 1 inch x 1 inch stainless steel cartridge that is 3D printed. That reactor is an add-on technology to an existing piece of laboratory equipment called a gas chromatograph. What it does is improve the gas chromatograph's ability to analyze different species by giving them a uniform response. Prior to this device, if a scientist wanted to analyze, for example, a bottle of whiskey to figure out how much ethanol is in there and the quantity of other chemicals present, they would need to inject that sample into a gas chromatograph and then look at the signal that comes out. They would need to calibrate the machine for each individual compound in there and this can be incredibly time-consuming and expensive. Sometimes it is even impossible, because calibration standards do not exist for some molecules. With our device we chemically transform, using our 3D printed reactor and our nanotechnology, all of those species into the same molecule called methane so that we are able to analyze all of those species with the same sensitivity. That eliminates the need for the time-consuming calibration, which can be crippling in terms of time, cost, and the fact that sometimes it is not possible to get an accurate reading.

CEO CFO: *Are the people that could benefit from this aware of what you are doing?*

Mr. Jones: It is a relatively new product since we launched a year ago and it is coming into a very conservative industry that, for good reason, needs to thoroughly test new technology and develop new methods. The technology that we are improving is called the flame ionization detector, which pairs with the gas chromatograph. This detector has stayed relatively unchanged for sixty years. It is a great piece of technology, but it was ripe for innovation. As a result we have undergone a long campaign of awareness and education to teach scientists about this new technology. This takes time, but we have been doing a great job and have some very stellar customers using the Polyarc to do all sorts of interesting things. We are still fighting that battle of awareness and getting it in front of the right scientists, as well as the battle of change and teaching people there is a new technology out there. It is revolutionizing the industry in a lot of respects.

CEO CFO: *It sounds exciting!*

Mr. Jones: Yes it is! It's especially exciting when we get the Polyarc in the hands of the right scientists and receive the great feedback they've been sharing. It's also challenging for a number of reasons due to established methods and regulations. The EPA, ASTM, FDA, and a number of organizations have written regulations that specify how to do some of the analyses. Those methods need to change to adopt new technology and that can take time. Then there are also unregulated methods written by scientists at the companies where they are used, which need to percolate through the companies and be validated. Science and research takes time so we have to be patient. What is fun is that we continually learn from our customers new uses for the Polyarc and new avenues for research. The customers really are the experts at these analyses and we learn a lot from them.

CEO CFO: *Where does cost come into play?*

Mr. Jones: The cost is relatively low for this market. The payback period that we have seen in the industry is typically less than four months, so it's usually easy to justify the cost. The concern for scientists is actually not cost, but the uncertainty of new technology. They wonder if it's going to work for their system and analysis.

CEO CFO: *How do you reach out?*

Mr. Jones: We have been going to a number of trade shows, and we have a good web presence. The Polyarc has also been published in trade magazines and technical journals. Many of our outstanding customers have also spread the news of the Polyarc through word-of-mouth, and the writing of technical journals and application notes. There are always more ways to get the word out and this will hopefully help as well.

CEO CFO: *Would you tell us about the R&D 100 recognition?*

Mr. Jones: We were excited to see that we were selected as a winner of the R&D 100 this year. It is an outstanding accomplishment and we are thankful to be up there with other excellent companies. We were selected under the

instrument analytical category, and I think this is a neat award to showcase this industry and just how groundbreaking this technology is even though most people have never heard of a gas chromatograph. We want the Polyarc to change how we analyze chemicals and determine the purity of products, and it is nice to see that this is being recognized.

CEO CFO: *What is your geographical reach?*

Mr. Jones: We are based in the US and sell direct domestically. We do not have any international offices at this point. We have a partnership with Wasson-ECE, which is a value-add that can sell our product internationally as well.

CEO CFO: *How are you funding research and development?*

Mr. Jones: We were funded early on with angel investment. We have been able to live off of that for the development of the Polyarc. Now that we are revenue generating we do not foresee the need for additional investments in the near term.

CEO CFO: *What is the learning curve for your Polyarc System?*

Mr. Jones: It is simple to use. You are using your same GC, same equipment and same software, but the results you are getting mean something different. The hardest part of using it is understanding the science behind why the results are different and what this means for data analysis. In the end and once the initial learning curve is conquered, that interpretation is much easier because the response is uniform rather than proportional to an empirical factor that you have to calibrate for.

CEO CFO: *How do you deal with the frustration of having something that is a game-changer yet there is such an arduous process to get the world to pay attention?*

Mr. Jones: I think you have to empathize with the customer that they have a lot on their plate. Everyone wants change but there are a lot of hurdles and a lot of work that goes into change. Being able to understand that you need to have some patience to see these things through. We also talk to others in the industry that have been through similar innovations, and learning about their comparable experiences can be very helpful.

CEO CFO: *Why is Activated Research and your Polyarc System so important?*

Mr. Jones: In general, what Activated Research Company does very well is the ability to combine these two technologies that have never been combined commercially before: 3D printing and catalysis/nanotechnology. Our ability to do that gives us this unparalleled access to a foundational technology that we can use to improve scientists' and consumers' lives in many ways. For example, scientists can now measure things they could not measure before allowing them to improve consumer products such as next-generation biofuels.

CEO CFO: *Final thoughts?*

Mr. Jones: We are not a one-trick-pony. We have this foundational technology that we intend to use on a variety of other products that are up and coming, so I would just tell everyone to stay tuned to see what comes next from our company. Our mission is to make the world a better place using our expertise in catalysis and we are intent on continuing to do this.

