JPL-20181119-JPLf-0001-Electrochemical Technologies Group John-Paul Jones

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I did my undergraduate work in chemistry at UC Berkeley. And then I went on from there to do my PhD at USC, also in chemistry. I went from organic chemistry, transitioned into doing electrochemistry by the end. It was sort of a chance

encounter, I guess, that I was able to meet somebody who worked in the Electrochemical Technologies Group and then be able to get myself in, first as an academic part-time then as a post-doc after my PhD and then as a full-time employee.

We're really lucky here because we get to work on both commercial technologies and research and development.

We have a wide variety of projects that we're able to work on--from testing commercial batteries for specific environments to developing new chemistries for fuel cells, batteries, and capacitors.

One of the projects I'm working on is a battery for a lander for Jupiter's moon Europa. Jupiter's moon Europa is really interesting because people think that there's a chance there might be life on it. And so we'd really like to go there and actually land on the surface.

But in order to do that you've got to be able to deal with the harsh radiation environment, meaning that any lander can only last for about 20 days on the surface.

You've also got to deal with the trip, which is going to take about 7 years. So we're trying to develop a new battery which would survive the radiation for at least 20 days. And also provide enough power to be able to do some interesting science

once we get there.

We're trying to use a new type of battery chemistry called Lithium CFx, which has about 50% higher energy compared to previous batteries we've used on landers like this. In order to know if a battery's going to function or not on Europa, we do a lot of testing here at JPL by wiring up individual cells, individual batteries and testing them in different environments, different temperatures, and different discharge rates. Because of the very high radiation environment, we expose the cells to

radiation and then test them to try to understand how the radiation affects them

functionally as well as how it affects them chemically.

So, another thing that we're working on are hydrothermal vents--which we know exist on Earth and we think may exist on moons like Europa and Enceladus. So we're actually taking samples from the vents, crushing them up, and making them into electrodes which we can study inside fuel cells. And the idea is to try to understand them better here on Earth, so that when we do go to Europa or Enceladus we can understand the signals that we're getting back from the spacecraft a little bit better.

The JPL culture, I feel, is very different from academia. That's for sure. It's also very different from industry. But I think it was a pretty good fit for me personally. There's a very high focus on quality. So here we try to do things the best possible way--that they're going to work as reliably as we possibly can. In academia you tend to focus on what's new and what's different. Whereas here that's not the case. And in industry you look at what's going to make money and what's going to be the cheapest solution. And that's not what we're interested in here either. We want something that's going to work--reliably, for as long as possible.

Even when things are challenging and I feel like I have too much to do, I have to look at the big picture of what I get to do, which is work on these amazing projects that nobody else in the world gets to work on.