JPL-20180322-JPLf-0001-Electrochemical Technologies Group Will West

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My educational background is primarily engineering, so my undergraduate degree was in chemical engineering and my masters and PhD was in material science engineering. They interviewed me and I did a seminar, and the people that interviewed my 19 years ago are my colleagues now.

My position at JPL calls for two very distinct activities. One is research and then flight work. For the research activity, what we do is looking towards developing new materials, new components and subsystems for energy storage and conversion for missions that will be launched perhaps in the 20-year time frame. So this is kind of long-term. On the other end of the spectrum then is flight work. So that's developing, leading the activities of designing, building, fabricating, testing and delivering spacecraft hardware for a specific mission. Research work and flight work have a very different cadence and a very different methodology. Research is more forward-looking and we have a general notion of where we're going with our program. For flight work, then, it's much less exploratory. JPL has an extensive background history in developing spacecraft and flying them. We work from design principles that have been developed by these previous engineers and scientists to take an idea and then flesh it out into actual hardware.

For the Mars Science Laboratory project, I was responsible for the thermal batteries and a power distribution box called the base load resistor assembly. As it enters deep space, it was powered by solar panels, which work very well in deep space. But you can imagine these fairly fragile solar panels get ripped apart by the forces as it enters the Martian atmosphere. We need some kind of energy storage system to provide power for the computer, the descent stage motors and so on. So we build lots and lots of these batteries and hope that they all work as planned. One of the most exciting and terrifying times during the MSL mission was the entry, descent and landing phase. I call recall very clearly hearing the call out from Mission Control that we had parachute deployment. That could only have happened with the thermal batteries operating as planned. Moments later the spacecraft was on the surface, and we knew that we had done our jobs and that the mission thus far was a success.

My most challenging assignment was a research project. The goal was to develop an ultra low-temperature battery for a spacecraft that would land on an outer planetary moon like, say, Saturn's moon Titan. So the surface temperature very, very low--about minus 180 degrees C. And conventional batteries fail at much higher temperatures. So our goal for this project was to develop one that could operate on the surface for an extended period of time without any heaters. We had to develop new chemistries, new components, catholytes, electrolytes, electrodes. And we were able to develop a battery that actually operated at minus 140 degrees C. Although it was a challenge, it was just... just complete excitement the entire time.

Perhaps one of the best things about working at JPL are my colleagues. One of my goals is to have some of these research activities that I was involved with reach the maturity that they could be used on a particular spacecraft mission. I think it would be the ultimate accomplishment, for me, to be involved on a mission that discovers extant or present-day life on another planetary surface. It would be one of humankind's greatest discoveries.