



Fully funded

Spartan wins fellowship from NSF after research around the Bay Area

By Kunal Mehta
SCIENCE & TECH EDITOR

Spending a summer researching at Stanford University blossomed into so much more for one Spartan.

Chemical engineering senior Jocelyn Valenzuela spent the summer of 2018 interning at the Stanford Synchrotron Radiation Lightsource that contains bright X-ray technology as a part of the SLAC National Accelerator Laboratory.

"I had the opportunity to further my understanding of X-ray techniques while also providing me with training as a science and math educator," she said. "For example, we learned how to give back to students by drawing on these research experiences to develop a lesson plan for students to teach the function of waves in light and sounds."

Now, Valenzuela plans to head back to Stanford in the fall to begin her doctoral studies. Interested in protein engineering, she hopes to work on finding cures for cancer and neurodegenerative diseases.

While most incoming doctorate students are limited based on where they'll get funding, that's not a worry for Valenzuela, who recently won a 2020 National Science Foundation Graduate Research Fellowship that will pay for three years of her education and stipend.

"I'm kind of surprised, but really excited too," Valenzuela said over a Zoom call. "It gives me more flexibility on which graduate school to go to." Ultimately, she said, she chose Stanford because it was the best fit.

Having never written a research proposal before, Valenzuela said she expected her application to be a learning opportunity for her second attempt. Most students can only apply for the NSF fellowship twice, once as an undergraduate senior and then again in their first year as a doctoral student.

Valenzuela won it on her first attempt. "That research fellowship is something that's really hard to get on the first try," said Katy Kao, an SJSU chemical and materials engineering professor, over a Zoom call. "She's done really amazing work throughout her undergraduate career; that's what I think really got her the award."

Kao advised Valenzuela on her fellowship application.

"She approached me toward the beginning of the [Fall 2019] semester, just talking to me about her wanting to go to graduate school and that my area of research, which is industrial biotech, is something that she's interested in," Kao said.

That semester, Valenzuela became the first undergraduate student in Kao's lab, studying ways to improve lithium ion battery production.

"I'm very happy for [Valenzuela], I know it's extremely competitive to get an NSF graduate fellowship, so I'm ecstatic for her and I think

it's a testament to a lot of her hard work," SJSU chemistry professor Abraham Wolcott said over a Zoom call.

Valenzuela began her research career in Wolcott's lab during Fall 2017, researching how to modify nanoscale diamonds that could eventually be used to track cancer cells.

Kao explained that many laboratories have a limited amount of funding for graduate students.

"Now with the fellowship, it's OK. The [principal investigator] doesn't have to pay for her tuition, fees and stipend - it's essentially a free student," Kao said. "It opens up a lot more possibilities for [Valenzuela] and makes her more attractive as a Ph.D. candidate too."

Increasing representation

As part of the fellowship application, Valenzuela had to submit a personal statement.

"It was a few years ago now, I had a Ph.D. student who won the fellowship and so based on that experience I know that there are certain things that they look for," Kao said. "You really have to stand out and it's not just your science. You need to have a broader impact."

Figuring out that broader impact was simple for Valenzuela: helping other under-represented minority students.



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Abraham Wolcott
chemistry professor
Surface Science Center Laboratory director

helped her get ready for upcoming conferences and prepare her abstracts and posters.

More lucratively, the National Institutes of Health pays 60% of her SJSU tuition.

She also participates in SJSU's Research Initiative for Scientific Enhancement Program (RISE) and the California State University systemwide Louis Stokes Alliance for Minority Participation (LSAMP).

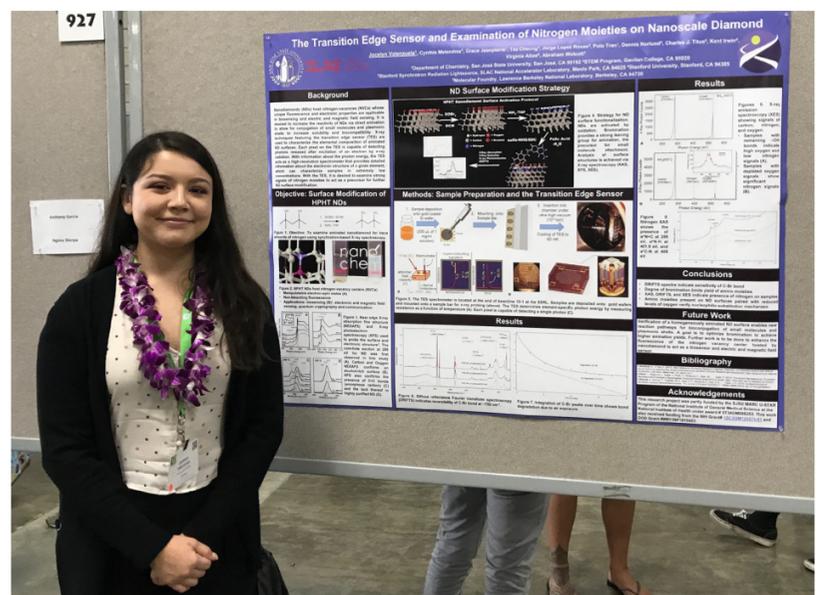
Valenzuela said the LSAMP program helped her and other under-represented students apply to graduate school and attend conferences.

Having benefited from these programs, Valenzuela said she hopes to serve as a role model for the next generation of minority students in STEM. In her fellowship application, she wrote that she wants to increase representation through mentorship, personal support and providing research opportunities.

Getting an early start

Wolcott, the director of the Surface Science Center Laboratory at SJSU, said he tries to appeal to students like Valenzuela.

"For my lab, I'm really enthusiastic about having as many under-represented minorities as I can," Wolcott said. "A lot of the funding we have is specific to make sure



PHOTOS COURTESY OF JOCELYN VALENZUELA

Top: Chemical engineering senior Jocelyn Valenzuela works with a sample of modified nanodiamonds inside a glovebox because they are highly sensitive to oxygen and water. Right: She poses by a poster about modifying surfaces of nanoscale diamonds at the 2019 Society for Advancement of Chicanos/Hispanics and Native Americans in Science.

[under-represented minority] students get financial support."

He designed the lab to mimic the experience of being in a doctorate program. In his lab, Valenzuela researched modifying nanoscale diamonds with an eventual goal of using them potentially tracking cancer cells.

"I never imagined going into research, but the opportunity was there and I really fell in love with it," Valenzuela said, regarding her experience in Wolcott's lab.

"She was a part of Team Amine," Wolcott said. "Her role, along with her colleagues, was to functionalize the surface of the diamond, going from an alcohol-rich surface to an amine."

Amines are a functional group that have nitrogen in different bonding environments and compared to the alcohol surface, are easier to modify.

"Once amines are on the nanodiamond surface they can be used as an anchor to [link] small molecule drugs, antibodies or active compounds to direct the diamond nanoprobe to a specific location in a cell or tissue," Wolcott said.

Valenzuela, along with two other lab members, went to Boston in November 2018 to present their research at the Materials Research Society conference.

Their work is described in an article that will soon be submitted to the Journal of the American Chemical Society, Wolcott said, with Valenzuela listed as a co-author.

"When you figure out how to do something new, you need to go ahead and get it out into the literature," Wolcott said. "In science we say 'Publish or perish,' and [Valenzuela] was a key member in getting this work accomplished."

She also presented their research at the 2018 Annual Biomedical Research Conference for Minority Students in Indianapolis, winning an award for outstanding presentation. In 2019, she traveled to Hawaii to present at the Society for Advancement of Chicanos/Hispanics and Native Americans in Science conference.

Heading back to Stanford

Originally from Salinas, Valenzuela came to SJSU to stay close to home and be near plenty of biotech companies - something that will continue to apply when she moves about 25 miles away to Stanford.

In the fall, things will be different compared to her previous summer experience because of the coronavirus pandemic. Most

non-COVID-19 research has been suspended. "I'm hoping things turn around so I can get that hands-on experience," Valenzuela said.

She explained that typically at Stanford, the first year doctorate students rotate through the different professors' laboratories, figuring out whether choosing that professor as your mentor will be a good fit. That decision affects who she'll do research with for the rest of her time there.

But because of the pandemic, she might not be able to even step foot inside those labs. Kao expressed some concerns if shelter-in-place orders are lifted in a few months.

"So when labs open back up again there are probably going to be rules on social distancing," Kao said. "So if you're an experienced researcher already, you don't need someone to show you how to do things, then it's a lot easier for you to just say, 'OK, I'm going to come in during this hour where no one is.' But if you're brand new and still need to learn the technique, that's going to be really challenging."

There may be some opportunities for literature review outside of the laboratory, Kao noted.

In the meantime, both Kao and Wolcott encouraged other students to pursue research and to start as soon as possible.

"[Valenzuela] was very competitive for this fellowship because she's been involved in doing research since her junior year," Kao said. "She's contributed data towards publications. In order to be competitive for these fellowships you need to have publications under your belt."

On top of that, Wolcott emphasized that students working in his lab are already getting paid.

"That's very special, because instead of going out and working at a non-science job, for instance like retail, or something like that, students can come in and learn how to do science and get compensated at the same time," he said.

At the end of the day, Wolcott identified three traits that make students pursuing research successful.

"Science is hard," Wolcott said. "You need somebody who is smart, stubborn and is a hard worker, and [Valenzuela] was able to do all three."

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