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DAAD RISE Summer 2008 Research Internship

Chemical Engineering at the Universität Karlsruhe, Deutschland

Report from Participant

Last year during the spring semester of my junior year, I was applying for research programs across the country when I stumbled across the DAAD RISE Program while at my university's Scholarship Office. Immediately I knew that I would apply for this unique opportunity and that it would be my first choice for the upcoming summer. I had always wanted to study abroad, and was particularly interested in Germany, and this program allowed me to combine my international curiosity with my enthusiasm for research within my major. The research topics were highly diverse and so appealing that it difficult to narrow it down to my top three choices. Furthermore, the opportunity to work with a Ph.D. student was particularly intriguing to me because I wanted to catch a glimpse of graduate life before applying to graduate schools the following year. After much investigation and writing, I submitted my application.

The program placed me in Karlsruhe to conduct research to design a process to convert trace carbon monoxide to carbon dioxide in a hydrogen stream to be used as the fuel for hydrogen fuel cells, which are poisoned and caused to cease functioning by carbon monoxide. The basic premise of the project is to "clean up" the hydrogen so that it may be used effectively without damaging fuel cells, once these emerge on the market. This topic was perfect for me because of my interest in renewable energy and fuel cells, in particular.

At the beginning of my internship, I read a number of research articles to familiarize myself with the topics I would be dealing with, and was excited to find that this type of work is

on the cutting edge in the hydrogen field. Getting into the every-day work in the laboratories, however, was the most thrilling part. I greatly enjoyed the work I was assigned. I had had previous experience working in a technical lab the previous summer, so I was familiar with some of the equipment being used and was happy to start quickly. I was surprised that either identical or similar parts were used in this lab as in the United States. My Ph.D. student was very patient and supportive in teaching me the remaining skills necessary to help him or to work alone. The independence I was often granted was one of the parts of my research that I enjoyed the most because I was able to figure out how some things work on my own and even solved some of the simpler problems by myself. On a typical day, I prepared catalyst samples in the morning and then assisted with the construction of the laboratory plant in the afternoon.

By the end of my internship, I had prepared 25 varied ceramic foam catalyst samples. I sliced thin discs of ceramic foam from longer cylinders and coated them with the active catalysts using several coating methods, from the traditional methods of dip-coating and drop-wise coating, to more creative spray methods. I began to test the activities of these catalysts, the degree to which they are effective in adsorption, by crushing them and using Temperature-Programmed analysis methods (TPx). Simultaneously, I was assisting with the construction of the laboratory plant that will be used to test the actual performances of the catalysts. I completed such tasks as assembling and connecting a gas feed system, calibrating mass flow controllers, installing analysis equipment, and pressure-testing and repairing the plant. The work was very interesting and I learned a lot from this experience.

The program meeting in Heidelberg was a worthwhile experience because it gave a chance to all of the RISE students to meet up in one place and discuss our experiences. It was interesting hearing about the broad range of projects other students had been working on, as well

as the travel experiences they had had. It was a pleasure meeting the people who put the program together and learning about the other programs available to us for post-graduate study. Each student also had the opportunity to visit a German company within their field of study, and it was interesting to observe the similarities and differences between the German company and companies in the United States.

I also had some great travel experiences in my free time. On the weekends during my internship, I travelled across Germany and surrounding countries using the extensive rail system. Over my 11 weeks abroad, I visited Berlin, Karlsruhe, Stuttgart, Neuschwanstein Castle near Füssen, Heidelberg, Cologne, Dusseldorf, Hamburg, Baden-Baden, Triberg in the Black Forest, Munich, Paris, and Zurich. The cultural experiences were amazing. I got to try the local food, hear the local music, frequent local events, and talk to the people living in these places. Travelling with other RISE students and with students I met at my University in Karlsruhe was also very fun.

I greatly enjoyed my experiences in the DAAD RISE 2008 Program and would recommend it to every college student interested in conducting cutting-edge scientific research and exploring abroad.