

## Sampling the work world

*Internships provide a view of research outside the university.*

By Eleanor A. Gamble



As a PhD student's thesis research approaches completion, it is necessary to determine the next step on the career path. This can be a difficult step in the graduate school experience. Some of my graduate student colleagues at the University of California, Santa Barbara, entered graduate school with the goal of going into teaching, becoming a researcher in industry or at a national lab, or joining a startup company to develop products on the cutting-edge of technology. Others, like myself, were motivated to earn a PhD by a love of research and discovery but were not sure how we wanted to use that passion to earn a living. I have found that research internships are valuable experiences for gaining insight into my career interests and for exploring opportunities.

During my undergraduate studies, I participated in two summer internships at the NASA Glenn Research Center in Ohio. These first experiences with materials research helped shape my

career. They solidified my decision to obtain a PhD and allowed me to begin developing the skills necessary to succeed in a graduate program. I hoped an internship in industrial research would prove similarly useful for expanding my skill set and providing experience in research outside the academic com-

munity. Professor Levi at UCSB helped put me in contact with the Engineered Ceramics lab at the GE Global Research Center, and I spent February–May 2011 working there.

My research activities at GE Global Research focused on high-temperature ceramic coatings for turbine compo-

*Charles Forman and Patrick Sinko are junior materials science and engineering majors at Virginia Tech and had interesting summer work experiences, albeit very different. Their stories show how government and industry internships differ.*

### Government Sector

By Charles Forman

I participated in a Department of Energy sponsored Science Undergraduate Laboratory Internship at the Thomas Jefferson National Accelerator Facility in Newport News, Va., last summer. Jefferson Lab is a world-class nuclear physics research facility that houses a 7/8-mile continuous electron beam accelerator for studying subatomic particles.

I was assigned a mentor, Michael Kelley, who gave me a unique materials research project. My project was the very first to dissect and analyze a high-performing superconducting radio-frequency niobium accelerator cavity.

Many Jefferson Lab engineers are relaxed in terms of attire, but they are all very involved in their work. My research experience was more formal, because my mentor treated me as a graduate student.

I am still impressed by the quality of equipment present at Jefferson Lab. I needed only to sign up online, and I had access to top of the line optical, scanning and atomic force microscopes. In addition to my mentor, I reported to the supervisor of the internship program.

All interns are expected to write a formal research paper and present their work in a poster session at the end of the summer. The DOE annually chooses the top 14 papers from about 500 national lab interns nationwide to be published in the agency's *Journal of Undergraduate Research*. They selected my paper and arranged for me to compete in a national conference in Washington, D.C.

Overall, they treated me very well, and I had a great research experience.

### Private Sector

By Patrick D. Sinko

For the past two years I have been working in the pharmaceutical industry as a materials scientist and engineer at Bristol-Myers Squibb. Although the company is global, I worked at the original site in New Brunswick, N.J. I spent my first summer at BMS characterizing pharmaceutical excipients and active pharmaceutical ingredients. I had the opportunity to work with experienced materials engineers from all over the world as well as world-class pharmacists. This was beneficial because I was using traditional methods and cutting edge technologies to generate a central database of pharmaceutical materials properties. I had the opportunity to develop a platform formulation.

The working atmosphere at BMS is relaxed, but you are expected to deliver results on time or early. The dress code was relaxed, business casual in the office and appropriate lab safety gear while in the lab.

My job resided in the Drug Product Science and Technology Department, but I actually belonged to two smaller groups within that department that deal with materials characterization and development. My team was five people ranging from 25 years of experience to myself with only a years of experience.

BMS holds an internal symposium, which the upper management and most of the top level scientists attend, and this is where you present the findings from your research. The amount of learning that I experienced over my two years at BMS was not limited to material systems and pharmaceutical knowledge, but extended to professional development and learning how to work in industry as an engineer. ■