PEOPLE

Sayata Ghose, polymer researcher

Polymer engineering, the branch of chemical engineering that involves plastics and fibers, is Dr Sayata Ghose's passion. Her innovative research in the field has touched everything from the cooling system for astronauts' space suits to environmentally friendly tire disposal.

Ghose is a research scientist for the National Institute of Aerospace (NIA, Hampton, VA). Before joining NIA she held a fellowship in the NASA postdoctoral program (nasa.orau.org/postdoc). The program is administered by Oak Ridge Associated Universities (ORAU), a consortium of more than 100 academic institutions that share the common objective of advancing scientific research and education. The consortium also develops and promotes partnerships with national laboratories, including NASA, where Ghose's research has been based.

As a NASA postdoctoral Fellow, Ghose enjoyed the freedom to conduct her own research at NASA's Langley Research Center (NASA-LaRC, Hampton, VA). "You don't get this kind of freedom in industry," Ghose notes.

Ghose was born in Calcutta, India. In college she liked learning about the chemistry behind polymers and how they're used. "I wanted to know more about making materials and applications, and chemistry was the subject that would allow me to do that," Ghose says.

She finished her BS in chemistry in July 1996 at Calcutta University and her bachelors of technology-first class in polymer engineering in July 1999. During school she was a student research associate at the Indian Association for the Cultivation of Science, one of the premier research institutions in India, and an engineer trainee at Fort Gloster Cables in Calcutta. "I had to learn how they selected materials to make various cables. Depending on the application, you need different types of polymers," Ghose explains.

She wanted a graduate school with a strong polymer program. She chose the PhD program at the University of Akron (Akron, OH), which is ranked number two in the U.S.

Her doctoral research was on finding ways to recycle the thermoset polymers used in tires. Tire material

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is designed not to melt, so tires are especially difficult to recycle. "What I did was use ultrasonic energy to break chemical bonds so you can get useful material from the tire," Ghose says. "A lot of the material in tires is very toxic. As my advisor used to say, if you can recycle a tire and get a garden hose out of it, that's much better than burning it!"

As she came to the end of her PhD studies her advisor suggested that she apply for a postdoc position at NASA-LaRC through the National Research Council (NRC), which has a large materials division. She received an NRC resident research associate award in February 2004. Management of the award, along with all of NASA's postdoctoral fellowships, was transferred to ORAU in late 2005.

As part of her postdoc, Ghose helped NASA figure out how to make plastic conduct electricity. "When they sent vehicles out in space, the plastic parts would accumulate charge like the static you experience in winter. Then the buildup would discharge, harming the astronauts and equipment," says Ghose.

"NASA wanted to put something in the polymer that would conduct the electricity away and avoid the buildup." At the same time NASA hoped to add strength to the polymer. Ghose worked with carbon nanotubes and nanofibers. "They have high strength and conductivity, but they're lightweight," she explains. Similar composite materials will be incorporated into the new line of Boeing 787s, Ghose notes.

When her NASA fellowship ended in early 2007, Ghose accepted a research scientist position with the NIA at NASA-LaRC. Her husband, Tony Belcher, whom she met in the NASA postdoc program, is a PhD organic chemist, also with the NIA at NASA-LaRC.

Today Ghose is the materials engineer on a team of five. One of her projects has been in space suit design. Astronauts' suits have tubes that cool their skin with water and absorb heat and sweat. "Our goal has been to improve the thermal conductivity of the tubes, and we have been very successful," Ghose says. The technology fits well with NASA's goals for new spacesuit designs.

"I definitely want to continue with the work I'm doing for NASA. It's very satisfying. You are really thinking thirty years ahead. When you go to a branch meeting it's fun to hear people talking about building houses on Mars, because they're making dreams into reality." *D/C*