Young chemical engineer on cutting edge of organic polymer-based electronics

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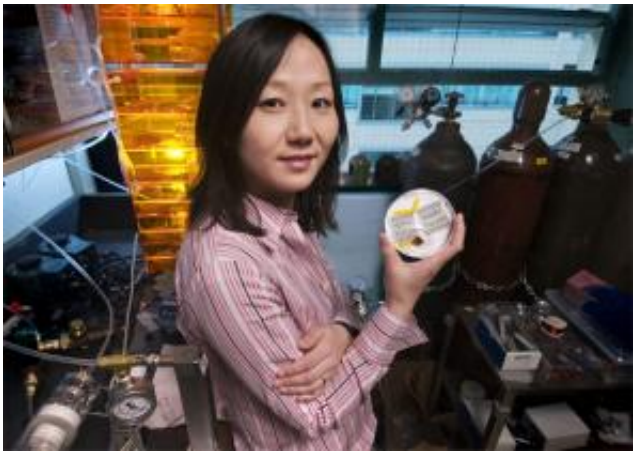

Zhenan Bao holds samples of flexible circuit boards, which combine the useful properties of semiconductors with the versatility of plastics. Bao was named a recipient of a 2006 Sloan Research Fellowship Award.

For most people, a little girl with a lollipop isn't what comes to mind when thinking of a future scientist. When she was just 4 years old, however, Zhenan Bao was conducting her first science experiment at a park in her hometown of Nanjing, China. After handing her a lollipop, Bao's father, a physicist, asked her what would happen if she threw her candy into a nearby lake. Would it sink or float?

"My parents always encouraged me to observe and discover things in everyday life," says Bao, an associate professor of chemical engineering

at Stanford University.

"The lollipop didn't sink," she added. "I thought it would."

Thirty years later, her penchant for exploration is inspiring the next generation of would-be scientists. Recipient of a 2006 Sloan Research Fellowship Award and named one of the 100 top young innovators by *Technology Review* magazine in 2003, Bao focuses her research on using an organic polymer commonly found in Silly Putty to create high-performance transistors, light-emitting diodes and lasers. Bao has helped pioneer the field of organic polymer-based electronics by designing plastic circuit boards that combine the useful properties of semiconductors with the versatility of plastics. Such "flexible electronics" can be used in displays, sensors and solar cells.

Her interest in these unique materials began when she arrived in the United States in 1990 to study chemistry at the University of Chicago. After completing her doctorate in 1995, Bao took a research position at Lucent Technologies' Bell Laboratories in New Jersey.

In her eight years at Bell Labs, Bao published more than 70 papers and filed 40 patents. During that time, she received the Outstanding Young Woman Scientist award from the American Chemical Society and was selected as one of the National Academy of Engineering's Top 100 Young Engineers. Along with her colleagues, she discovered new semiconducting plastics that allowed electrical charge to cruise through thin films at a respectable speed—a huge step toward creating flexible electronics.

"I learned a lot at Bell Labs—not just the technical aspect, but how to start my independent career," Bao says. After a few years at Bell Labs, she started thinking about making a move to academia. Various universities courted Bao, and she came to Stanford in 2004. "I felt

Stanford was the right place because of the excellence across the university," she says. "I knew the interaction potential would be great."

Along with her work on flexible electronics, Bao's group at Stanford is studying polymer-based solar cells, carbon nanotube-based electronics and single-molecule nanoelectronics. She also has started a research collaboration with her husband, Jeff Tok, a biologist at Lawrence Livermore National Laboratory, on DNA-templated nanoelectronics. Her latest study, which appeared in the March 8 issue of the *Journal of the American Chemical Society*, describes a stamping technique to make thin-film transistors with complex patterns.

Aside from her academic pursuits, Bao was recently named a Stanford Commute Hero, an honor bestowed by the university's Parking and Transportation Services on employees who commute using alternative transportation. She walks the half-hour each way from her home to campus every day.

Bao says that what she likes most about her job is discussing ideas with students and colleagues to find new directions for her work. Her research group, located in the Stauffer III building, consists of five undergraduate students, 11 graduate students, six postdoctoral scholars and two visiting engineers. Postdoctoral scholar Jason Locklin says Bao is a great mentor. "She allows us the freedom and actually encourages the exploration of our own ideas even when they appear to be unrelated to current funded group projects," he says.

Echoing her parents' enthusiasm for science, Bao encourages her daughter to explore and discover through experiments of her own. "I try to do the same for my daughter, things like dipping her blue marker pen into water followed by a yellow marker pen to make water turn green," Bao says. "She may not know the exact meaning of 'experiments,' but she always says experiments are fun."

Source: Stanford University, by Aditi Risbud