the **News** Journal

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Spring 2004

Alumnus Profile: David Soane

David Soane (Ph.D. '78,, ChemE)

Clothing that won't get dirty; Stealthy cancer drugs; powdered carbonated drinks; permanent hair color that literally brushes on. David Soane is an entrepreneur—a serial entrepreneur. He admits as much in his airy Emeryville, CA office, surrounded by photos of his family. "I enjoy working at a company in its early stage, when there is a lot of excitement and spirit," he said. Soane starts technology companies the way some people buy new shoes. He has founded eight companies in the past ten years and has more than 100 patents.

All of Soane's ventures are based on novel nanoscale polymer chemistry. He started ACLARA BioSciences, which manufactures "lab on a chip" products for biomedical use; 2C Optics, which produces polymers for eyeglass lenses; and Nano-Tex, a pioneering company that creates fabric finishing agents. The bane of dry-cleaners everywhere, Nano-Tex is the company written about in the newspapers right now. It is the company behind those stain-free, wrinkle-free, miraculous clothes showing up in numerous stores, including Eddie Bauer and the Gap. "I haven't had any threats from dry-cleaning chains yet," he laughed. And, as expected, the man's clothes are blemish-free.

The Nano-Tex products have been a huge success. The breakthrough of Nano-Tex's technology is that the nanopolymers are directly bonded to fibers to impart various characteristics to the cloth. "We use technology to create, alter and improve textiles at

the molecular level, developing intelligent fabrics," Soane said. In addition, the company's methods require only general factory equipment and water, clearing the way for mass production without large capital investment or special machines.

Alnis, another Soane company, uses nanotechnology to improve cancer drug therapy. "Our approach to fighting cancer uses hydrogels, which are simply 25-nanometer highly hydrated sugarballs," Soane explained. "We can then covalently link a useful drug like doxorubicin to the carbohydrate scaffold interior and attach multiple copies of a targeting peptide on the surface of the sugarballs. By using a peptide that binds to tumor vasculature we can obtain a large amount of tumor cell death and necrosis." This "Trojan Horse" approach yields drug-laden particles that bind specifically to the tumor cells, sparing surrounding normal tissue.

Soane received his Ph.D. in 1978 in chemical engineering under the mentorship of Professor Mitchel Shen. A prolific researcher, Soane joined the faculty in 1979 and published approximately 200 technical papers and two books during his fifteen years as a professor.

He left his regular faculty position in the department in 1994 to pursue his entrepreneurial industrial ideas; however, he maintains an adjunct professor appointment in chemical engineering. "I am very interested in the affairs of the department and enjoy giving guest lectures and colloquiums. I want to teach current students how academicians can benefit the local economy by teaming up with industry." He also participates in college alumni activities, speaking last year at the CHEMillennium alumni kickoff event and at the Stanford-MIT-UC Berkeley Nanotech Forum.

As both a former graduate student and faculty member of the chemical engineering department, Soane found that the rigorous scientific investigation that he undertook at Berkeley provided a good foundation for his current work.

"I get to work on fun projects with direct market applications," he said.

His products are both fun and practical. For

instance, if you like sodas, then Soane is working on a product for you. "One of my latest companies is DuraFizz, and we are developing powdered carbonated drinks. Instead of taking up lots of shelf space and
contributing to the landfill problem (although recycling does help, it requires a lot of energy), carbonated beverages would be available in powder form. We can nano-encapsulate a bi-carbonate core (for the immediate and sustained fizz) and eliminate the preservatives." This would help make the picnic basket lighter.

Yet another company that he heads up is Cosmetica, which focuses on personal care products. "We would love to revolutionize the hair-coloring industry," he said with a smile. The current way to change your hair color or cover gray hair is to essentially do chemical experiments on your head. Peroxide destroys the melanin in the hair shaft, and then dye precursors, comprised chiefly of aromatic compounds in an ammonia solution, are combined with hydrogen peroxide. Color is created inside the hair via oxidative coupling.

"We would like to change this process by doing the chemistry somewhere else, away from your head," Soane said.

Nanoparticles that bind selectively to hair can be engineered to contain color. The particles would readily be suspended in solution, and the color could literally be brushed onto the hair, creating immediate, water-resistant color. The nanoparticles could then be removed at any time with Cosmetica's proprietary remover. "You (or your kids) would be able to have crazy green and purple hair for Halloween and go into the office the next day with everything back to normal, no regrets. I have a beautiful fluffy white cat at home that might make a good spokes-animal for our product line," he laughed.

Soane is optimistic yet cautious about the current nanotechnology hype that pervades the media. "The nanotech revolution is still very early. I see a gradual evolution from the microscale to the nanoscale. But I think that continuing to develop smart materials will pay big dividends."

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College of Chemistry UC Berkeley