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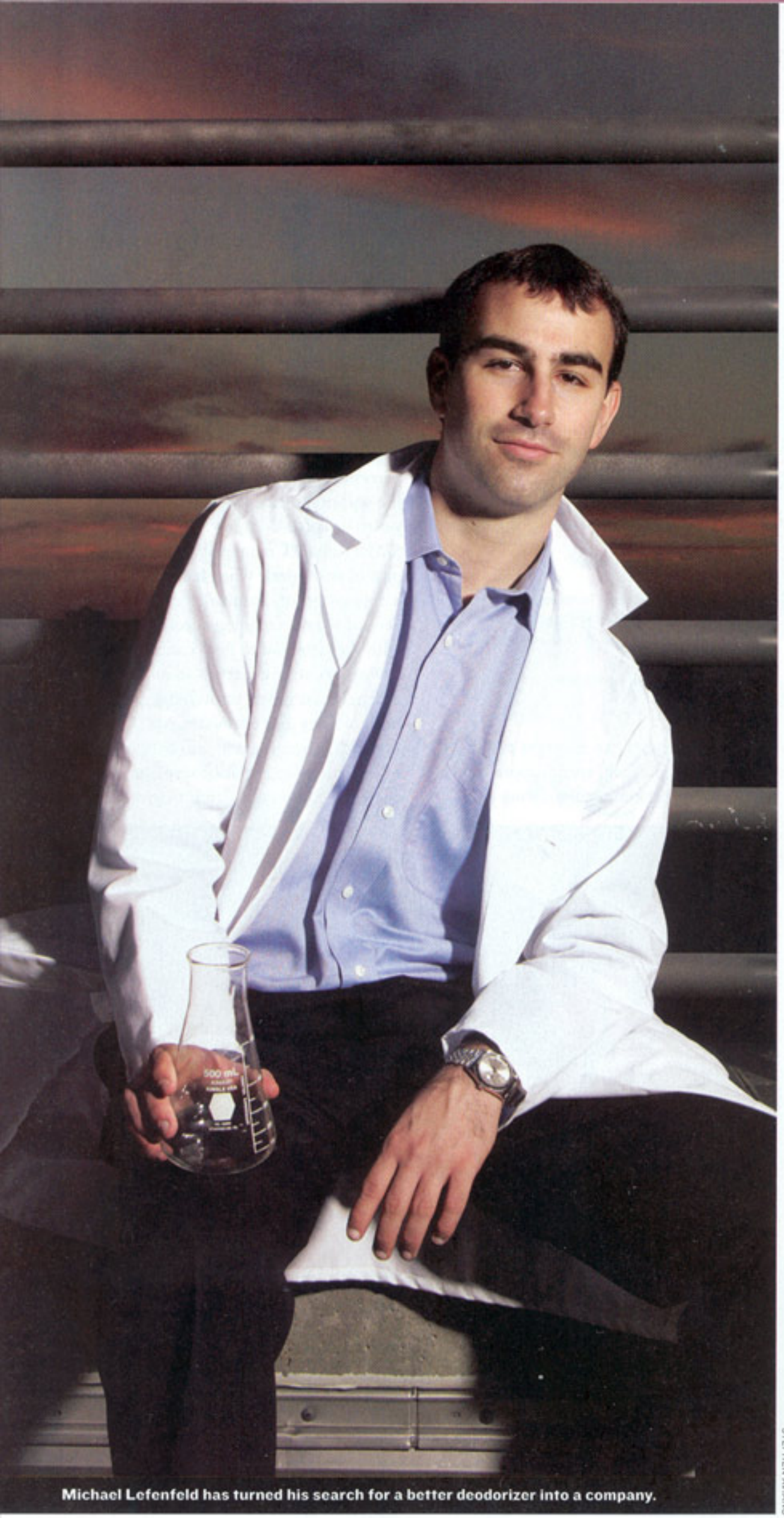

Michael Lefenfeld has turned his search for a better deodorizer into a company.

STEPHEN AVIANO

that could herald the next wave of life-saving drugs.

Recognition for her work came last year in the form of a Presidential Early Career Award for Scientists and Engineers (PECASE), America's highest honor awarded to professionals at the outset of their careers.

Ms. Kubanek discovered her interest in marine chemistry when as an undergraduate student she switched from biology courses to chemistry because she wasn't happy with the way biological science was taught at universities.

She soon found a way to tackle the sweet spot where the two meet. For her doctoral thesis, she explored the metabolic processes that sea slugs and worms use to produce unusual chemical compounds that can ward off predators. Understanding this gave her an overview of how chemical reactions operate in living systems, an understanding that she continues to work on.

Ms. Kubanek's research has already sparked interest from pharmaceutical giant Bristol-Myers Squibb, which along with Nereus, a San Diego biotechnology company, is trying to explore its commercial potential.

Despite her collaboration with the industry, Ms. Kubanek says she is too much her own person to ever want to work for a company.

"One of the things I decided against was being told what to do or what projects to work on," she says. "In academia, I get to choose what I work on." RH

The Nano Alchemist

NAME Michael Lefenfeld
UNIVERSITY Columbia University
RESEARCH/INNOVATION Devising a process to stabilize alkali metals; new chemistry for hydrogen fuel

Michael Lefenfeld's sojourn into the world of nanotech and business started with the goal of creating a better bathroom deodorizer for his grandfather. At the age of 23, he put his materials engineering degree to work.

Two years later, the 25-year-old has founded startup SiGNa Chemistry, released three materials onto the market, and lured major customers like Pfizer, Shell Chemical, and BASF.

After his grandfather's request, Mr. Lefenfeld started out with fragrant oils, and then added alkali metals that would react with water and generate heat, releasing the oil into the air. Researchers have long known that alkali metals have huge potential in many fields, from pharmaceuticals to portable power generation. Immersed in liquid, the metals produce a useful chemical reaction.

But they are also volatile. When exposed to air or moisture, they can burst into flame—a property that has so far limited their use in industrial applications. So Mr. Lefenfeld, who had also worked as a scientist at Bell Labs and DuPont—set out to find a way to stabilize the alkali metals for his purposes. The turning point came as he browsed research on the Internet and found experiments by James Dye, a retired professor at Michigan State University.

When Mr. Lefenfeld met Mr. Dye at an American Chemical Society meeting, Mr. Dye doubted the possibility of making a stable alkali gel. But he worked on the idea in his lab space at MSU, and it soon became apparent that the idea would work. Mr. Dye is now vice president of R&D at SiGNa, which is based in New York City.

Eventually, the pair devised a way to combine an alkali metal with silica gel and yield a stable powder. The powder can be easily and cheaply stored, transported, and handled. It can be used at room temperature without a catalyst. Mixed with water, it produces cheap, clean hydrogen gas, and is especially valuable for analysis in the pharmaceutical and food industries.

This powdered approach overcomes one of the big problems of transporting gas in tanks, which is both expensive and dangerous. Beyond the $80-billion chemistry market, the powder can be used in drug making and oil refining, where it should save money and time. SiGNa also plans to pursue the $10-billion portable-power market, and produce hydrogen as an alternative energy source. Mr. Lefenfeld says lab tests show that 0.9 milligrams of the company's powder can produce 20 milliliters of hydrogen gas.

What's the secret to his success? "It is always good to be the least smart person at the table," he says. "To know what you don't know and have a support team to know what you don't know." RH