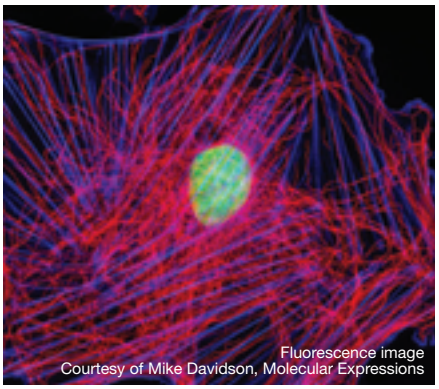
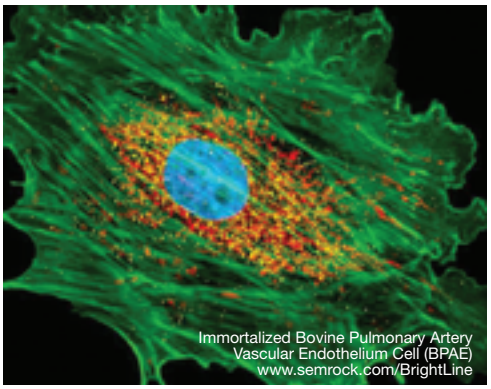
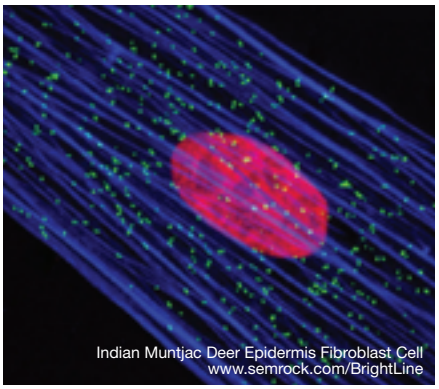

Fluorescence image
Courtesy of Mike Davidson, Molecular Expressions


Immortalized Bovine Pulmonary Artery
Vascular Endothelium Cell (BPAE)
www.semrock.com/BrightLine


Indian Muntjac Deer Epidermis Fibroblast Cell
www.semrock.com/BrightLine

The Story of Semrock Inc.

A company reinvents itself after the telecom bust.

Jennifer D.T. Kruschwitz

Semrock Inc. of Rochester, N.Y., an optical component company, was founded in September 2000 by Victor Mizrahi and Turan Erdogan. It was one of the many venture-capital-funded start-ups that emerged during the telecom bubble. Mizrahi, Semrock's president and CEO, was previously the chief scientist at CIENA Corporation. Prior to that, he was a research scientist at AT&T Bell Laboratories.

It was at Bell Labs in 1992 that Mizrahi met Erdogan, who had just finished his Ph.D. and come to Bell to do his postdoctoral work. After two productive years of working together, Mizrahi and Erdogan parted ways in 1994, when Erdogan received an assistant professorship at the University of Rochester's Institute of Optics. Meanwhile, Mizrahi joined CIENA, a then-unknown startup company. There, he built several successful optical component manufacturing operations. In August 2000, Mizrahi convinced Erdogan to leave his tenured position in Rochester to join him in founding Semrock.

At that time, the venture capital community was eager to invest in telecom, so Mizrahi and Erdogan received rapid funding. The money was used to purchase state-of-the-art ion-beam-sputtering (IBS) deposition equipment—the technology of choice for making sophisticated dense wavelength division multiplexing thin-film filters—and to hire good people.

Their very first hire was their office manager, Michele Cali. Mizrahi jokes that he and Erdogan didn't know how to create a payroll system, so they told Cali that her first job was to figure out how to pay herself. Erdogan used his Rochester connections to hire the first of many talented engineers, who were to form the backbone of the development effort.

> Just as Semrock was building momentum, the telecom market dissolved. Mizrahi knew that Semrock couldn't afford to wait for the market to return—and that it would be a very different business when it did.

The fledgling team worked together to specify the first IBS systems and develop the filter fabrication processes, as well as to create one of their core competencies by building and programming their own optical monitoring hardware and software. Semrock was in full development by 2001, with fewer than 20 employees who worked in the Rochester facility and a specialty optical fiber division in Maryland.

But just as Semrock was building momentum, the telecom market dissolved. Mizrahi knew that Semrock couldn't afford to wait for the market to return—and that it would be a very different business when it did. Instead of closing their Maryland plant, Mizrahi and Erdogan sold the fiber-optic division to a company outside of telecom so that their employees didn't have to face unemployment. The plant is still in operation today.

They consolidated the money from the sale of the fiber division with what was left from the original investment. They knew they had to find a non-telecom market segment that would enable them

to use their core competencies. But more than that, they realized that telecom had handed them an opportunity.

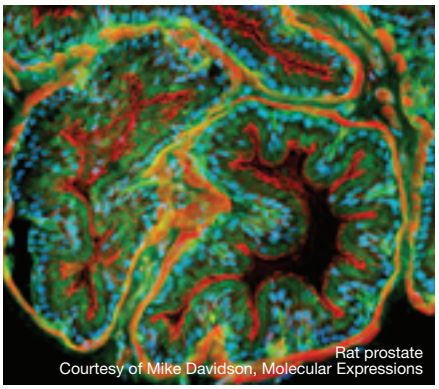
The push toward higher-capacity telecommunications systems had created the demand for very sophisticated and highly reliable thin-film filters, and in the process had driven amazing advances in this technology. The Semrock team had contributed to these advances. They had become experts in manufacturing highly reliable telecom optical thin-film filters with hundreds of layers. They realized that if these advances could be adapted to other fields, exciting opportunities would open up.

Telecom filters are tiny (typically 1.4 mm on a side), and they are manufactured using optical monitoring based on clean, tunable near-infrared laser sources. To leverage their new technological advances, the Semrock engineers would have to increase dramatically the usable coating area—by several hundred times over the previous size—while developing a new optical monitoring technology capable of maintaining fidelity over multi-hundred-layer deposition runs, but at visible wavelengths.

The company would also need more IBS coating equipment in order to make enough sellable product. This problem was easy to solve because the collapse of telecom meant that Semrock could buy used equipment at bargain-basement prices. The team watched every penny spent, knowing they would have to make it without seeking any further investment.

Being a scientist by training, Mizrahi took an analytical approach to picking the right market. He invited technical employees to weekly brainstorming meetings to discuss various market and product opportunities. All product ideas were welcome, as long as they could be made significantly better than the current technology, and still be profitably sold at market pricing.

The severe capacity constraints of IBS technology at the time meant that many ideas quickly fell by the wayside. Eventually, it became clear that biotech and analytical instrumentation held the most business promise, and could benefit from the innovations that Semrock had to offer.



Rat prostate
Courtesy of Mike Davidson, Molecular Expressions

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The standard in biotech at that time was to make soft-coated filters with tens of layers. Semrock was prepared to offer these markets hard-coated filters with the performance that comes from having hundreds of layers. This meant making filters with markedly improved performance and the proven reliability that was the standard in telecom.

To become a world-class company, Mizrahi and Erdogan realized that they could not simply become a "job shop." Rather, they needed to have significant innovative product lines and high-volume OEM customers. They brought on a field sales team, worked on the marketing message, and sought international distribution. They sent their engineers and sales staff to conferences, short courses and expos in the biotech arena so that they could become familiar with the language of their customers, discuss the needs of the industry, and list all of the possible products that could be created using their IBS process.

Finally, following some initial OEM wins in 2002, Semrock launched its BrightLine series of fluorescence filters as catalog products in January 2003. The company's unique MaxMirror won a 2003 Photonics Circle of Excellence Award. That same year, Semrock introduced their RazorEdge filters for Raman spectroscopy measurements. These high-efficiency edge filters had higher transmission and steeper transitions than competing holographic notch filters. Sales were immediate, and strong demand continues to this day.

In 2004, Semrock announced that the famed Carl Zeiss AG had adopted BrightLine filters for their high performance fluorescence microscopes. The 2004 Photonics Circle of Excellence award soon followed—this time for Semrock's multiband fluorescence filter sets for microscopy applications. While new products were being developed and introduced, the engineering team never stopped working to improve the manufacturing process; in fact, they are on their fourth generation of optical monitoring technology. "The Semrock of today has far greater manufacturing prowess than the Semrock of only two years ago," says Erdogan.

Semrock now has several dozen employees and they are growing at a steady pace. Their latest print catalog is 36 pages and contains hundreds of products. They have shipped many tens of thousands of high-end IBS filters around the world. Their future plans include making continual innovations in their product offerings to maintain a leadership position in the biotech optics field.

Mizrahi feels that the excellence of the Semrock team is what has driven the company's success. "There are two things about Semrock of which I will always be proud," says Mizrahi. "One is that this team was able to pull off a remarkable and total change of direction and make it work. The other is that we have been able to make a difference in a field that matters." ◭

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