

## Nanotech firm to launch first products

BY SUSAN L. THOMAS

With a new \$500,000 grant in its pocket and a fresh-faced CEO, Nanomix Inc. of Emeryville has its eye on a long-awaited prize — the launch of the company's first two nanotechnology sensors beginning early next year.

For four years, the UC-Berkeley spin-off has focused almost exclusively on trying to perfect a way of developing nanoelectronic sensors, a fast-growing niche within nanotechnology.

The process involves integrating extremely narrow, hollow cylinders made of carbon atoms, or nanotubes, with tiny silicon chips. Nanomix is developing sensors with a wide array of applications, including biomolecule detection for drug research and diagnostics and for the detection of pollutants in

**Nanomix Inc.**  
**Business:** Nanotechnology sensors  
**Headquarters:** Emeryville  
**CEO:** David Macdonald  
**Founded:** 2000  
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air and water.

Now, the 20-person firm is preparing to launch its first product — a hydrogen sensor — early in 2005. Hydrogen sensors can be used anywhere batteries are being charged, such as at semiconductor foundries or telecommunications towers.

Also, the National Science Foundation's \$500,000 grant to the company, awarded this month, moves Nanomix a step closer to converting its prototype medical capnography sensor into an actual product. Nanomix expects that sensor will be on the market in the third quarter of 2005.

Capnography is the measurement of carbon dioxide concentration in human breath. Medical capnography sensors now provide a color-coded, "yes or no" test to detect if carbon dioxide is present, according to CEO David Macdonald.

Nanomix is working with UC-San Francisco researchers to design and test a tiny, low-power sensor that measures the amount and pattern of carbon dioxide, rather than simply whether it is present. Anesthesiologists and emergency room workers typically monitor carbon dioxide to ensure patients are getting adequate ventilation and that they have been intubated properly.

"This is a device that will prevent brain damage and save lives," said Macdonald.

Nanomix is among several East Bay nanotechnology firms. The field typically refers to research done at the atomic, molecular or macromolecular level in which the dimensions are less than one-hundredth of the diameter of human hair.

Macdonald said he joined Nanomix in March to bring a business sense to what had largely been a research-

oriented firm. Most recently, he was vice president of global operations at Nanogen Inc. in San Diego.

Nanomix has out-licensed some of its technology. For instance Dupont is developing a flat panel using Nanomix's optoelectronics technology. That was a strategic decision, Macdonald said, that has allowed Nanomix to keep its focus exclusively on sensors.

"We're a nanotechnology company that's very close to putting products into the market, which is very unique," Macdonald said. "There are a number of nanotechnology companies out there that have interesting technology, but they are the first to say they are several years away from products."

The company says its sensor chips, which are about the size of the pupil of an eye, can be tuned to respond selectively to a variety of chemicals that are difficult to detect using traditional sensors. The nanotubes in Nanomix's sensors are only one molecular layer thick and every atom is at the surface, which makes the nanotubes highly sensitive to many analytes in gas and liquid.

Because nano-tubes are so small, very little power is required to operate the sensors, according to Nanomix. Multiple nanosensors can be integrated on one tiny chip, with minimal power and space requirements.

Government agencies and private firms are also developing nano-sensors.

"There are large, fast-growing market opportunities and the particular architecture that we have in this platform is applicable to a wide range of molecules, both chemistries as well as biomolecules. So it really brings some unique features to sensor needs," Macdonald said. "Just the sensor area alone is an enormous opportunity. It's over \$15 billion



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**Desiree Davis tests a circuit at Nanomix, one of the relatively few nanotechnology firms that is close to putting its products on the market.**

and growing very rapidly."

Nanomix has received funding from several venture capital firms, including Alta Partners in San Francisco. Macdonald said the company is seeking a third round of VC funding, which it plans to close by the end of the year. He said the company has enough funding to last until early next year.

One of the greatest challenges now, he added, is creating a balance between science and business that will be needed to commercialize the company's products. After it closes its funding round, Macdonald said Nanomix will hire 15 more employees.

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