

# It's a Small World After All

Tiny science takes hold in a big way.

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“Let’s Get Small” was a popular routine of comedian Steve Martin in the late 1970s. Nearly three decades later, it seems the whole world is taking that advice and positioning to take advantage of the emerging science of nanotechnology.

Described as enabling technology rather than an industry, nanotechnology crosses virtually every field in some way.

The amount of federal, state and private dollars pouring into nanotech centers is anything but small. U.S. states put more than US\$400 million into nanotechnology research, facilities and business incubation programs in 2004, according to New York City-based Lux Research, a firm devoted to nanotech-

nology. That comes on top of more than \$1 billion in federal spending.

Lux and *Small Times* magazine issue annual state rankings, using different mixes of criteria. Their top 10 states differ, but both agree that California, Massachusetts, New Mexico, New York, Illinois and Maryland are at the head of the class. As is the case with biotechnology, most development centers around major universities or national labs. But there are also noteworthy developments quietly taking place in areas that might be off the popular nano radar screens.

## Tiny Capsules Offer Drug Delivery Hope

Central Michigan University in Mount Pleasant is on its way toward becoming a center of R&D in one of those little-known nano niches with much potential: Dendrimers, or dendritic polymers. Dendrimers are a new class of nanostructure that researchers believe offer great potential as tiny containers to deliver drugs to target specific diseases.

**Dendritic Nanotechnologies** (DNT) was founded in 2003 based on technology developed at Dow Chemical. It found a home at Central Michigan University’s incubator. DNT is now the anchor firm at the 300-acre (121-hectare) Central Michigan University

Research Park, which qualifies as a Michigan SmartZone.

“The thing that ties it all together goes back to when Central Michigan University decided to spin out the Central Michigan Research Corporation,” says Bob Berry, DNT’s CEO.

Dendrimer technology is largely chemistry-based and the initial research came from Dow Chemical, headquartered in nearby Midland. DNT recently reached an agreement with Dow whereby DNT receives Dow’s intellectual property in dendrimers in exchange for a significant equity stake in DNT.

“Our ability as a startup to attract PhDs and chemists has been outstanding,” Berry says. “More importantly, we are not in direct competition with a bunch of other startups to hire talent. Central Michigan is large enough to assist and partner with, but not so large it can act entrepreneurial. For example, DNT and the university worked together to raise \$6 million in Department of Defense contracts.”

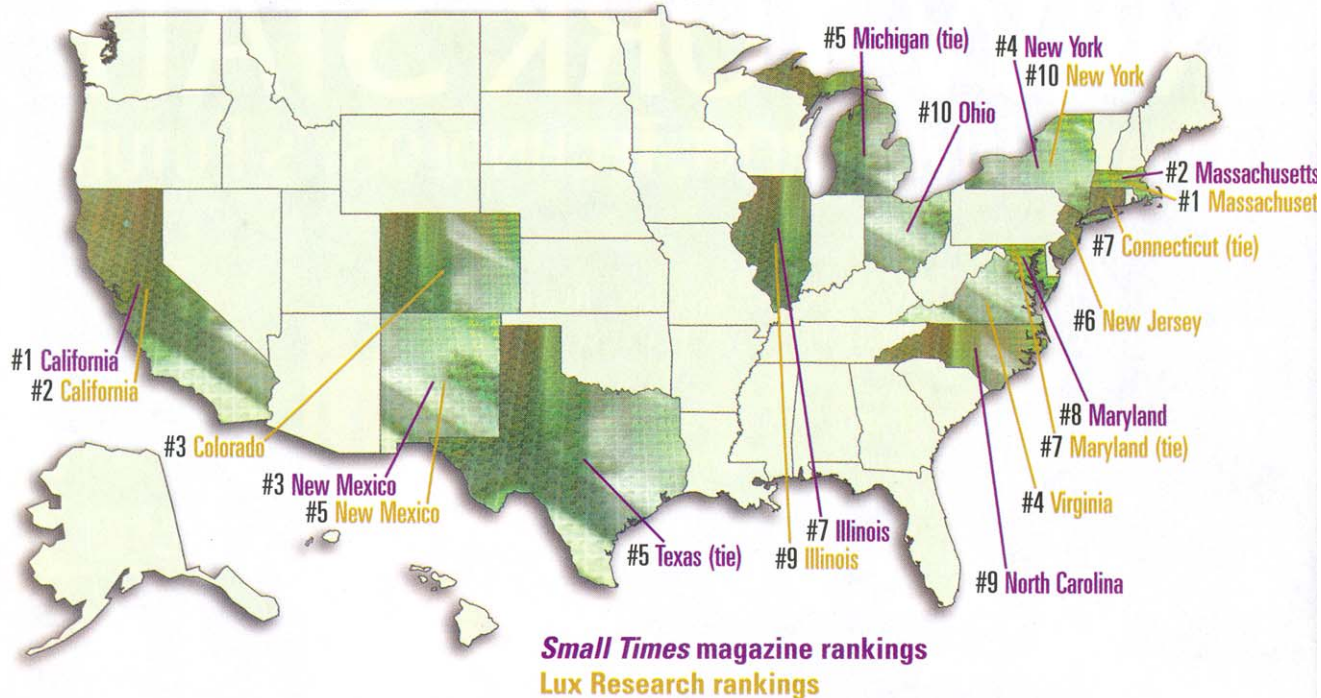
Berry believes Mount Pleasant offers quality of life aspects unavailable in the better-known research meccas of Boston or the Silicon Valley.

“Scientific talent like the idea of working in a college town that’s dominated by a university that has an academic feel about it,” Berry says. “The

**The \$65-million Center for Nanophase Materials Science, the first of five DOE nanotechnology research centers, will open in October at Oak Ridge National Laboratory in Tennessee.**



## Top 10 Nanotechnology States for 2005



quality of life here is outstanding. Here, we have a 'rush minute' that lasts about 30 seconds."

Those aspects have helped DNT bring in talent from Texas, Germany, India and China among its current roster of 19. While Berry says the market economics are not quite there yet for commercialization of dendrimers, he believes it's on the horizon. Developments continue to drive costs down.

"The application potential is so large, people will figure it out," Berry says.

### Little Science On the Prairie

Nanotech may be finding a high-plains outpost in Fargo, N.D. The North Dakota State University Center for Nanoscale Science & Engineering moved into a new facility in the NDSU Research Park last year.

The Center focuses on radio frequency identification (RFID) tag research and development. RFID tags, which use tiny silicon chips to store information, may eventually replace bar codes for tracking inventory.

"We are targeting to be the epicenter for the RFID industry," says Dr. Philip Boudjouk, NDSU's vice president for research, creative activities and technology transfer. He says the region has plenty of potential to build on the uni-

versity's strong engineering college. He says the required elements are in place.

"The stars seem to be lining up for us," Boudjouk says. "We have good air connections to Minneapolis, Denver and Chicago. We're near the intersection of two Interstates and we're located in a big open area in a progressive, economically healthy city. North Dakota State is an enormous engineering college with one in four students an engineer, so every May you have a pretty good class coming out."

The eventual cornerstone of the NDSU Research Park will be the world's highest capacity RFID manufacturing and research center, developed by **Alien Technology**.

Alien, based in Morgan Hill, Calif., planned to begin construction of a 47,000-sq.-ft. (4,370-sq.-m.) facility this spring. The facility will have an eventual capacity of 20 billion RFID devices per year. Alien is currently operating in Fargo in a rented facility.

### Oak Ridge Gets First DOE Nano Center

Tennessee's nanotech effort figures to get a major boost with the opening of the \$65-million Center for Nanophase Materials Sciences (CNMS) at the Oak Ridge National

Laboratory (ORNL), the first of five U.S. Dept. of Energy nano research centers. CNMS will have three major scientific thrusts: Nano-dimensional soft materials, complex nanophase materials systems and theory/modeling/simulation. A major focus of the CNMS will be to exploit ORNL's capabilities, such as the \$1.4 billion Spallation Neutron Source set to open in 2006. CNMS is currently operating in interim facilities. Alan Liby, ORNL's program manager, technology transfer and economic development, says much of the early research will be life sciences-related.

**Nanotek LLC** is one of the first startups emerging at Oak Ridge. CEO Joe Matteo is currently his firm's only employee. Nanotek's niche will be to focus on high-speed chemistry for pharmaceutical and biotech markets. Nanotek, which has GlaxoSmithKline as a technology partner, specializes in microfluidics, the development of tiny channels that allow fluid manipulation. This allows faster testing of potential new biopharmaceuticals.

"There's broad potential for commercial applications," Matteo says. "It's a generic platform for high-speed chemistry. The target is the drug discovery world."

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