

CMU aims to be big in nanotech

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Central Michigan University chemists and Carea entrepreneurs are building a high-tech cluster in Mt. Pleasant, drawing in federal research dollars for nanotechnology research and for technology start-ups.

City and CMU officials partnered to form one of 11 state-funded Smart Zones, located at the 300-acre Center for Applied Research & Technology on CMU's campus. With CART anchor tenant, two-year-old Dendritic Nanotechnologies Inc., mid-Michigan could be poised to grab hold of the potentially \$1 trillion a year market in nanotechnology, officials say.

"Every major technology revolution has to have fundamental building blocks," said Donald Tomalia.

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Entrepreneur Charles Burke of Dendritic Nanotechnologies Inc., center, speaks with Center for Applied Research & Technology development director Brent Case and CART receptionist Audra Buchanan. Photo courtesy CART

NANO: CMU has big hopes for small particles

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Tomalia, president of **Dendritic Nanotechnologies Inc.** "We hope that Holy Grail of nanochemistry is right here in Mt. Pleasant."

Nanotechnology is the application of science to develop new materials by manipulating molecular and atomic particles. It generally refers to incredibly small devices, measured on the nanoscale — nano means one-billionth, or down to the size of atoms, which are roughly the size of 10 nanometers.

The work at CMU and elsewhere around the nation has applications for faster and smaller electronics, stronger plastics, more precise medical techniques and a possibly endless list of industrial uses, said Dr. Bradley Fahlman, assistant professor of chemistry at CMU.

Fahlman announced two weeks ago results of a study that could lead to cheaper and easier production of carbon nanotubes. The cylindrical carbon atom structures can conduct electricity and, relative to size and weight, are 10 times stronger than steel, Fahlman said.

Prior to Fahlman's work, extreme temperature and pressure and high-cost catalyst materials were needed to grow carbon nanotubes. Using dendrimers, a class of polymer molecules developed by Tomalia, as a building block, Fahlman grew nanotubes at lower temperatures, he said.

"He's been able to use dendrimers as a template for growing

plained.

Tomalia's dendrimers are an assemblage of molecules that can be precisely and repeatedly constructed to exact sizes and weights, he said. Picture an onion with its core and layers of shell growing one on top of the other.

While a scientist at Midland-based **Dow Chemical Co.** [NYSE:DOW], Tomalia discovered the new class of polymer and coined the term dendrimer, he said.

Dendrimers can be put together in endless ways to form complex nanostructures that have potential as semi-conductors, medical devices and other electronics and for drug delivery, Tomalia said.

"Dendrimers have been commercial for 10 years," Tomalia said.

They're used in medical diagnostic equipment that determines whether emergency room patients are having a heart attack or just a severe case of heart burn, he said.

"Dow is still getting the royalties from some of my dendrimer research," he said.

Once Tomalia realized the potential of dendrimers, he struck out on his own to commercialize the technology, landing in Mt. Pleasant where the research facilities and university support were more than he expected, he said.

"What we found up here was really a well-kept secret," Tomalia recalls. "The facilities for doing this type of research were just outstanding."

With seed money from an Australian biomedical company and

through CART, Dendritic Nanotechnologies has grown, Tomalia said. Last year it joined a \$50-million Department of Defense research effort, led by the **Massachusetts Institute of Technology**, to develop nanotechnology for military applications.

State economic development officials want to help leverage more federal research dollars for nanotech through the Technology Tri-Corridor, said Cindy Douglas, vice president of technology acceleration for the **Michigan Economic Development Corp.**

"One of the things we're doing is encouraging our universities to seek federal research funding," Douglas said. "The MEDC is interested in matching those dollars."

Mt. Pleasant and CMU are emerging as a hot spot for nanotechnology, she said.

"It's becoming very clear that that's going to be a great opportunity for Michigan," she said.

As evidence that Mt. Pleasant is on the radar screen of international nanotechnology, CMU will host the fourth annual International Dendrimer Symposium next year, Tomalia said. It's the first time the symposium will be held in North America, following two conferences in Germany and one in Japan.

"It's a testament to the attention that Mt. Pleasant and CMU are getting in nanotech," said Brent Case, business development manager for CART.