

“This is a significant breakthrough.” CEO Bob Berry



Douglas R. Swanson, senior research and development scientist at Dendritic Nanotechnologies Inc. in Mt. Pleasant, in DNT's temporary laboratory at Central Michigan University.

Photo by Jeremy W. Steele



Swanson holds a flask of DNT's new lower-cost nanotechnology substance.

Photo by Jeremy W. Steele

Small could get **HUGE** Nanotechnology comes up big for Mt. Pleasant co.

By Jeremy W. Steele

jsteele@mbusinessreview.com

A new class of low-cost nanoparticles should help Mt. Pleasant-based **Dendritic NanoTechnologies Inc.** expand its business beyond the pharmaceutical industry and into advanced materials, company officials say.

The firm last week announced its development of Priostar, a new class of dendrimers that can be manufactured more easily and inexpensively than previous versions of the tiny molecules.

Dendrimers are a type of man-made spherical particle that measure between 1 nanometer and 100 nanometers — the scale of DNA, viruses and human antibodies. A nanometer is one-billionth of a meter.

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"This is a significant breakthrough in terms of the technology," CEO Bob Berry said. "Now we have a whole new family of dendrimers that will give us 20 years of patent extension and take this technology forward."

Dendrimers are being used experimentally to develop new drugs, improve reagents — the chemical dyes used for magnetic resonance imagers and other diagnostic equipment — and to improve effectiveness of existing drugs, including the cancer-fighting cisplatin. DNT builds the particles, selling and licensing them to other companies to be incorporated into products.

Because of the nanoparticle's tree-like design, dendrimers can be used to encapsulate materials — by trapping them within their branches — or attach them to the surface — like leaves on the outside shell of a tree canopy.

The nanoparticles then become precise carriers of those materials — including medicines, coatings and other chemicals — often enhancing their characteristics.

But the expense — \$82 to \$3,000 per gram, based on size and purity — has limited the use of dendrimers to high-end purposes. Plus their sensitivity to temperature — they have to be kept at below freezing temperatures to



Donald A. Tomalia, president and chief technical officer of Dendritic Nanotechnologies Inc. in Mt. Pleasant.

Photo by Jeremy W. Steele

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prevent degradation — has prevented them from being used in industrial applications, such as materials coatings.

"If you have cancer, you're probably going to pay a premium for something that works

well," Berry said. "But you're not going to for a coating on a table."

The new Priostar line, however, reduces the cost from hundreds of dollars per gram to tens of dollars, DNT officials say, and it holds up well to heat.

"We have transformed this platform from an exotic to a cost-competitive platform," said Donald

Tomalia, DNT's founder, president and chief technical officer.

"Already we've gotten some feedback from the Department of Defense and some electronics companies," he said.

The new line of dendrimers also speeds up the process of their construction. Instead of taking a month, the Priostar nanoparticles can be built in days.

"Time is money," Berry said. "The complexity is simpler."

AT A GLANCE

Dendritic

NanoTechnologies Inc.

Founded: 2003

Location: Mt. Pleasant

Employees: 19

Annual revenue: \$1 million

Funding: \$9 million from investors, including Dow Chemical Co. of Midland and Starpharma Holdings Ltd. of Australia; \$4 million in research contracts from the U.S. Department of Defense and others.

Patents: More than 200 in more than 30 patent families related to dendrimers

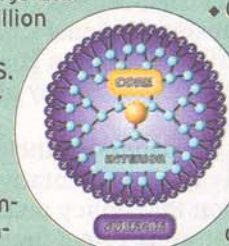
Officers: CEO Robert Berry; founder, President and Chief Technical Officer Donald Tomalia; CFO Gifford Brown (former CFO for Dow Corning Corp.); Chairman Richard Hazleton (former chairman and CEO of Dow Corning).

What is it?
Nanotechnology
At its simplest, nanotechnology is the science of small things. More precisely, it focuses on the study and devel-

opment of materials in the nanoscale region — the range from 1 nanometer to 100 nanometers, or to the scale of DNA, viruses and human antibodies.

There are four main architectural classes of nanoparticles, each of which has different properties and different potential uses:

- ◆ Dendrimers
- ◆ Quantum Dots
- ◆ Fullerenes, or "Bucky Balls"
- ◆ Nanotubes



Dendrimer

A dendrimer is a synthetically produced polymer in which

atoms are arranged in branched structures radiating from a central core. The spherical nanoparticles are engineered to carry molecules encapsulated in the interior or attached to the surface. Size, shape and reactivity are determined by generations (shells, or how many atoms the dendrimer is made of) and chemical composition (the type of atoms used to make it). Dendrimers have applications in the medical, electronics, chemicals and materials industries.