

Nanocerox featured in Crain's Detroit Business

NANOCEROX CONTINUES GROWTH IN NANOTECHNOLOGY MARKETPLACE WITH SOLID PARTNERSHIPS.

ANN ARBOR, MI – MARCH, 2012

Nanocerox was recently featured in "Focus: Innovations" section of the March 5, 2012 edition of Crain's Detroit Business.

"The article entitled: Powder power: Nanocerox grows with the help of national partners, is a nice summary of our capabilities and accomplishments to-date," says Michael Kelly – CEO. "Our key engagement and focus for the future will be producing transparent ceramics for the commercial marketplace; in applications ranging from scintillators to laser disks."

Outlined below is a copy of the March 5, 2012 Crain's Detroit Business article:

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CRAIN'S DETROIT BUSINESS

Focus: Innovations

Powder power: Nanocerox grows with help of national partners

BY TOM HENDERSON
CRAIN'S DETROIT BUSINESS

Nanocerox Inc., a little company in Pittsfield Township, has two mighty partners in its efforts to diversify and grow: a national laboratory that is considered one of the world's best research facilities, and the U.S. Air Force.

A spinoff from the University of Michigan, Nanocerox supplies Lawrence Livermore National Laboratory in Livermore, Calif., with ceramic oxide powders that — because of their tiny nanoscale dimensions — can be made into extremely hard crystals with useful optical properties.

The transparent ceramics are used in the lenses of the guidance systems of drone airplanes and the nose cones of missiles. They have the potential to be used to detect radiation, provide for better imaging in medical imaging devices, toughen up military armor and even make paint more durable.

"This is truly an enabling technology. It has a very bright future," said Steve Payne, associate program leader at Lawrence Livermore. He said Nanocerox's technology allows crystals to be grown much faster and in various shapes.

Lawrence Livermore's focus has been to use Nanocerox's powders in developing transparent ceramic



scintillators, which are used in high-energy radiographic imaging devices and in radiation detectors. They can be used at airports and at border crossings to detect illegal nuclear materials.

Scientists at Lawrence Livermore are now helping Nanocerox expand its business by becoming not just a supplier of powders to its manufacturing customers, but by using its powders to make products. By mid-year, the company hopes to be making small ceramic discs used in the commercial laser market and pieces of transparent armor that can be tiled to make fighter aircraft windows more impervious.

In August, Nanocerox, which employs 18, won a \$2.5 million grant from the Air Force to help it scale up production to meet the needs of an undisclosed missile system.

Nanocerox, which has four patents, was founded in 1996 as **TAL Materials Inc.** by Richard Laine, a professor in UM's Department of Materials Science and Engineering.

It began to morph from what was basically an R&D company existing on government grants to a commercial enterprise when two veteran venture capitalists in Ann Arbor, Peter Gray and Steve Swanson of **Arbor Partners**, invested in

the company in 2002, took over management and changed the name to reflect what it does.

And what it does is use high-tech furnaces to heat rare earth metals to 900 degrees centigrade, producing powders with a diameter of from 20 nanometers to 75. A human hair is about 100,000 nanometers wide.

Last April, Gray and Swanson brought in Michael Kelly as president and CEO to continue the job they'd started. By then, they'd grown revenue from about \$150,000 when they bought the company to about \$2.5 million, and had diversified it from a total reliance on government funding to a 50-50 mix of government grants and contracts, and private sector sales.

Kelly — former president and CEO at **Allied PhotoChemical Inc.**, a Warren-based maker of coatings and paintings — upgraded and expanded Nanocerox's production

department and began recruiting engineering technicians and comptroller Kim Kochan, who had been CFO at **HandyLab Inc.**, an Ann Arbor-based medical device company that was sold for \$275 million in 2009 to New Jersey-based **Secton, Dickinson and Co.**

Kelly said he expects revenue to hit \$2.8 million this year.

Nerine Cherepy, a research scientist at Lawrence Livermore, began research with ceramic oxide powders in 2005, having bought a small furnace from a supplier in Switzerland that allowed her to make a few grams a day.

"Our very first batch made beautiful transparent ceramics, but we couldn't ramp up our production," she said. Some colleagues had heard about Nanocerox, and she placed a small order to see if it could augment what she was making. "Little by little, the relationship has grown. We ordered larger and larger batches, and now we're getting batches of many kilograms."

As Nanocerox has helped Lawrence Livermore with its projects for the **U.S. Department of Homeland Security**, the **Department of Defense** and the **Department of Energy**, now it's time for the national lab to help Nanocerox.

Lawrence makes prototype products and materials, "but we need a

commercialization partner. Nanocerox produces the very best nanopowders in the world, so it makes sense for us to help them convert their powders into optical products for purchase. They're poised to take advantage of what could be a very big market with no U.S. competitors," she said.

Cherepy said she has been trying to get officials at the **European Organization for Nuclear Research** in Switzerland interested in ceramic oxide crystals because of their improved qualities. The organization, known as CERN, is the largest particle physics lab in the world and includes the Large Hadron Collider, a mammoth underground particle accelerator.

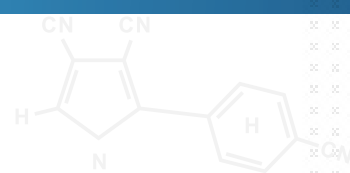
Massachusetts-based **Raytheon Co.** is also helping Nanocerox as it tries to ramp up production, according to Rick Gentilman, an engineering fellow in advanced technology at Raytheon.

Nanocerox has been a subcontractor to Raytheon on a four-year, \$15 million contract from the **U.S. Defense Advanced Research Projects Agency** to design nanocomposite materials that make better, stronger windows for automated guidance systems on such things as nose cones and drone airplanes.

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ABOUT NANOCEROX



Nanocerox is a leading producer of high purity ceramic nanopowders and optical ceramics; and develops, refines and manufactures nanopowders to produce products requiring transparency, durability and heat resistance for use in industrial, military, medical and aerospace applications. Nanocerox's patented Liquid Flame Spray Pyrolysis process produces highly pure, chemically-precise and uniformly-sized nanoparticles.

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