

## Argonne technology strengthens Illinois economy

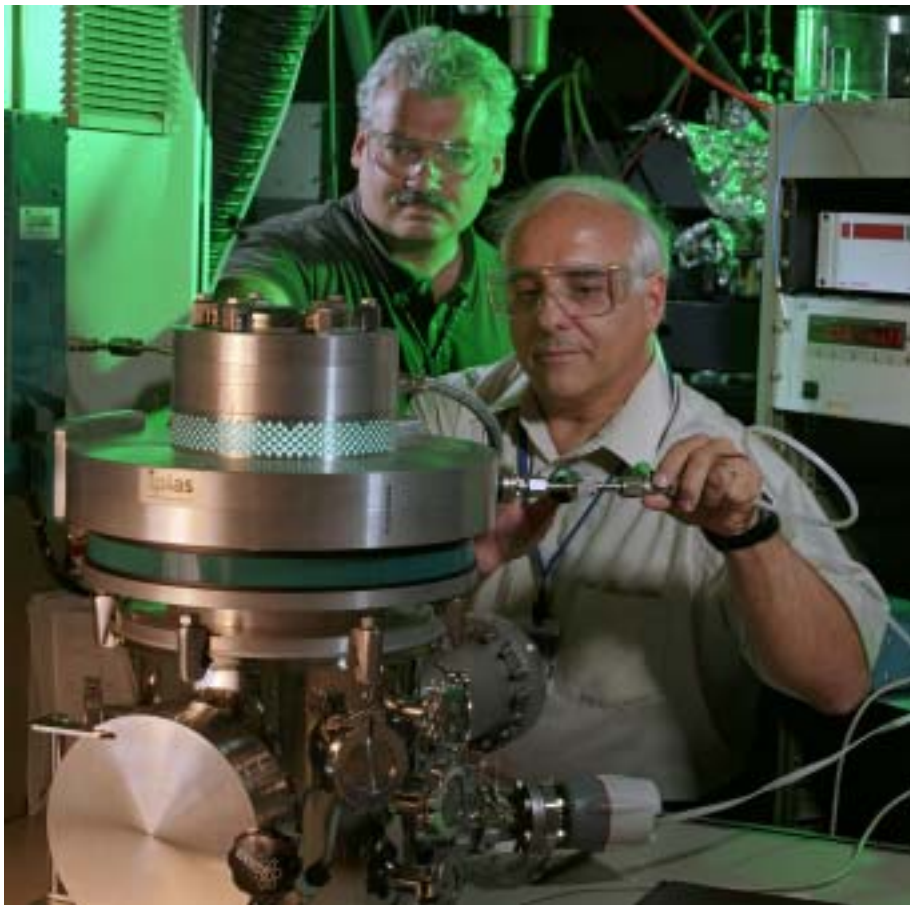
Located near Lemont, Ill., Argonne National Laboratory contributes to the strength of the Illinois economy in many ways. Chief among them is through the creation of new companies to license and market new technologies developed at Argonne. Another way is by providing access to unique research facilities where Illinois companies can conduct research aimed at developing new products.

### Nanotechnology spin-offs

Argonne has partnered with many large and small companies interested in nanomaterials. Some companies are formed expressly to license laboratory technology. Nanophase Technologies Corp. of Romeoville, Ill., is an early example. The publicly traded company was founded in the 1980s to commercialize an Argonne technology for making materials from particles less than 50 nanometers in diameter.

Nanophase's challenge was to commercialize the nanomaterials synthesis process by bringing production volume up and cost down. Initially, materials production was measured in grams per day and cost thousands of dollars per gram. Now, production is measured in tons, and the cost is low enough that the company's materials are used in textile fibers, fuel cells, abrasion-resistant coatings, sun screen and other personal products.

Advanced Diamond Technologies is the latest Illinois company developed to license Argonne-developed nanomaterials technology. The company licensed the rights to Argonne's ultrananocrystalline diamond (UNCD) patents and is developing protective



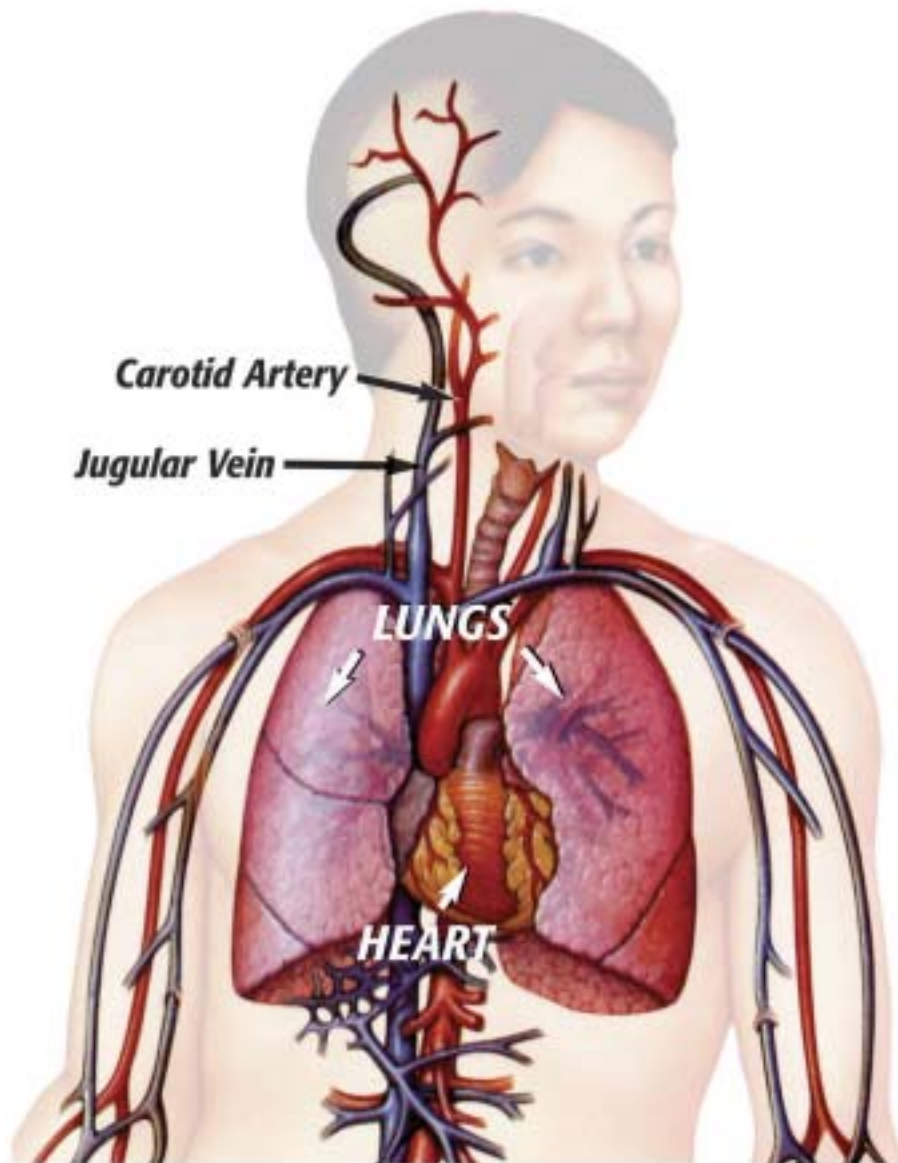
START-UP COMPANY — Illinois start-up company Advanced Diamond Technologies is developing the ultrananocrystalline diamond film technology invented by John Carlisle (left) and Orlando Auciello of Argonne for a variety of applications.

UNCD coatings for several applications, including mechanical shaft seals used in many industries. Reducing friction with UNCD coatings can help devices last longer and run cooler.

The company is using UNCD as a substrate for building Micro-Electro-Mechanical Systems (MEMS) – systems-on-a-chip technology that integrates mechanical elements, sensors, actuators and electronics on a common substrate – and for biomedical implants and biosensors.

### Fighting AIDS with X-ray research

Kaletra®, one of the world's most prescribed drugs for AIDS, was developed by Abbott Laboratories of Abbott Park, Ill., as a result of research conducted at Argonne's Advanced Photon Source, the Western Hemisphere's most powerful source of X-rays for research. X-ray studies of the crystalline structure of the protein called "HIV protease" revealed the



**LIFE SAVER** — An ice slurry injected into the lungs can rapidly cool brain cells, giving doctors more time to save heart attack and stroke victims.

atomic details of how compounds interact with the protein and led to the development of Kaletra, which blocks the ability of the HIV virus to reproduce. Since its approval, Kaletra has made a tremendous impact on helping to prevent progression of the disease in patients infected with HIV virus. In clinical trials, patients taking Kaletra are living for more than six years. Today, Kaletra is one of Abbott's highest selling prescription drugs.

### Ice slurries may save lives

Cold Core Therapies, a new Illinois start-up company, is working to commercialize a technology that uses ice slurries to save the lives of people who suffer strokes and sudden cardiac arrest away from hospitals. The technology is a joint development between Argonne and the University of Chicago Emergency Resuscitation

Center. The basic idea is to inject a mixture of ice and salt water into the lungs to rapidly cool brain cells. People who suffer cardiac arrest outside the hospital have only a 2 to 4 percent recovery rate, because lack of blood flow to the brain causes brain cells to start dying after 10 to 12 minutes. Cooling the brain would delay the onset of brain death and give more time to save the patient. Improving the survival rate by just 1 percent, would save 10 lives every day.

In addition to strokes and heart attacks, the technology may also help improve laparoscopic surgery. This surgery often involves stopping blood flow to small organs, such as kidneys or the liver. Cooling these organs before stopping their blood supply would give surgeons more time to operate before organ cells begin to die from lack of oxygen.

### AI-based software predicts failures

SmartSignal of Lisle, Ill., uses Argonne-developed artificial intelligence-based software to monitor equipment performance and predict possible failure well ahead of conventional monitoring methods. The company's software is monitoring key components and systems on three units at Arizona Public Service Company's Palo Verde nuclear generating station, 30 of Entergy Corporation's fossil fuel plants, on Panhandle Energy's natural gas pipelines and at Wisconsin Public Service's De Pere power plant.

During real-time operation, SmartSignal software compares expected sensor values to actual real-time data collected from the equipment. By analyzing all correlated sensors for a piece of equipment or the whole system, the technology identifies process deviations that are too subtle to trigger a normal alarm.

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