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For immediate release

## Argonne researchers win 2 R&D 100 Awards

ARGONNE, Ill. (July 17, 2008) – Researchers at the U.S. Department of Energy's (DOE) Argonne National Laboratory and their industrial partners have won two R&D 100 Awards for innovative fluid sealing and lithium-ion battery technologies.

Argonne scientists have been awarded 101 R&D 100 Awards since the awards were introduced by *R&D Magazine* in 1964. Winning a prestigious R&D 100 Award -- dubbed the "Oscars of innovation" by *The Chicago Tribune* -- provides proof that a product is one of the most innovative ideas of the year, according to *R&D Magazine*.

"This is yet the latest example of how the Department of Energy and our national laboratories are continuing to demonstrate world-class leadership in innovation, as we enhance our energy security, national security and economic competitiveness," Energy Secretary Samuel W. Bodman said. "On behalf of the department, I would like to congratulate all of our employees who have earned R&D 100 awards and in particular this year's winners."

"These awards demonstrate the scientific know-how and innovative spirit on the part of Argonne researchers," said Argonne Director Robert Rosner. "I offer my hearty congratulations to our winning scientists."

This year's winners are:

- EnerDel/Argonne High-Power Lithium-Ion Battery for hybrid electric vehicles.
- Ultrananocrystalline Diamond (UNCD) Mechanical Seals, a fluid sealing technology.

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Argonne R&D 100s – add one

### **EnerDel/Argonne Advanced High-Power Battery for hybrid electric vehicles**

The EnerDel/Argonne lithium-ion battery is a highly reliable and extremely safe device that is lighter in weight, more compact, more powerful and longer-lasting than the nickel-metal hydride (Ni-MH) batteries in today's hybrid electric vehicles (HEVs).

The battery is expected to meet the U.S. Advanced Battery Consortium's \$500 manufacturing price criterion for a 25-kilowatt battery, which is almost a sixth of the cost to make comparable Ni-MH batteries intended for use in HEVs. It is also less expensive to make than comparable Li-ion batteries. That cost reduction is expected to help make HEVs more competitive in the marketplace and enable consumers to receive an immediate payback in gas-cost savings rather than having to wait seven years for the savings to surpass the premium placed on HEVs.

Additionally, the EnerDel/Argonne battery does not use graphite as the anode material, which been the cause for concerns about the safety other Li-ion battery brands. Instead, Argonne developed an innovative, more stable new form of nano-phase lithium titanate (LTO) to replace the graphite. It also developed a new way of making nano-phased LTO that will allow for easier industrial processing, as well as provide a high packing density that can increase the battery's energy density and provide the power needed for vehicle acceleration and regenerative charging of HEVs.

The battery's principal developers are Khalil Amine, an Argonne senior scientist and group leader; Illias Belharouak, an Argonne materials scientist; Zonghai Chen, an Argonne assistant chemist; Taison Tan, EnerDel's research and development manager; Hiroyuki Yumoto, EnerDel's director of research and development; and Naoki Ota, EnerDel president and chief operating officer.

The DOE Office of Energy Efficiency and Renewable Energy's (EERE) FreedomCAR and Vehicle Technologies program provides funding for Argonne battery research.

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Argonne R&D 100s – add two

### **UNCD Mechanical Seals**

UNCD Mechanical Seals are specially-treated pumping-system seals that have their surfaces imparted with the properties of diamond to improve their reliability, useful life and integrity in preventing the escape of pumped fluids into the environment. UNCD is an engineered nanomaterial invented at Argonne and is known for its exceptional smoothness when applied to the bearing surface of a mechanical seal. UNCD is an exceptionally low-friction material, and among its many benefits it saves energy by reducing friction on the sealing surface.

The UNCD Mechanical Seals were jointly developed by a team from Argonne, Advanced Diamond Technologies, Inc., (ADT), Romeoville, Ill., and John Crane Inc., Morton Grove, Ill. The Argonne team included former Argonne process development engineer John Hryn, now senior development associate at Praxair, Inc., Gregory Krumdick, engineer, Jeffrey Elam, chemist, and Joseph Libera, post-doctoral appointee. The ADT contributors included Charles West, vice president of engineering, James Netzel, director of seals engineering, John Carlisle, chief technical officer, and Orlando Auciello, ADT technical consultant and Argonne senior physicist. The John Crane team included Douglas Volden, new products director, Joe Haas, vice president of engineering, and Rick Page, vice president of marketing.

EERE's Industrial Technologies Program provided funding for the development of the UNCD Mechanical Seals.

ADT, an Argonne spin-off company, secured the rights from Argonne to commercialize the technology in 2004 and has since then actively pursued several applications for it, including mechanical seals. ADT has developed a commercial manufacturing platform for making UNCD Seals in volume with exceptional reproducibility and quality. John Crane, the world's largest manufacturer of seals and associated products, performed exhaustive tests that demonstrated that the UNCD-enhanced seals have a significant friction-reducing advantage that improves the performance capabilities of mechanical seals when compared to conventional mechanical seal face materials.

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Argonne R&Ds – add three

Interestingly, the UNCD thin film production technology that was developed in 2002 by Argonne and iplas GmbH, near Cologne, Germany, won an R&D 100 Award in 2003. UNCD marked the first-ever affordable diamond film suitable for mass production of a wide range of diamond-based microelectromechanical systems, nanoelectromechanical system devices, biodevices, biosensors and microelectronic circuits. Adjustments in the production process were necessitated to make UNCD suitable for application on mechanical seals.

#### **About Argonne**

Argonne National Laboratory brings the world's brightest scientists and engineers together to find exciting and creative new solutions to pressing national problems in science and technology. The nation's first national laboratory, Argonne conducts leading-edge basic and applied scientific research in virtually every scientific discipline. Argonne researchers work closely with researchers from hundreds of companies, universities, and federal, state and municipal agencies to help them solve their specific problems, advance America's scientific leadership and prepare the nation for a better future. With employees from more than 60 nations, Argonne is managed by [UChicago Argonne, LLC](#) for the [U.S. Department of Energy's Office of Science](#).

#### **About EnerDel**

EnerDel is owned by Ener1, Inc. (80.5 percent) and Delphi Corporation (19.5 percent). EnerDel has a production facility in Indianapolis, Ind. EnerDel currently employs approximately 65 highly experienced engineers and technicians involved in the battery development of both cells and systems.

#### **About Advanced Diamond Technologies**

Advance Diamond Technologies, Inc. was formed in December 2003 to commercialize the UNCD technology developed by Argonne National Laboratory. ADT is the licensee to the Argonne portfolio of application and process patents for using, synthesizing and micromachining UNCD films.

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Argonne R&D100s – add four

### **About John Crane**

John Crane is part of Smiths Group, a global technology business listed on the London Stock Exchange. John Crane is the world leader in the design and manufacture of mechanical seals and associated products mainly for the oil and gas, chemical, pharmaceutical, pulp and paper and mining sectors.