

NEWS RELEASE

Electron Energy Corporation Wins Phase I Research Contract to Design Environmentally Friendly Magnetic Refrigerator for U. S. Air Force

LANDISVILLE, PA, February 10, 2010 – Electron Energy Corporation (EEC), the nation’s leading producer of rare-earth magnets for critical applications, was recently awarded a \$100,000 Small Business Innovation Research (SBIR) contract by the U.S. Air Force Research Laboratory, Dayton, OH, for the development of a magnetic refrigerator. EEC is collaborating on the project with Astronautics Corporation of America, Milwaukee, WI, a global leader in developing cutting-edge magnetocaloric refrigeration systems. The announcement was made by EEC President Michael H. Walmer.

“Magnetic refrigeration will be a sustainable, attractive technology for cooling high power density rotating machines and electronic devices used in military and commercial applications,” Walmer said. High efficiency magnetic refrigeration systems will reduce aircraft heat signatures and substantially improve the service life of electronic devices when able to operate at even modestly lower temperatures. The systems will also be used to cool drilling instruments and data logging equipment typically used in environments where temperatures exceed 120°C.

Jinfang Liu, Ph.D., vice president of technology and engineering explained, “Chillers that provide cooling for electronics and electronic components aboard U.S. Navy ships and military aircraft are good examples of a niche market for magnetic refrigeration systems”. The systems offer cooling in remote locations of the aircraft and operate in any orientation, which is critical for aircraft engaged in inverted flight or sharp banking maneuvers. The technology will assist the Air Force in advancing its Interdependent Vehicle Energy Technologies (INVENT) initiative.

Phase I of the contract extends from March through December 2009. Peter Dent, EEC vice president of business development, said the research will focus on developing high temperature magnetocaloric materials for compact, lightweight magnetic refrigerators that can provide hundreds of watts of cooling, and operate efficiently in the 120–500° C range.

The magnetocaloric effect is a phenomenon in which a reversible change in the temperature of magnetic materials occurs in the magnetization/demagnetization process. By cycling magnetocaloric materials through hot and cold states and exchanging the heat through a fluid medium, the system can generate an overall cooling effect. Dent noted that research during the past 10 years has resulted in the discovery of materials with a giant magnetocaloric effect at room temperature and has demonstrated that magnetic refrigeration—using materials that exhibit the magnetocaloric effect—offers great potential improvement in energy efficiency of up to 60 percent of a Carnot cycle. Furthermore, room temperature magnetic refrigeration is a “green” technology, using no ozone-depleting or greenhouse gases, nor any toxic or hazardous substances.

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*Awarded Research Contract by USAF for Magnetic Refrigerator Design
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The contract calls for the overall technical approach of the research effort in Phase I to examine crystalline and non-crystalline materials with substantial magnetocaloric effect, refrigeration system modeling based on specific parameters, and conceptual refrigeration design that can operate in the desired temperature range.

Jinfang Liu, Ph.D., vice president of technology and engineering at EEC and an internationally-recognized researcher in rare earth magnet materials and systems, will serve as the principal investigator for the project. Melania Marinescu, Ph.D., will lead the effort on magnetocaloric materials development at EEC. This research work will be supported by Dr. Steven Jacobs, Dr. Carl B. Zimm, and Dr. Steve Russek of Astronautics Corporation of America.

Since 1996, EEC has been granted 22 Small Business Innovative Research (SBIR) Phase I and Phase II programs, which have resulted in three patents and more than 40 papers published in professional journals.

For more information about Electron Energy Corporation's magnets, design engineering services and magnet assemblies and systems, call 1-800-824-2735. Our staff of engineering specialists is available for free technical consultations.

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Electron Energy Corporation (EEC) offers unmatched expertise in rare earth magnets, assemblies and systems. Founded in 1970, EEC is a US owned and operated company that develops and produces custom Samarium Cobalt (SmCo) and Neodymium-Iron-Boron (NdFeB) sintered permanent magnets, assemblies and systems. EEC is dedicated to improving rare earth magnet performance to meet the most technically demanding applications in aerospace, military, medical, electronics, and motion control markets. As world-renowned experts in material sciences, testing and 2-D/3-D Finite Element Analysis, our vertically integrated operation provides you with the full range of services to meet your magnetic needs. Visit www.electronenergy.com or call 800-824-2735.