Lockheed Martin Tests Carbon Nanotube-Based Memory Devices On NASA Shuttle Mission

PRNewswire
PALO ALTO, Calif.

A radiation-resistant version of NRAM(TM) carbon-nanotube-based memory, developed jointly by Lockheed Martin and Nantero, was tested on a recent Space Shuttle mission. The NRAM(TM) was incorporated by NASA into special autonomous testing configurations installed into a carrier at the aft end of the payload bay. It was launched into space as part of STS-125, the May 2009 mission of the Space Shuttle Atlantis that successfully serviced the Hubble Space Telescope. The project was managed by Dan Powell, Chief Nanotechnologist at NASA Goddard Space Flight Center (GSFC).

"Lockheed Martin is a leader in the research, development and application of nanotechnology to future government applications," said Dr. Jim Ryder, vice president and general manager of the Lockheed Martin Advanced Technology Center in Palo Alto. "This demonstration of carbon-nanotube-based semiconductor devices in the rigorous conditions of space is an important step towards a whole new suite of future applications."

The experiment was a proof-of-concept that enabled the testing of launch and re-entry survivability, as well as basic functionality of the carbon nanotube switches on orbit throughout the shuttle mission. The NRAM(TM) devices were early prototype parts, and performed the same before, during, and after completion of the mission. This mission represents an important first step in the development of high-density, non-volatile, carbon-nanotube-based memories for spaceflight applications. Lockheed Martin and NASA are working on plans for future NRAM(TM) flights.

Carbon nanotubes are tiny cylindrical carbon molecules just 1/50,000th the diameter of a human hair that possess unique electrical and structural properties. The word nanotube is, of course, from nanometer (10-9 meters or approximately 10 carbon atoms) and tubular (the shape of a rolled up sheet of graphene that forms a carbon nanotube). Carbon nanotubes are half the density of aluminum, 50 times stronger than steel, thermally stable in vacuum up to nearly 3,000 degrees Centigrade, efficient conductors of heat and may be either metallic or direct bandgap semiconductors.

Thomas Rueckes, Nantero's Co-founder and CTO, said, "We are proud of the success of our NRAM memory devices in even the harshest of conditions, and honored for being selected by NASA for this mission."

Dan Powell of GSFC, said "Carbon nanotubes have tremendous potential for a wide range of future space-based applications, and we couldn't be happier for the success of this experiment."

Lockheed Martin recognizes the critical importance of nanotechnology to its current and future portfolio of products and services. Direct benefits of nanotechnology for government customers could include stronger, lighter and less expensive materials; more capable systems; and enhanced personal protection for military and first responders. Through partnerships with small businesses and universities, Lockheed Martin is leveraging its own investment in nanotechnology to develop innovative solutions for the most demanding technological challenges. Lockheed Martin Nanosystems is a business unit of Lockheed Martin Space Systems Company.

Nantero is a nanotechnology company using carbon nanotubes for the development of next-generation semiconductor devices. Nantero's main focus is the development of NRAM(TM). Nantero is also working with licensees on the development of additional applications of Nantero's core nanotube-based technology. Lockheed Martin holds an exclusive license arrangement with Nantero for government applications of Nantero's extensive intellectual property portfolio. More information on Nantero, Inc. is available in English and Japanese at http://www.nantero.com/.

Headquartered in Bethesda, Md., Lockheed Martin is a global security company that employs about 140,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services. The corporation reported 2008 sales of $42.7 billion.

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