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Northrop Grumman And University Of Illinois Researchers Make History With All-Carbon Nanotube Radio

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Baltimore — Northrop Grumman Corporation and the University of Illinois at Urbana-Champaign have created the first fully-functional, all-carbon nanotube transistor radio, demonstrating that carbon nanotubes can be used as high-speed transistors, while consuming only one-thousandth the power required by current transistor technology.

"Leading researchers have long theorized that carbon nanotube transistors possess the kind of material properties that could allow for very low power, high-speed transistors," said Dr. John Przybysz, a senior consulting engineer at Northrop Grumman. "Carbon nanotube technology changes the way we look at power requirements for military sensor systems because they perform equally with other microwave transistors but use a lot less power than current semiconductor devices."

"Since carbon nanotube transistors use less power, the implications for battery operated radio frequency electronics is dramatic. Instead of a battery lasting two days, the same battery providing power to sensor systems built with carbon nanotube transistors may last up to two weeks," said Przybysz.

"By using thousands of perfectly aligned, single-walled carbon nanotubes as a type of semiconductor thin film, our researchers have become the first to successfully bring together all of the pieces required for building real radio frequency analog electronics, including amplifiers, mixers, and resonant antennae," said Dr. Hong Zhang, lead for carbon nanotube development at Northrop Grumman.

Northrop Grumman and the University of Illinois researchers have published their findings with the Proceedings of the National Academy of Sciences. The document is available on the Web at www.pnas.org.

"Carbon nanotube devices made up all the active, vital components of the prototype radio system we built," added Zhang. "The user listens to regular radio broadcasts that flow directly from a carbon nanotube transistor to a pair of headphones or speakers."

"Typical nanotube devices are structured such that they use a single tube to carry current, but the array format provides thousands of conduction channels in each device. Carbon nanotube arrays have high current capacities and enable high power gain at low impedances. That's a significant advantage," said Dr. John Rogers, founder professor of the

Materials Science and Engineering department at the University of Illinois at Urbana-Champaign. Roger's team created these large arrays of carbon nanotubes.

Funding was provided by the National Science Foundation and the Department of Energy.

Northrop Grumman Corporation is a $32 billion global defense and technology company whose 120,000 employees provide innovative systems, products, and solutions in information and services, electronics, aerospace and shipbuilding to government and commercial customers worldwide.

SOURCE: Northrop Grumman Corporation

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