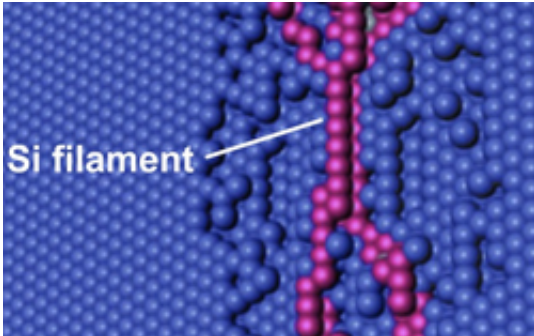


Same-day delivery to space station succeeds

August 15 2012, By Mike Williams



Silicon nanowire forms when charge is pumped through silicon oxide, creating a two-terminal resistive switch. Graphic by Jun Yao/Rice University

(Phys.org) -- The journey of a set of devices from Rice University to the International Space Station (ISS) earlier this month gave new meaning to the concept of “fast chips.”

Rice sent its unique silicon oxide memory chips to the ISS as part of a NASA experiment to test their ability to hold a pattern when exposed to radiation in space.

The chips got there in a hurry aboard a Russian supply mission, Progress 48. Usually ships carrying people or supplies take two to four days to catch up with the ISS. But the mission that launched Aug. 1 promised same-day delivery – a first. The trip from launch to docking took less than six hours. (See the launch [here](#) and the docking [here](#).)

“It’s exciting to see years of our research tested in the real environment where it might one day be used,” said James Tour, the T.T. and W.F. Chao Chair in Chemistry as well as a professor of mechanical engineering and materials science and of computer science. “That the science has reached this level is a joy for our entire team.”

Postdoctoral associate Jian Lin, graduate student Adam Lauchner and former Rice graduate student Jun Yao developed the chip in the labs of Yao’s advisers — Tour; Douglas Natelson, a professor of physics and astronomy and of electrical and computer engineering; and Lin Zhong, an associate professor of electrical and computer engineering.

The nonvolatile memory chips are part of an experiment called [HiMassSEE](#); a container of devices from various sources will spend two years aboard the station to test for radiation hardening. At the end, they will be returned to their labs for comparison with identical chips stored on Earth to see how primary and secondary ionizing radiation affected their circuitry.

The technology behind the chips was a breakthrough when announced two years ago — a story that landed on the front page of the New York Times. Yao discovered that bits of memory could be embedded into slices of insulating silicon oxide by applying a charge to electrodes on either side. The jolt stripped the oxygen atoms and left behind five-nanometer channels of pure silicon – a conductor. Lesser charges would break and reconnect the silicon repeatedly and make a two-terminal memory unit.

The first attempt to send samples to the ISS was less successful. On Aug. 24, 2011, the day Yao left Rice for a postdoctoral position at Harvard, HiMassSee launched from Kazakhstan on Progress 44, a cargo mission that crashed minutes later in Siberia. Russian investigators found the cause was a malfunction in the Soyuz rocket’s third-stage engine.

Steven Koontz, the ISS system manager for space environments in charge of HiMassSee, said at the time in an email to his research partners that nearly all the materials needed for a duplicate payload were in place. “As Winston Churchill is reported to have said (many times), ‘Never ever, ever, ever, ever quit,’” he wrote.

Two-terminal [memory chips](#) made of silicon, one of the most abundant materials on the planet, could lead to very dense memories for computers and other electronics. The chips may become a key element of transparent electronics, and help extend the limits of miniaturization subject to Moore’s Law.

Provided by Rice University

Citation: Same-day delivery to space station succeeds (2012, August 15) retrieved 27 April 2024 from <https://phys.org/news/2012-08-same-day-delivery-space-station.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.