

Science Centric | Sunday, 3 February 2008



SCIENCE CENTRIC

[HOME](#) | [SCIENCE NEWS](#) | [COMPENDIUM](#) | [RESOURCES](#)Topics — [Physics](#) | [Chemistry](#) | [Geology and palaeontology](#) | [Biology](#) | [Environment](#) | [Astronomy](#) | [Health](#)[RSS](#) | [Google Custom Search](#)

GO

## New kind of transistor radios shows capability of nanotube technology

*Science Centric*  
29 January 2008 | 14:10 GMT**Elicarb™ SW**Single-wall carbon nanotubes Commercial supplies  
[www.thomas-swan.co.uk](http://www.thomas-swan.co.uk)**High Performance Raman**Fiber probe & flow through systems w/ sensitivity, resolution & value  
[www.lambdasolutions.com](http://www.lambdasolutions.com)**Carbon nanotubes**Field emission grade CNT powder. High emission current.  
[www.xintek.com/products](http://www.xintek.com/products)**Electronic Components**Connect With Component Suppliers. Free & Easy Component Search Tool!  
[SupplyFrame.com](http://SupplyFrame.com)

Ads by Google

Carbon nanotubes have a sound future in the electronics industry, say researchers who built the world's first all-nanotube transistor radios to prove it.

The nanotube radios, in which nanotube devices provide all of the active functionality in the devices, represent 'important first steps toward the practical implementation of carbon-nanotube materials into high-speed analogue electronics and other related applications,' said John Rogers, a Founder Professor of Materials Science and Engineering at the University of Illinois.

Rogers is a corresponding author of a paper that describes the design, fabrication and performance of the nanotube-transistor radios, which were achieved in a close collaboration with radio frequency electronics engineers at Northrop Grumman Electronics Systems in Linthicum, Md.

The paper has been accepted for publication in the Proceedings of the National Academy of Sciences, and is to be published in PNAS Online Early Edition next week.

'These results indicate that nanotubes might have an important role to play in high-speed analogue electronics, where benchmarking studies against silicon indicate significant advantages in comparably scaled devices, together with capabilities that might complement compound semiconductors,' said Rogers, who also is a researcher at the Beckman Institute and at the university's Frederick Seitz Materials Research Laboratory.

Practical nanotube devices and circuits are now possible, thanks to a novel growth technique developed by Rogers and colleagues at the U. of I., Lehigh and Purdue universities, and described last year in the journal Nature Nanotechnology.

The growth technique produces linear, horizontally aligned arrays of hundreds of thousands of carbon nanotubes that function collectively as a thin-film semiconductor material in which charge moves independently through each of the nanotubes. The arrays can be integrated into electronic devices and circuits by conventional chip-processing techniques.

'The ability to grow these densely packed horizontal arrays of nanotubes to produce high current outputs, and the ability to manufacture the arrays reliably and in large quantities, allows us to build circuits and transistors with high performance and ask the next question,' Rogers said. 'That question is: 'What type of electronics is the most sensible place to explore applications of nanotubes?' Our results suggest that analogue RF (radio frequency) represents one such area.'

As a demonstration of the growth technique and today's nanotube analogue potential, Rogers and collaborators at the U. of I. and Northrop Grumman fabricated nanotube transistor radios, in which nanotube devices provided all of the key functions.

The radios were based on a heterodyne receiver design consisting of four capacitively coupled stages: an active resonant antenna, two radio-frequency amplifiers, and an audio amplifier, all based on nanotube devices. Headphones plugged directly into the output of a nanotube transistor. In all, seven nanotube transistors were incorporated into the design of each radio.

In one test, the researchers tuned one of the nanotube-transistor radios to WBAL-AM (1090) in Baltimore, to pick up a traffic report.

'We were not trying to make the world's tiniest radios,' Rogers said. 'The nanotube radios are a demonstration, an important milestone toward building the technology into a form that ultimately would be

[LATEST](#) | [MOST POPULAR](#) | [ARCHIVE](#)

Researchers uncover more about how poxviruses evade the immune system  
Genetic mutation increases risk of preterm birth  
Using musical chords to analyse and illustrate hydrogen molecule's response to laser pulses  
New, noninvasive prostate cancer test beats PSA in detecting prostate cancer  
Balloon catheter-based sinus surgery radiation exposure 'very low,' safe  
Prostate cancer: Watchful wait or vaccinate?  
Researchers discover a pathway to turn off immune system cells  
Malaria vaccine trials begin using 'chimpanzee virus'  
Early detection critical in treating paediatric thyroid cancer  
MIT researchers awarded \$8.5M for autism and dyslexia research  
UW paper in Science shows how some solids mimic liquids on nanoscale  
Dermatologists can identify common hair disorders and offer solutions  
Dermatologists with new tools to minimise facial scars from skin cancer surgery  
Research confirms genetic skin barrier defect linked to eczema  
Scientists succeed In protecting the 'green lungs' of Europe  
Protein in common virus linked to aggressive brain tumours  
Study of sugars on cell surface identifies key factor in flu infection  
Scientists uncover new potential treatment for inflammatory Bowel Disease  
Hubble finds double Einstein ring  
Scientists ready for MESSENGER Mission flyby of Mercury  
The violent lives of galaxies  
MESSENGER reveals Mercury in new detail  
Medical implants: the inside story  
Scientists create beating heart in lab  
Even thin galaxies can grow fat black holes  
Physics and guitars collide to make a big bang in schools  
Hubble finds that blue blobs in space are orphaned clusters of stars  
Nervous system can reorganise itself  
Pathogenicity of Toxoplasma gondii under control of a plant hormone  
A project seeks fuel from thin air  
480 million-year-old fossil sheds light on 150-year-old mystery  
Brain response differences found in the way women with IBS anticipate and react to pain

2007

— [II](#) [III](#) [IV](#) [V](#) [VI](#) [VII](#) [VIII](#) [IX](#) [X](#) [XI](#) [XII](#)

2008

— [1](#)

commercially competitive with entrenched approaches.'

The work was funded by the National Science Foundation and the U.S. Department of Energy.

Source: [University of Illinois at Urbana-Champaign](#)

---

#### **Oncology Applications**

PALM Microlaser Systems -modern technology for oncology analysis  
[www.palm-microlaser.com](http://www.palm-microlaser.com)

#### **Helicos BioSciences**

The future of genomic science via true Single Molecule Sequencing.  
[www.helicosbio.com](http://www.helicosbio.com)

#### **Prepare for Research 2.0**

PhD programs prepare you for 21st Century research. Five departments  
[MedicalCollegeofWisconsin.com](http://MedicalCollegeofWisconsin.com)

#### **Research Lab Lasers**

Powerful Lasers For Chemistry Research Labs. Priced From \$36.  
[www.Microfiber-Products-Online.com](http://www.Microfiber-Products-Online.com)

Ads by Google

---

Share - [del.icio.us](#) | [Digg](#) | [Facebook](#) | [Newsvine](#) | [reddit](#) | [StumbleUpon](#)

#### **Leave a comment**

The details you provide on this page will not be used to send unsolicited e-mail, and will not be supplied to a third party!

Your name

Your e-mail

Comment

**SEND**

---

#### **T h e l a s t 4**

##### **Researchers uncover more about how poxviruses evade the immune system**

— Scientists at Saint Louis University and the University of Alabama at Birmingham have uncovered important... [03 Feb 2008] — [full story](#)

##### **Genetic mutation increases risk of preterm birth**

— Genetic mutations in the Toll-like receptor 4 (TLR4) gene appear to have significant association with... [03 Feb 2008] — [full story](#)

##### **Using musical chords to analyse and illustrate hydrogen molecule's response to laser pulses**

— For Kansas State University physics professor Uwe Thumm, confirmation of a theory about the behaviour... [03 Feb 2008] — [full story](#)

##### **New, noninvasive prostate cancer test beats PSA in detecting prostate cancer**

— An experimental biomarker test developed by researchers at the University of Michigan more accurately... [03 Feb 2008] — [full story](#)

WWW Search |

**GO** powered by Google

Science Centric

— Info source in the field of natural sciences, breaking news, compendium, resources

[Front page](#) | [News](#) | [Compendium](#) | [Resources](#) | [Site map](#) | [Accessibility](#) | [About us](#) | [Contact us](#) | [RSS feed](#)

[Net Empire Group](#) — [Free Photo World](#) · [Lepidopterology.com](#)

Copyright © 2008 Net Empire. [Terms of use](#) and [Privacy policy](#) are applicable to you. All rights reserved.