



SUPERSiC Silicon Carbide

Beryllium Replacement. Optics & structures.
Design flexibility.

Silicon Wafers

Silicon, Wafers, Thin film, Reclaim Polished
silicon wafers

[About - LinuxElectrons™](#) | [Submit News](#) | [Links](#) | [Forums](#)

[FrontPage](#) | [Advanced Search](#)

News

[FrontPage](#)
[Hardware](#)
[Linux](#)
[Embedded](#)
[Mobile](#)
[Application](#)
[General](#)
[EDA](#)

Features

[News RoundUp](#)
[Review's](#)
[HowTO's](#)
[User Forums](#)
[Security Alerts!](#)
[FrontPage Archive](#)

Google™

Search

Web LinuxElectrons™

Stretchable Silicon Could Be Next Wave in Electronics

Thursday, December 15 2005 @ 11:27 PM CST

Contributed by: [Tommy](#)

Get **Firefox** with
Google Toolbar

What's Related

[More by Tommy](#)
[More from General News](#)

Story Options

[Mail Story to a Friend](#)
[Printable Story Format](#)

Ads by Goooooogle

Metal Finishing

Polishing, Lapping, Fine
Grinding, Diamond
Machining, Metrology.
www.ensurfin.com

Silcon Metal Powder

99.999% pure for thermal,
optical, mechanical and
electrical uses
www.micronmetals.com

Ortech Advanced Ceramic

Silicon Carbide
Components Prototype to
Production Qtys
www.ortechceramics.com

Silicon Carbide Products

nano-powder, substrate
fabrication, crucibles,
bricks, kiln furniture
www.alphamaterials.com

Silicon Carbide

Find Industrial Compound
Mfrs Search Locally by
State or Zip Code
www.ThomasNet.com

What's New

STORIES

[11 new Stories in the last 1 day](#)

COMMENTS last 2 days

[Linux Nibbles On ...](#)
[+5]
[HP to Support HD-...](#)

MOST READ last 2 days

[Open Source Software Makes Inroads a...](#)
[Philips Introduces VoIP to the Nexpe...](#)
[Winter Movies Rendered on Linux usin...](#)
[Linux Screensaver for Windows](#)
[Skanska Leaves UNIX in Favor of Red ...](#)

Latest Forum Topics

User Functions

Username:

Password:

Login

[Don't have an account](#)

yet? Sign up as a [New User](#)
Lost your [password](#)?

CHAMPAIGN, Ill. – The next wave in electronics could be wavy electronics. Researchers at the University of Illinois at Urbana-Champaign have developed a fully stretchable form of single-crystal silicon with micron-sized, wave-like geometries that can be used to build high-performance electronic devices on rubber substrates.

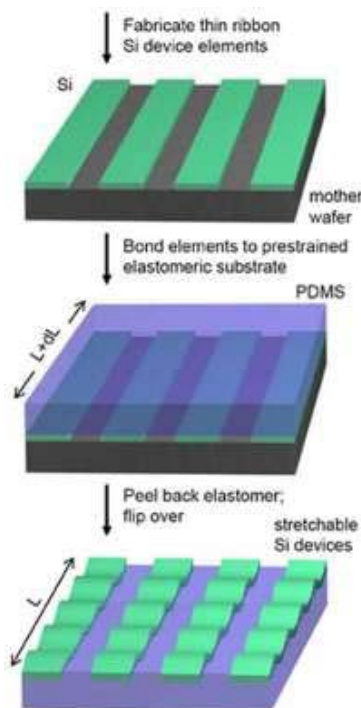


“Stretchable silicon offers different capabilities than can be achieved with standard silicon chips,” said John Rogers, a professor of [materials science and engineering](#) and co-author of a paper to appear in the journal *Science*, as part of the Science Express Web site, on Dec 15.

Functional, stretchable and bendable electronics could be used in applications such as sensors and drive electronics for integration into artificial muscles or biological tissues, structural monitors wrapped around aircraft wings, and conformable skins for integrated robotic sensors, said Rogers, who is also a Founder Professor of Engineering, a researcher at the [Beckman Institute for Advanced Science and Technology](#) and a member of the [Frederick Seitz Materials Research Laboratory](#).

To create their stretchable silicon, the researchers begin by fabricating devices in the geometry of ultrathin ribbons on a silicon wafer using procedures similar to those used in conventional electronics. Then they use specialized etching techniques to undercut the devices. The resulting ribbons of silicon are about 100 nanometers thick – 1,000 times smaller than the diameter of a human hair.

In the next step, a flat rubber substrate is stretched and placed on top of the ribbons. Peeling the rubber away lifts the ribbons off the wafer and leaves them adhered to the rubber surface. Releasing the stress in the rubber causes the silicon ribbons and the rubber to buckle into a series of well-defined waves that resemble an accordion.



Schematic illustration of the process for building stretchable single crystal silicon devices on rubber substrates.

“The resulting system of wavy integrated device elements on rubber represents a new form of stretchable, high-performance electronics,” said Young Huang, the Shao Lee Soo Professor of Mechanical and Industrial Engineering. “The amplitude and frequency of the waves change, in a physical mechanism similar to an accordion bellows, as the system is stretched or compressed.”

As a proof of concept, the researchers fabricated wavy diodes and transistors and compared their performance with traditional devices. Not only did the wavy devices perform as well as the rigid devices, they could be repeatedly stretched and compressed without damage, and without significantly altering their electrical properties.

“These stretchable silicon diodes and transistors represent only two of the many classes of wavy electronic devices that can be formed,” Rogers said. “In addition to individual devices, complete

circuit sheets can also be structured into wavy geometries to enable stretchability.”

Besides the unique mechanical characteristics of wavy devices, the coupling of strain to electronic and optical properties might provide opportunities to design device structures that exploit mechanically tunable, periodic variations in strain to achieve unusual responses.

In addition to Rogers and Huang, co-authors of the paper were postdoctoral researcher Dahl-Young Khang and research scientist Hanqing Jiang. The Defense Advanced Research Projects Agency and the U.S. Department of Energy funded the work.

[«Prev](#)[Next»](#)[URI](#) [TRACKBACK](#)

Trackback URL for this article:

<http://www.linuselectrons.com/trackback.php/20051215232752400>

No trackback comments for this article.

Stretchable Silicon Could Be Next Wave in Electronics | 0 comments | [Create New Account](#)

[Oldest First](#)[Threaded](#)[Refresh](#)[Reply](#)

The following comments are owned by whomever posted them. LinuxElectrons™ is not responsible for the content.