



IMPORTANT SAFETY INFORMATION ABOUT MIRENA

Science News

[Share](#) [Blog](#) [Cite](#)
[Print](#) [Email](#) [Bookmark](#)

Geckos Inspire New Method to Print Electronics on Complex Surfaces

ScienceDaily (Sep. 21, 2010) — Geckos are masters at sticking to surfaces of all kinds and easily unsticking themselves, too. Inspired by these lizards, a team of engineers has developed a reversible adhesion method for printing electronics on a variety of tricky surfaces such as clothes, plastic and leather.

See Also:

Plants & Animals

- [Biology](#)
- [Biotechnology](#)
- [Genetically Modified](#)

Matter & Energy

- [Electronics](#)
- [Technology](#)
- [Spintronics](#)

Reference

- [Mechanical engineering](#)
- [Metallurgy](#)
- [Circuit design](#)
- [Machine](#)

Researchers from Northwestern University and the University of Illinois at Urbana-Champaign designed a clever square polymer stamp that allows them to vary its adhesion strength. The stamp can easily pick up an array of electronic devices from a silicon surface and move and print them on a curved surface.

The research will be published Sept. 20 by the Proceedings of the National Academy of Sciences (PNAS).

"Our work proposes a very robust method to transfer and print electronics on complex surfaces," said Yonggang Huang, Joseph Cummings Professor of Civil and

Environmental Engineering and Mechanical Engineering at Northwestern's McCormick School of Engineering and Applied Science.

Huang, co-corresponding author of the PNAS paper, led the theory and design work at Northwestern. His colleague John Rogers, the Flory-Founder Chair Professor of Materials Science and Engineering at the University of Illinois, led the experimental and fabrication work. Rogers is a co-corresponding author of the paper.

Key to the square and squeezable polymer stamp are four pyramid-shaped tips on the stamp's bottom, one in each corner. They mimic, in a way, the micro- and nano-filaments on the gecko's foot, which the animal uses to control adhesion by increasing or decreasing contact area with a surface.

Pressing the stamp against the electronics causes the soft tips to collapse up against the stamp's body, maximizing the contact area between the stamp and the electronics and creating adhesion. The electronics are picked up in a complete batch, and, with the force removed, the soft tips snap back to their original shape. The electronics now are held in place by just the four tips, a small contact area. This allows the electronics to be easily transferred to a new surface.

"Design of the pyramid tips is very important," Huang said. "The tips have to be the right height. If the tips are too large, they can't pick up the target, and if the tips are too small, they won't bounce back to their shape."

The researchers conducted tests of the stamp and found the changes in contact area allow the stamp's adhesion strength to vary by 1,000 times. They also demonstrated their method can print layers of electronics, enabling the development of a variety of complex devices.

The National Science Foundation and the U.S. Department of Energy supported the work.

The title of the PNAS paper is "Microstructured Elastomeric Surfaces with Reversible Adhesion and Examples of Their Use in Deterministic Assembly by Transfer Printing." In addition to Huang and Rogers, other authors of the paper are Jian Wu (a postdoctoral fellow at Northwestern), Seok Kim, Andrew



Gecko feet clinging on glass. Geckos are masters at sticking to surfaces of all kinds and easily unsticking themselves, too. Inspired by these lizards, a team of engineers has developed a reversible adhesion method for printing electronics on a variety of tricky surfaces such as clothes, plastic and leather. (Credit: iStockphoto/Stephan Hoerold)

Ads by Google

Hyperspike Sound Laser

Long range voice communication
World Record AHD technology
www.Wattre.com

Discount Rubber Mulch

ILlinois-Ohio-Wi-IN
MO-KS
shreddedmulch.com

national polymer labs

Polymer and nano technology in Ohio
coatings - adhesives - composites
www.nationalpolymerlabs.com

GEICO Car Insurance

\$100? \$200? \$300? How much could you save with GEICO? Get a quote.
www.GEICO.com

Related Stories

 **How Humidity Makes Gecko Feet Stickier: Softens Setae to Tighten Gecko's Grip** (Oct. 17, 2010) — Geckos have amazingly sticky feet. Their stickability comes from billions of dry microscopic hairs that coat the soles of their feet. However, when humidity increases, gecko feet stick even tighter ... [> read more](#)

Switchable Adhesive (July 26, 2007) — How geckos, insects and other animals can switch off and on adhesion is not yet understood in detail. But the scientists can now reveal the secret of their "intelligent" ... [> read more](#)

Droplets Manipulated On Nanostructured Silicon Surfaces (May 26, 2009) — Researchers have studied silicon micro and nanofabrication methods, which have a large number of applications. They have found a novel nanopatterned silicon surface that allows almost limitless ... [> read more](#)

 **Combating Friction And Stiction In Electronic Devices** (Mar. 19, 2007) — Micro-electro-mechanical systems, popularly referred to as MEMS, in small electronic devices often fail because of adhesion

Just In:

[Taste Receptors Found in Lungs](#)

Science Video News

Shark-Inspired Boat Surface

Researchers are using shark skin as a model for creating new coatings that prevent adhesion of algae and barnacles to boats. The new coating is. ... [> full story](#)

[Physicists Create Insect-imitating Robot To Scoot Over Unstable Surfaces](#)

[Micro-X-Ray Fluorescence Also Provides Spectroscopic Information](#)

[Materials Scientists Copy Beetle Anatomy To Develop New Coatings](#)

[more science videos](#)

Breaking News

... from [NewsDaily.com](#)

[Haiti may be primed for another quake](#)



[German government asks EU to propose Galileo cost cuts](#)

[Diabetes to double or triple in U.S. by 2050: government](#)

[Virgin Galactic eyes NASA commercial space work](#)

[Marathon man: How not to hit the wall](#)

[more science news](#)

In Other News ...

[Iran says some academic courses too "Western"](#)

[Senate unlikely to follow House on yuan](#)

[Former Dubai bank executives face heavier penalty](#)

[U.N. will help, but not discuss, Afghan peace talks](#)

[Haiti cholera toll tops 250, but seen stabilizing](#)

Carlson, Sung Hun Jin, Anton Kovalsky, Paul Glass, Zhuangjian Liu, Numair Ahmed, Steven L. Elgan, Weiqiu Chen, Placid M. Ferreira and Metin Sitti.

Email or share this story: | More

Story Source: Articles Videos

Headline stories reprinted with editorial adaptations by ScienceDaily staff) from materials provided by Northwestern University. The original article was written by Megan Fellman.

Journal Reference:

- 1. Yonggang Huang, John Rogers et al. Microstructured Elastomeric Surfaces with Reversible Adhesion and Examples of Their Use in Deterministic Assembly by Transfer Printing. PNAS, September 20, 2010

Need to cite this story in your essay, paper, or report? Use one of the following formats:
APA Northwestern University (2010, September 21). Geckos inspire new method to print electronics on complex surfaces. ScienceDaily. Retrieved October 25, 2010, from http://www.sciencedaily.com/releases/2010/09/100920151804.htm
MLA
Note: If no author is given, the source is cited instead.

and stiction - the attractive force between the surfaces of interacting ... > read more



Move Over, Silicon: Advances Pave Way For Powerful Carbon-Based Electronics (Dec. 20, 2007) —

Bypassing decades-old conventions in making computer chips, engineers developed a novel way to replace silicon with carbon on large surfaces, clearing the way for new generations of faster, more ... > read more

Ads by Google

Adhesion & Cohesion

Measure Tack, Adhesion, Peel, Shear & Tension with the TA.XTPlus www.TextureTechnologies.com

LANTUS® Physician Site

(insulin glargine [rDNA origin] injection) Info for Physicians Only Lantus.com/HCP

Search ScienceDaily

Number of stories in archives: 93,129

Afghan gameshow brings relief, and a chance of cash
Democrat fights for political life in Bush country
Foreign troop deaths in Afghanistan near 600 for 26th
more top news

Advertisement for LANTUS medication. Text: 'If you suffer from moderate or severe plaque psoriasis... of Clearer Skin. Individual results may vary. Request Kit. Read the Medication Guide and talk to your doctor.'

Find with keyword(s): [input field] Search

Enter a keyword or phrase to search ScienceDaily's archives for related news topics, the latest news stories, reference articles, science videos, images, and books.

Copyright Reuters 2008. See Restrictions.

About ScienceDaily® | Editorial Staff | Awards & Reviews | Contribute News | Advertise With Us | Privacy Policy | Terms of Use
Copyright © 1995-2010 ScienceDaily LLC — All rights reserved — Contact: editor@sciencedaily.com
Note: This web site is not intended to provide medical advice, diagnosis or treatment.
Part of the iVillage Your Total Health Network

Free Subscriptions ... from ScienceDaily

Get the latest science news with our free email newsletters, updated daily and weekly. Or view hourly updated newsfeeds in your RSS reader:

- Email Newsletters
RSS Newsfeeds

Feedback ... we want to hear from you!

Tell us what you think of the new ScienceDaily -- we welcome both positive and negative comments. Have any problems using the site? Questions?

Your Name: [input field]
Your Email: [input field]
Comments: [text area]

Click button to submit feedback: [Send It button]