DISCOVER
Science, Technology, and The Future

- Subscribe
- Give a Gift
- **Archives**
- **Customer Service**

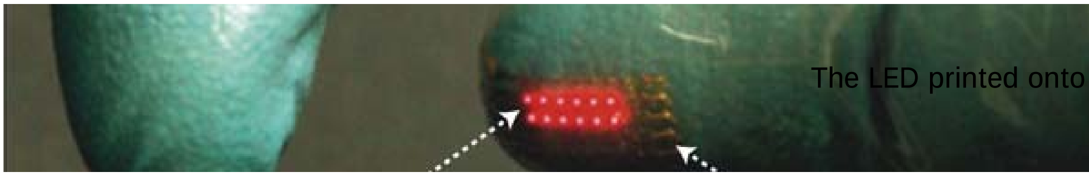
SEARCH SUBMIT>>

- Health & Medicine
- Mind & Brain
- Technology
- Space
- Human Origins
- Living World
- Environment
- Physics & Math
- Video
- Photos
- Podcast
- RSS

Blogs / 80beats

« The Stone Age Food Pyramid Included Flour Made From Wild Grains
Evidence of Smart, Jewelry-Making Neanderthals Is Challenged »

Implantable LEDs Could Be Medical Sensors, or Sweet Glowing Tattoos



The LED printed onto a vinyl glove

Flexible materials technology may just bring the next wave of trendy to the markets, in the form of glowing tattoos and T- shirts. Or the hot new tech could be used for its intended purpose: monitoring medical conditions.

This flexible light-emitting diode (LED) array uses many already existing materials and techniques to create a nano-sized, flexible patch of light. A team lead by John Rogers developed the array as a medical device; it could be implanted to serve as a readout for monitoring internal body conditions, like blood oxygenation or glucose levels, or it could turn on light-activated drugs.

> "The applications we're interested in mostly include interfaces with the human body," says John Rogers…. For some biological applications, he adds, a conventional LED's brightness, reliable operation and suitability for waterproof implementation make it a more attractive option than an organic LED. [Scientific American].

Each individual LED is a square that measures 2.5 micrometers thick (smaller than the diameter of your cells' nucleus) and 100 micrometers on each side (the thickness of a coat of paint). Many of these LEDs can be printed together to form an array of light points connected by swirls of connective wire that give it additional flexibility. The substrate is flexible enough that it can be stretched and flexed up to 75 percent without losing function. The researchers described the technology in the journal *Nature Materials*.

> [The researchers] deposited LEDs on aluminum foil, the leaf of a tree, and a sheet of paper; they wrapped arrays around nylon thread and tied it in a knot; and they distended LED arrays by inflating the polymer substrate or stretching it over the tip of a pencil or the head of a cotton swab. "Eventually the students just got tired" of devising new tests for the light-emitting sheets, Rogers says. "There was nothing that we tried that we couldn't do." [Scientific American].

The arrays are made on a semiconductor called gallium arsenide and other materials that are traditionally very brittle, but when stamped onto a plastic array they become flexible. They are then coated in rubber, which makes them waterproof and ready to be implanted. No humans have glowing LED tattoos yet, but the researchers were able to implant the array into a latex glove, and also put one underneath an animal's skin and in other materials including fabric, paper, and aluminum foil.

> Brian Derby, a materials scientist at the University of Manchester, UK, agrees that the development is less a scientific breakthrough than a feat of engineering. However, he has spotted a drawback: the use of interconnecting wires to take the mechanical strain keeps the device density low. "The large spacing of the LEDs or photo-detectors will lead to a limited range of applications — no flexible displays, for example," he says. [Nature News].

The researchers have anticipated that concern, and say the arrays can be layered on top of each other to create a denser patch of light.

Related content:
80beats: Two New Nanotech Breakthroughs Point the Way to Nano-Electronics
80beats: Scientists Create "Artificial Electronic Skin" From Nanowire Mesh
80beats: Rubbery Computer Screens Can Be Bent, Folded, and Even Crumpled
DISCOVER: Top 100 Stories of 2008: #83: Bulletproof Paper Is Stronger Than Kevlar
DISCOVER: Metamaterial Revolution: The New Science of Making Anything Disappear

All images: Nature Materials / John Rogers

October 19th, 2010 12:13 PM Tags: electronics, flexible array, LED, light, materials science, medical technology, tattoo
by Jennifer Welsh in Health & Medicine, Technology | 0 comments | RSS feed | Trackback >

Leave a Reply

Name (required)

Mail (will not be published) (required)

Website

Submit Comment

- ## About 80beats

  80beats is DISCOVER's news aggregator, weaving together the choicest tidbits from the best articles on the day's most compelling topics.

  80beats is written by Andrew Moseman and Jennifer Welsh, and is edited by Eliza Strickland. This team darts through each day's science news faster than the ruby-throated hummingbird that beats its wings 80 times per second. Send ideas, tips, suggestions, and complaints to [estrickland at discovermagazine dot com].

- ## Subscribe: RSS Feed or Email Newsletter

  The RSS feed for 80beats is here .

  If you'd prefer to receive a daily email newsletter, sign up here.

- ## Facebook

- ## on 80beats

  - **Recent Posts** ◦ Categories ◦ Archives
    - Spaceport America Dedicates Its Runway; Flights *Could* Begin in 2011
    - Running by the Books: Math for the Marathoner
    - Arctic Report Card: Warm Weather and Melted Ice Are the New Normal
    - "Life Ascending" Wins the Royal Society's Science Book Prize
    - Pretty Liquid Crystal Experiments Could Reorganize Electronic Displays
    - Second Look at NASA's Moon Bombing Reveals Even More Water
    - Depressed Mice Just Need a Shot of Gene Therapy in the Brain
    - "Metabolic Sins of the Father": Fat Dads May Give Their Kids Diabetes

- ## on Discover

  - **On Discover Blogs** ◦ Discover Tweeters
  - Mon Oct 25th, 2010 by Jennifer Welsh | no comments
    80beats | Google Street View's Privacy Blunder Just Keeps Getting Worse
  - Mon Oct 25th, 2010 by Phil Plait | one comment
    Bad Astronomy | It's full of stars!
  - Mon Oct 25th, 2010 by Razib Khan | one comment
    Gene Expression | *History and Geography of Genes* on a Desktop
  - Mon Oct 25th, 2010 by Sean | 6 comments
    Cosmic Variance | Ghost Moon?
  - Mon Oct 25th, 2010 by Eliza Strickland | one comment
    Discoblog | Einstein & Air Miles: Do Frequent Fliers Age at a Different Rate?

- Mon Oct 25th, 2010 by Carl Zimmer | 3 comments
  The Loom | Got satellite radio? I'll be talking about weird life at 1 pm EST today on XM171 and SR147
- Mon Oct 25th, 2010 by Chris Mooney | 4 comments
  The Intersection | New Point of Inquiry: Carl Zimmer--This is Your Brain on iPad
- Mon Oct 25th, 2010 by Eric Wolff | 8 comments
  Science Not Fiction | For Transgenic Mice, SmelleVision Replaces Television
- Thu Oct 21st, 2010 by Rebecca Horne | one comment
  Visual Science | I Spy... Classified Aircraft
- Wed Oct 20th, 2010 by Ed Yong | 42 comments
  Not Exactly Rocket Science | The origin of complex life – it was all about energy

Copyright: Some Rights Reserved

Connect With Discover