



**Bioscience**  
TECHNOLOGY.

Log in | Register

Directory Publications Sections News Products Multimedia Community

Search Bioscience  
Technology

Search

RSS Feeds Newsletters Bookmarks  
[-] Text [+]

## Water droplets shape graphene nanostructures

Featured In: [Instrumentation](#)

By EurekAlert

Thursday, December 17, 2009

Graphene -- A single-atom-thick sheet of carbon, like those seen in pencil marks -- offers great potential for new types of nanoscale devices, if a good way can be found to mold the material into desired shapes.

Chemists at the University of Illinois at Chicago say it's possible, reporting that graphene can become quite pliable using only a nanodroplet of water to do the job.

"Up until now, it wasn't thought we could controllably fold these structures," said Petr Král, assistant professor of chemistry at UIC. "But now we know how to shape graphene by using weak forces between nanodroplets carefully positioned on graphene sheets."

Král and two of his graduate students described the process in a recent article in *Nano Letters*, which is highlighted in *Nature's* "news and views" section Dec. 17.

Engineers already cut graphene into narrow ribbons and other shapes, expanding the set of carbonaceous systems such as fullerenes, carbon nanotubes and nano-diamonds. Using computer simulations, Král showed that weak molecular interactions called van der Waals forces between water nanodroplets and graphene can shape it into a wide variety of forms, without the water and graphene chemically binding.

"Depending on the size of the water droplet and the shape and size of graphene flake used, we can fold it in different shapes for various applications," said Král. "It's similar to the way proteins are folded in biological cells with the help of chaperone proteins."

Král and his students discovered they could use water droplets to roll, bend, slide and shape graphene into different complex structures such as capsules, sandwiches, knots and rings -- all potential building blocks of nanodevices with unique mechanical, electrical or optical properties. By using special techniques like atomic force microscopy and carefully guided microscopic needles, water droplets and other materials can be carefully positioned on graphene to shape it into desired forms, he says.

Král's laboratory is studying potential uses of nanoscale graphene, such as ways to coat it with phospholipid molecules that would allow it to become part of biological cell membranes where it might perform specific functions. His lab is also designing graphene sheet nanoscale pores that allow the building of novel ion and molecular separation membranes for use in desalination and other applications.

While the materials he works with are inorganic, Král sees a growing trend to developing hybrid multifunctional systems that combine inorganic nanostructures with biological cellular systems.

"We're trying to detect signals from the biological world or pass signals to the biological world," he said. "In the future, perhaps proteins will evolve to interact with inorganic systems. It's a way of evolution to form a new interface, or hybrid system, working together on novel functions."

### SOURCE

Join the Discussion

Rate Article: Average 0 out of 5  
[register](#) or [log in](#) to comment on this article!



Email **1** tweet  
 Print **0** retweet

### News

### Supplier Update

Merck buys British maker of biotech medicines  
**2 hours ago**

UR study reveals chemo's toxicity to brain, possible treatment  
**3 hours ago**

Special excerpt of Environmental Policy and Law about human rights and the environment  
**3 hours ago**

Anadys hepatitis C drug meets key study goals  
**3 hours ago**

Invasion without a stir  
**4 hours ago**

NIH awards La Jolla Institute \$18.8 million for major infectious disease study  
**4 hours ago**

Hebrew U. receives \$5 million for research on leishmaniasis in Ethiopia  
**4 hours ago**

[more NEWS >>](#)

LABORATORY EQUIPMENT  
Webcast Series

NOW ON DEMAND

**Analytical Techniques for Monitoring Bioethanol**

Sponsored by:

PerkinElmer  
For the Better

phenomenex  
...breaking with tradition

**REGISTER FREE**

### Most Popular

### Related Content

'Extreme' genes shed light on origins of photosynthesis  
**Dec 11**

0 COMMENTS

ADD COMMENT

Text Only 2000 character limit

Add Comment

Page 1 of 1

AGU fall meeting: Final press conference list, press conference visuals online  
Dec 10

Researchers demonstrate nanoscale X-ray imaging of bacterial cells  
Dec 7

Imaging Through the Pipeline  
Jun 15

Copying mother nature's designs  
Dec 11

## Research Exchange

Application  
Notes

White Papers

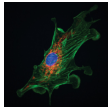
Posters

Journal  
Articles

Ask the  
Experts

### Calibration Free Analysis to Measure the Concentration of Active Proteins Nov 23

An SPR-based method, Calibration Free Concentration Analysis can be used to accurately determine the concentration of active protein in a sample, relating to the specific binding activity of the protein, and without the need for a standard.



### Advances in EMCCD Technology: Making Imaging Less Arbitrary Nov 16

Recent advances in EMCCD technology have solved the problem of non-standardized measurement units by using the photoelectron to standardize imaging experiments.



### 10 Tips for Successful Sample Concentration and Buffer Exchange Nov 6

Centrifugal devices with ultrafiltration (UF) membrane can solve common problems researchers face when working with proteins.



### Meeting the Challenges of Long-term Time-lapse Imaging Oct 26

Recent technological developments in the sequence capture of cellular events through a light microscope can be combined to image multiple independent experiments automatically, with many advantages.

[more APPLICATION NOTES >>](#)

STAY INFORMED: SUBSCRIBE TO

**Bioscience  
TECHNOLOGY**

Magazine and E-mail Newsletters

E-mail:

DRUG DISCOVERY & DEVELOPMENT  
Webcast Series

On Demand Now

Accelerating Your  
GPCR Research

Sponsored by:

PerkinElmer  
For the Better

REGISTER FREE

## MULTIMEDIA

### Video:



### Neuroscience Diseases of The Brain and How The Mind Emerges

Nov 8

Dennis Choi, director of Emory University's Neuroscience Center, is renowned for his groundbreaking research on brain and spinal cord injury.

[more VIDEO >>](#)

### Podcasts:



### Allen Institute for Brain Research Oct 14

Discussed in this interview are both the mouse brain project and the human cortex project with an emphasis on the importance of these projects to neuroscience research.

[more PODCASTS >>](#)








- [Chromatography Techniques](#)
- [Drug Discovery & Development](#)
- [Lab Design News](#)
- [Laboratory Equipment](#)
- [Pharmaceutical Processing](#)
- [R&D Magazine](#)
- [Scientific Computing](#)

**Information:**

- [About Us](#) | [Contact Us](#) | [Advertise With Us](#)
- [Sitemap](#) | [Privacy Policy](#)
- [Terms & Conditions](#)

**Stay in Touch:**

-  [RSS Feeds](#)
-  [Podcasts](#)

-  [Newsletters](#)
-  [Mobile](#)
-  [Blogs](#)