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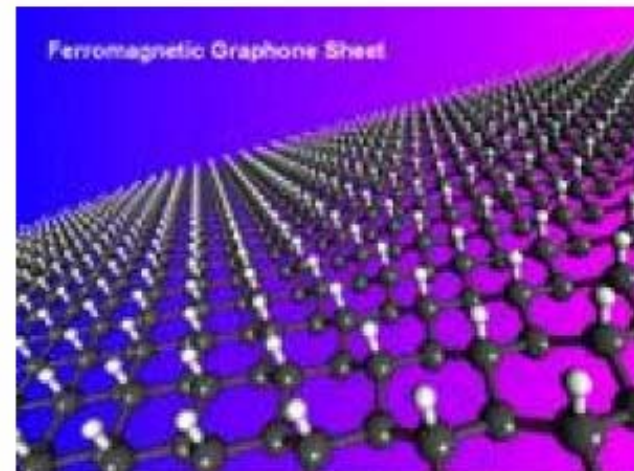
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The team of researchers from Virginia Commonwealth University; Peking University in Beijing, China; the Chinese Academy of Science in Shanghai, China; and Tohoku University in Sendai, Japan; used theoretical computer modeling to design the new material they called graphone, which is derived from an existing material known as graphene.



Ferromagnetic graphone sheet. (Credit: Puru Jena/VCU)

Researchers design new graphene-based, nano-material with magnetic properties

Published: Wednesday, September 2, 2009 - 11:17 in [Physics & Chemistry](#)

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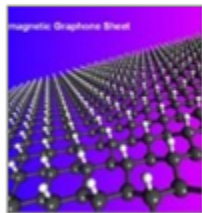










Image courtesy of Puru Jena/VCU

An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips. The team of researchers from Virginia Commonwealth University; Peking University in Beijing, China; the Chinese Academy of Science in Shanghai, China; and Tohoku University in Sedai, Japan; used theoretical computer modeling to design the new material they called graphone, which is derived from an existing material known as graphene.

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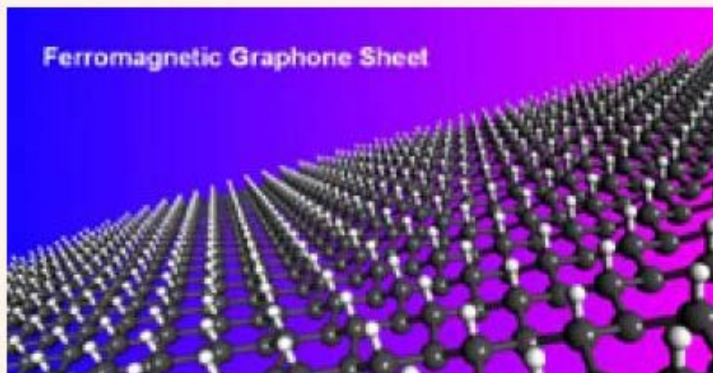


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Graphene, created by scientists five years ago, is 200 times stronger than steel, its electrons are highly mobile and it has unique optical and transport properties. Some experts believe that graphene may be more versatile than carbon nanotubes, and the ability to make graphene magnetic adds to its potential for novel applications in spintronics. Spintronics is a process using electron spin to synthesize new devices for memory and data processing.

Although graphene's properties can be significantly modified by introducing defects and by saturating with hydrogen, it has been very difficult for scientists to manipulate the structure to make it magnetic.



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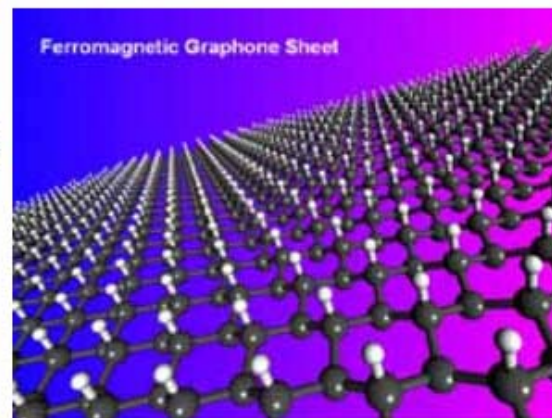
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Wednesday, September 2, 2009

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This is a ferromagnetic graphone sheet. Credit: Image courtesy of Puru Jena/VCU



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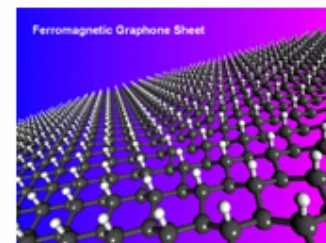
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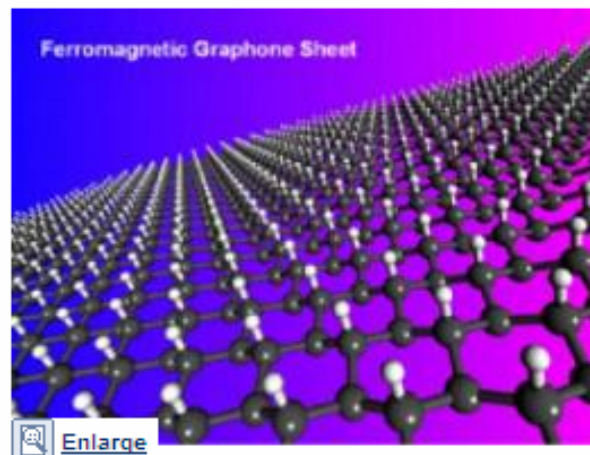
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New graphene-based nanomaterial with magnetic properties designed

September 2nd, 2009



This is a ferromagnetic graphene sheet. [Credit:](#) Image courtesy of Puru Jena/VCU


An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

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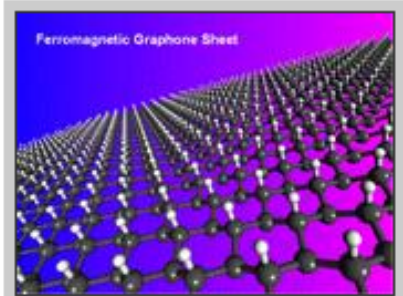
A possible pathway to simply synthesize ferromagnetic graphene

Sathya Achia Abraham
VCU Communications and Public Relations
(804) 827-0890
sbachia@vcu.edu

9/1/2009

An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

The team of researchers from [Virginia Commonwealth University](#); Peking University in Beijing, China; the Chinese Academy of Science



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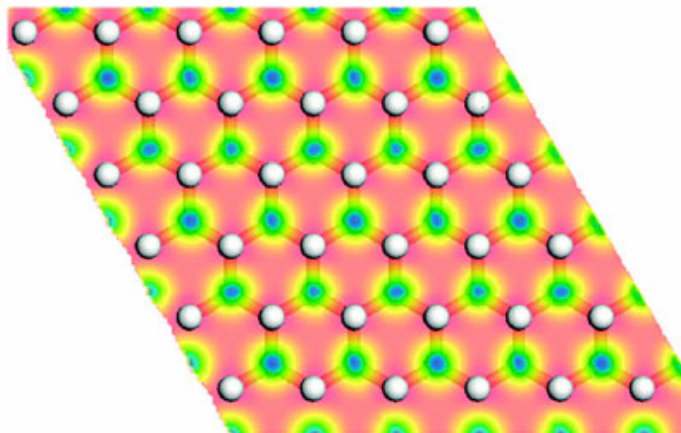
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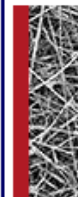
Researchers design new graphene-based, nano-material with magnetic properties

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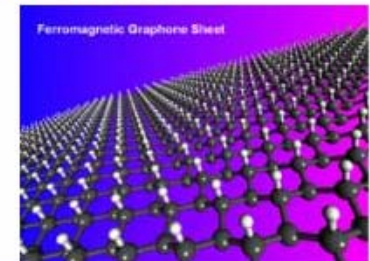
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Researchers Design New Graphene-based, Nanomaterial with Magnetic Properties

03.09.2009

An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

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Thursday 3rd September 2009

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China National News
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Washington, September 3 : An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

The nano-material was designed by a team of researchers from Virginia Commonwealth University (VCU); Peking University in Beijing, China; the Chinese Academy of Science in Shanghai, China; and Tohoku University in Sendai, Japan.

They used theoretical computer modeling to design the new material they called graphone, which is derived from an existing material known as graphene.

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One of the important impacts of this research is that semi-hydrogenation provides us a very unique way to tailor magnetism. The resulting ferromagnetic graphone sheet will have unprecedented possibilities for the applications of graphene-based materials

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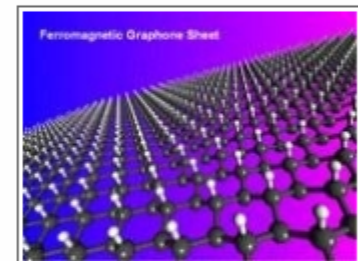
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Researchers Design New Graphene-Based, Nano-Material With Magnetic Properties

September 3, 2009

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Graphene, created by scientists five years ago, is 200 times stronger than steel, its electrons are highly mobile and it has unique optical and transport properties. Some experts believe that graphene may be more versatile than carbon nanotubes, and the ability to make graphene magnetic adds to its potential for novel applications in spintronics. Spintronics is a process using electron spin to synthesize new devices for memory and data processing.

Although graphene's properties can be significantly modified by introducing defects and by saturating with hydrogen, it has been very difficult for scientists to manipulate the structure to make it magnetic.

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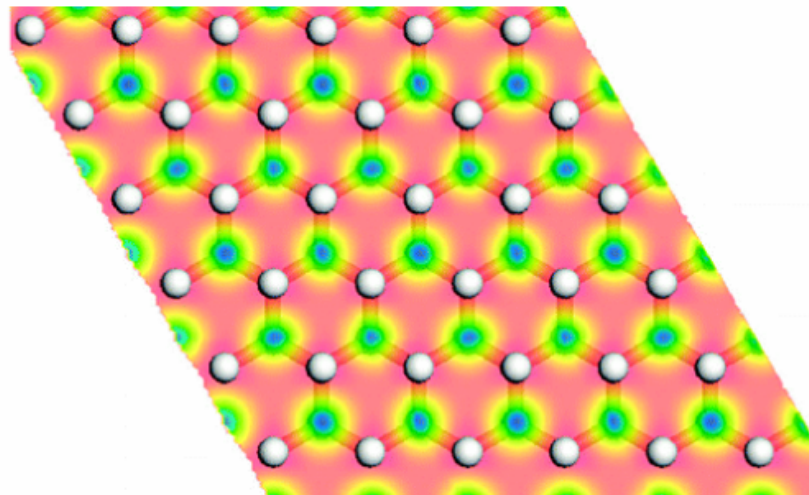


RESEARCH WATCH

Newly-developed 'graphone' makes spintronic devices closer than ever

By [Dario Borghino](#)

19:29 September 3, 2009 PDT



A team of researchers from the Virginia Commonwealth University, Peking University in Beijing, the Chinese Academy of Science, and Tohoku University in Japan has designed a new graphite-based magnetic nanomaterial that behaves as a semiconductor and could prove very important for ongoing research in the field of spintronics. [Read More](#)

Graphene made magnetic with hydrogen coating

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(09/03/2009 11:52 AM EST)



PORTLAND, Ore. — Graphone, a new magnetic version of carbon monolayers called graphene, could enable a new breed of carbon spintronic devices, researchers claim.

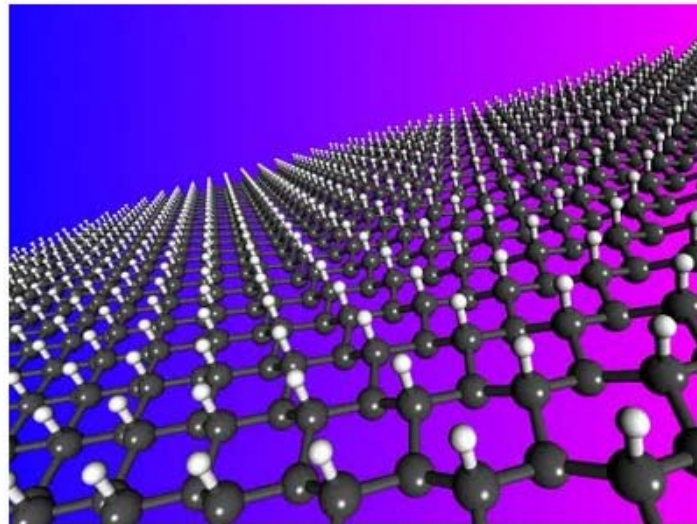
[Graphene](#), consisting of pure crystalline carbon sheets, cannot be doped with impurities to adjust its semiconducting and magnetic properties as easily as silicon since carbon does not readily "heal" implantations with annealing. Rather than implanting dopants, researchers say, a surface treatment can be used to adjust a carbon sheet's properties.

Researchers say hydrogen can be used to fine-tune graphene's metallic, semiconductor and magnetic properties, resulting in either graphane (metallic), graphane (semiconducting) or graphone (ferromagnetic).

Thursday, September 03, 2009

"MATERIALS: Graphene made magnetic with hydrogen coating"

Carbon sheets--graphene--can be made ferromagnetic, called graphone, by adjusting the amount of hydrogenation on their surface, according to these researchers. With an adjustable magnetic moment that can couple ferromagnetically, graphone allows the magnetism to be harnessed in semiconducting devices. Look for spintronic devices using graphone within 10 years. R.C.J.



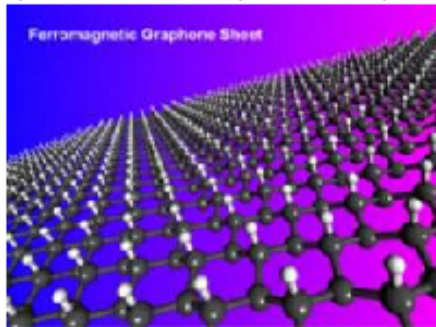
Graphone, a new magnetic version of carbon monolayers called graphene, could enable a new breed of carbon spintronic devices, researchers claim. Graphene, consisting of pure crystalline carbon sheets, cannot be doped with impurities to adjust its semiconducting and magnetic properties as easily as silicon since carbon does not readily "heal" implantations with annealing. Rather than implanting dopants, researchers say, a surface treatment can be used to adjust a carbon sheet's properties. Researchers say hydrogen can be used to fine-tune graphene's metallic, semiconductor and magnetic properties, resulting in either graphene (metallic), graphane (semiconducting) or graphone (ferromagnetic).



- ◆ — **New graphene-based nanomaterial with magnetic properties designed**

(Thursday, 03 September 2009 00:21)

An international team of researchers has designed Graphone, a new magnetic nanomaterial made by adding hydrogen atoms to graphene (a form of carbon), with the potential for novel applications in spintronics devices for memory and data



processing. *Ferromagnetic graphone sheet (Puru Jena/VCU (Source: <http://www.physorg.com/news171126902.html>)*

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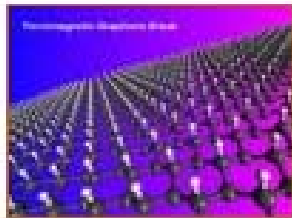
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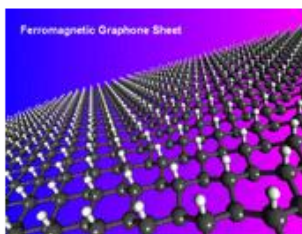
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(Virginia Commonwealth University)



Credit: Puru Jena, VCU

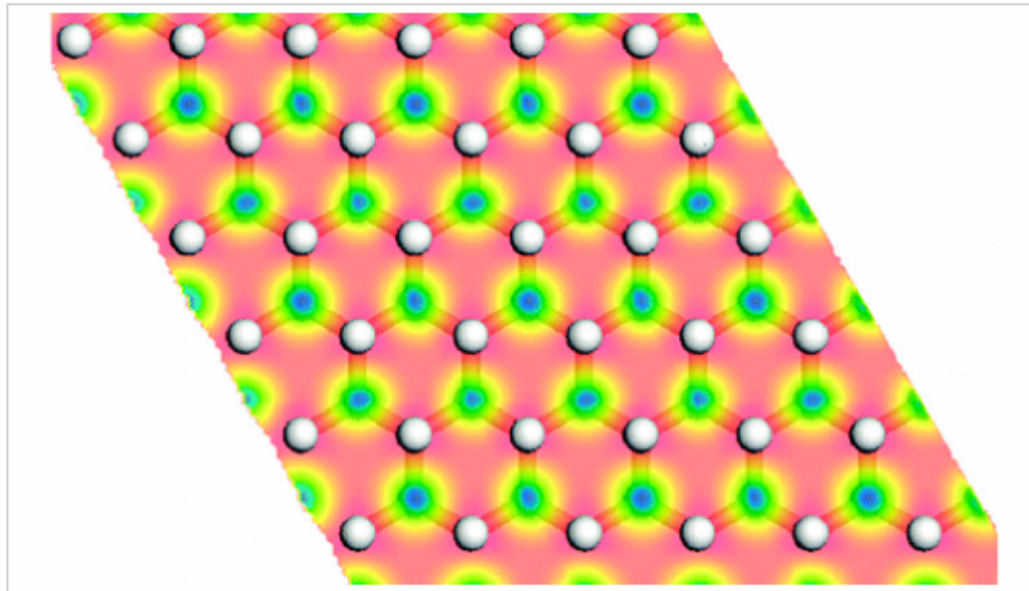
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[\[Ferromagnetism in Semihydrogenated Graphene Sheet, Nano Lett., Article ASAP \(August 31, 2009\) DOI: 10.1021/nl9020733\]](#)

(September 3, 2009)

Friday, September 4, 2009

Newly-developed 'graphone' makes spintronic devices closer than ever



A team of researchers from the Virginia Commonwealth University, Peking University in Beijing, the Chinese Academy of Science, and Tohoku University in Japan has designed a new graphite-based magnetic nanomaterial that behaves as a semiconductor and could prove very important for ongoing research in the field of spintronics.

Spintronics, or magnetoelectronics, is an emerging technology that harnesses the spin of electrons along with their electrical charge to store and transfer information in digital form. Because the electronic spin is closely related to magnetism, techniques that attempt to manipulate these particles must present strong and highly controllable magnetic properties.

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WASHINGTON - An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

The nano-material was designed by a team of researchers from Virginia Commonwealth University (VCU); Peking University in Beijing, China; the Chinese Academy of Science in Shanghai, China; and Tohoku University in Sendai, Japan.

They used theoretical computer modeling to design the new material they called graphone, which is derived from an existing material known as graphene.

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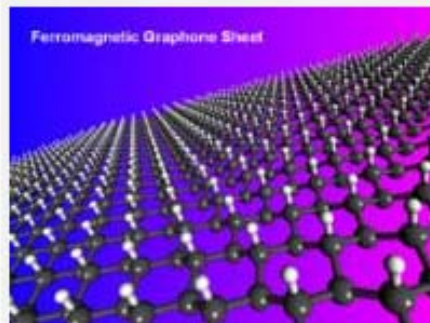
Researchers design new graphene-based, nano-material with magnetic properties

- 2 Sep 2009

By Virginia Commonwealth University

A possible pathway to simply synthesize ferromagnetic graphene

RICHMOND, Va. (Sept. 1, 2009) – An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.



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September 4th, 2009

Graphene made magnetic with hydrogen coating

Abstract:

Graphone, a new magnetic version of carbon monolayers called graphene, could enable a new breed of carbon spintronic devices, researchers claim.

Graphene, consisting of pure crystalline carbon sheets, cannot be doped with impurities to adjust its semiconducting and magnetic properties as easily as silicon since carbon does not readily "heal" implantations with annealing. Rather than implanting dopants, researchers say, a surface treatment can be used to adjust a carbon sheet's properties.

Researchers say hydrogen can be used to fine-tune graphene's metallic, semiconductor and magnetic properties, resulting in either graphane (metallic), graphane (semiconducting) or graphone (ferromagnetic).



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Graphene made magnetic with hydrogen coating

PORTLAND, Ore. - Graphone, a new magnetic version of **carbon** monolayers called graphene, could enable a new breed of **carbon** spintronic devices, researchers claim.

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Researchers design new graphene-based, nano-material with magnetic properties

- 2 Sep 2009

By Virginia Commonwealth University


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The team of researchers from Virginia Commonwealth University; Peking University in Beijing, China; the Chinese Academy of Science in Shanghai, China; and Tohoku University in Sedai, Japan; used theoretical computer modeling to design the new material they called graphene, which is derived from an existing material known as graphite.

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Researchers design new graphene-based, nano-material with magnetic properties

A possible pathway to simply synthesize ferromagnetic graphene

04 Sep 2009 - An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

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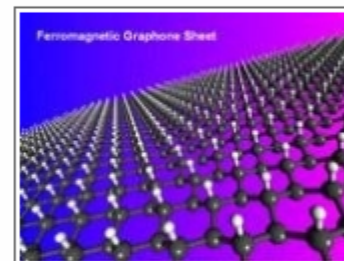
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September 3, 2009

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Washington, September 3 (ANI): An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

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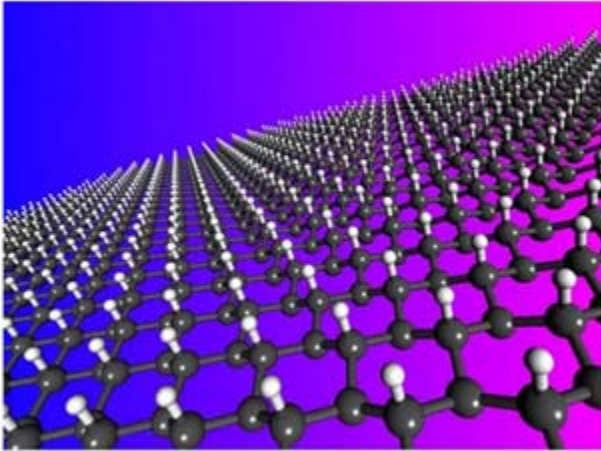
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"MATERIALS: Graphene made magnetic with hydrogen coating"

Carbon sheets—graphene—can be made ferromagnetic, called graphane, by adjusting the amount of hydrogenation on their surface, according to these researchers. With an adjustable magnetic moment that can couple ferromagnetically, graphane allows the magnetism to be harnessed in semiconducting devices. Look for spintronic devices using graphane within 10 years. R.C.J.



Graphane, a new magnetic version of carbon monolayers called graphene, could enable a new breed of carbon spintronic devices, researchers claim. Graphene, consisting of pure crystalline carbon sheets, cannot be doped with impurities to adjust its semiconducting and magnetic properties as easily as silicon since carbon does not readily "heal" implantations with annealing. Rather than implanting dopants, researchers say, a surface treatment can be used to adjust a carbon sheet's properties. Researchers say hydrogen can be used to fine-tune graphene's metallic, semiconductor and magnetic properties, resulting in either graphene (metallic), graphane (semiconducting) or graphone (ferromagnetic).

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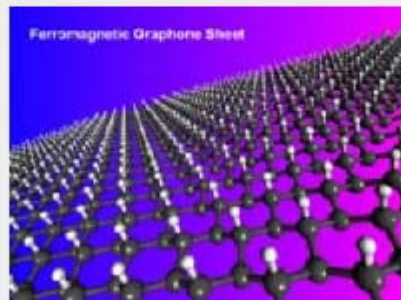
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New graphene-based nanomaterial with magnetic properties designed

PhysOrg.com, Sept. 3, 2009

An international team of **researchers** has designed Graphone, a new magnetic nanomaterial made by adding **hydrogen** atoms to graphene (a form of **carbon**), with the potential for **novel** applications in spintronics devices for **memory** and **data** processing.

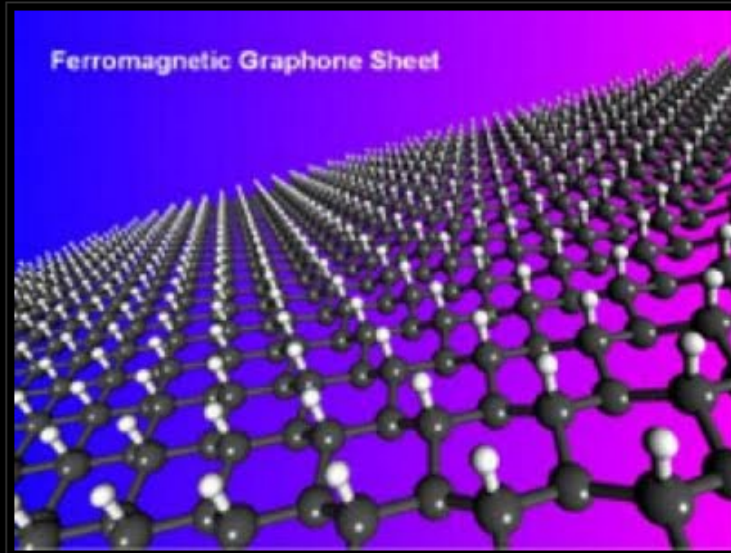


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Nuevo material magnético basado en el grafeno/A new graphene based magnetic material



Un equipo internacional de investigadores (pertenecientes a la **Virginia Commonwealth University (VCU)**, **Universidad de Pekín**, **Academia China de Ciencias de Shanghai** y la **Universidad Tohoku de Sedai en Japón**) ha diseñado un nuevo **nano-material magnético basado en el grafito que actúa como semiconductor** y que podría ayudar a fabricar componentes electrónicos, como micro-chips, de próxima generación.

El nuevo material se llama graphone (¿grafone?) y deriva del

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Some experts believe that graphene may be more versatile than carbon nanotubes, and the ability to make graphene magnetic adds to its potential for novel applications in spintronics.

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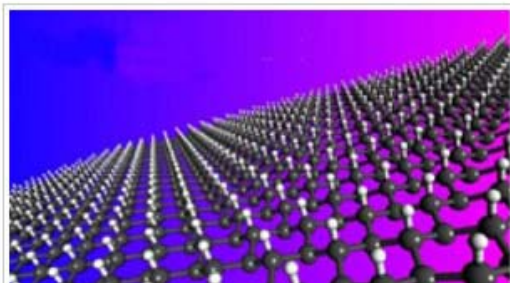
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Posted on September 10th, 2009 by David Bradley

An international team of researchers has developed a new magnetic carbon material that not only acts as a semiconductor but is also magnetic and could help scientists develop the next generation of microelectronic devices.

The new carbon material is based on graphene, which resembles graphite, the form of carbon found in pencil "lead", but which exists as single sheet-like layers resembling nanoscopic chicken wire fencing. Graphene was first created by scientists in Manchester five years ago and is not only 200 times stronger than steel but because its electrons are highly mobile it has unique electro-optical properties. As such, some researchers think that graphene is the natural successor to silicon and could lead to the advent of spintronic devices that exploit electron spin and charge in computer memory and data processing.



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Saturday, 05 Sep 2009



New graphite based magnetic nano material developed

Saturday, 05 Sep 2009

Science Daily reported that an international team of researchers has designed a new graphite based, magnetic nano material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

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Hello and welcome to your early week international coatings industry update, brought to you by SpecialChem. News has surged again, and we have a lot to talk about, starting with lessons learned in mergers and acquisitions.

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Researchers design new graphene-based, nano-material with magnetic properties

Posted on 02 Sep 2009 at 9:20pm

An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

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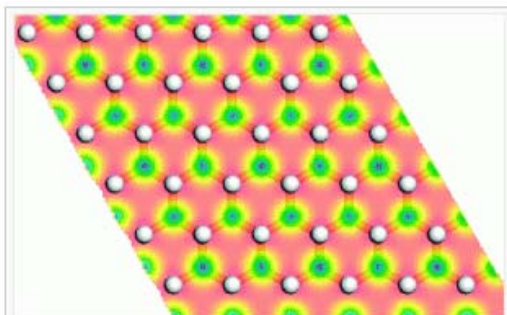
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Researchers design new graphene-based nanomaterial with magnetic properties

Edited By Ann_Spence • September 3, 2009



When half of the hydrogen in this graphane (fully hydrogenated graphene) sheet is removed, the resulting "graphone" becomes a ferromagnetic semiconductor with a small indirect gap.
(Credit: Nano Letters/ Puru Jena/VCU)

A team of researchers at Virginia Commonwealth University reports that it has designed a new graphite-based, magnetic nanomaterial that acts as a semiconductor and could help material scientists create the next generation of electronic devices and microchips.

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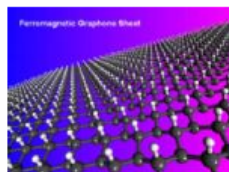
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Ferromagnetism in Semihydrogenated Graphene Sheet.

[Zhou J](#), [Wang Q](#), [Sun Q](#), [Chen XS](#), [Kawazoe Y](#), [Jena P](#).

Department of Advanced Materials and Nanotechnology, and Center for Applied Physics and Technology, Peking University, Beijing 100871, China, Department of Physics, Virginia Commonwealth University, Richmond, Virginia 23284, Shanghai Institute of Technical Physics, Chinese Academy of Science, Shanghai 200083, China, and Institute for Material Research, Tohoku University, Sendai, 980-8577, Japan.

Single layer of graphite (graphene) was predicted and later experimentally confirmed to undergo metal-semiconductor transition when fully hydrogenated (graphane). Using density functional theory we show that when half of the hydrogen in this graphane sheet is removed, the resulting semihydrogenated graphene (which we refer to as graphone) becomes a ferromagnetic semiconductor with a small indirect gap. Half-hydrogenation breaks the delocalized pi bonding network of graphene, leaving the electrons in the unhydrogenated carbon atoms localized and unpaired. The magnetic moments at these sites couple ferromagnetically with an estimated Curie temperature between 278 and 417 K, giving rise to an infinite magnetic sheet with structural integrity and magnetic homogeneity. This is very different from the widely studied finite graphene nanostructures such as one-dimensional nanoribbons and two-dimensional nanoholes, where zigzag edges are necessary for magnetism. From graphene to graphane and to graphone, the system evolves from metallic to semiconducting and from nonmagnetic to magnetic. Hydrogenation provides a novel way to tune the properties with unprecedented potentials for applications.

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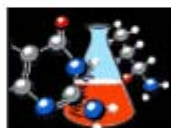
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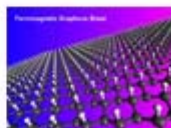
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