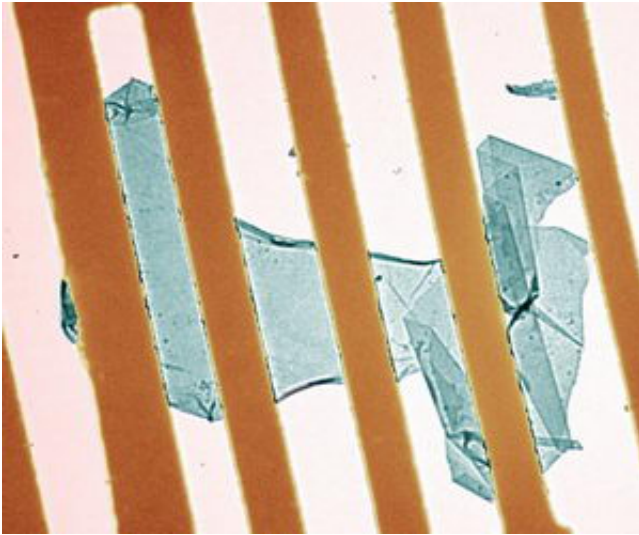


Physicists pioneer new super-thin technology (Update)

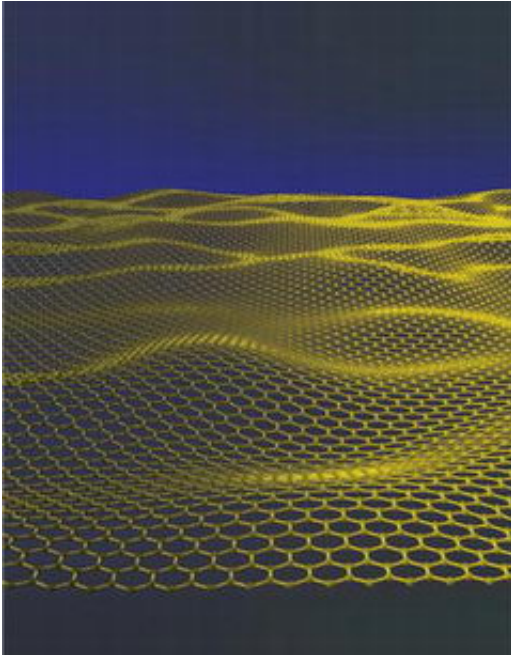
February 28 2007



Atomic gauze hanging on a scaffold of golden wires: It is the thinnest material you will ever see. Credit: University of Manchester

Researchers have used the world's thinnest material to create a new type of technology, which could be used to make super-fast electronic components and speed up the development of drugs.

Physicists at The University of Manchester and The Max-Planck Institute in Germany have created a new kind of a membrane that is only one atom thick.



An artist's impression of the chicken wire of carbon atoms. Credit: University of Manchester

It's believed this super-small structure can be used to sieve gases, make ultra-fast electronic switches and image individual molecules with unprecedented accuracy.

The findings of the research team is published today in the journal *Nature*.

Two years ago, scientists discovered a new class of materials that can be viewed as individual atomic planes pulled out of bulk crystals.

These one-atom-thick materials and in particular graphene – a gauze of carbon atoms resembling chicken wire – have rapidly become one of the hottest topics in physics.

However, it has remained doubtful whether such materials can exist in

the free state, without being placed on top of other materials.

Now an international research team, led by Dr Jannik Meyer of The Max-Planck Institute in Germany and Professor Andre Geim of The University of Manchester has managed to make free-hanging graphene.

The team used a combination of microfabrication techniques used, for example, in the manufacturing of microprocessors.

A metallic scaffold was placed on top of a sheet of graphene, which was placed on a silicon chip. The chip was then dissolved in acids, leaving the graphene hanging freely in air or a vacuum from the scaffold.

The resulting membranes are the thinnest material possible and maintain a remarkably high quality.

Professor Geim – who works in the School of Physics and Astronomy at The University of Manchester – and his fellow researchers have also found the reason for the stability of such atomically-thin materials, which were previously presumed to be impossible.

They report that graphene is not perfectly flat but instead gently crumpled out of plane, which helps stabilise otherwise intrinsically unstable ultra-thin matter.

Professor Geim and his colleagues believe that the membranes they have created can be used like sieves, to filter light gases through the atomic mesh of the chicken wire structure, or to make miniature electro-mechanical switches.

It's also thought it may be possible to use them as a non-obscuring support for electron microscopy to study individual molecules.

This has significant implications for the development of medical drugs, as it will potentially allow the rapid analysis of the atomic structures of bio-active complex molecules.

"This is a completely new type of technology – even nanotechnology is not the right word to describe these new membranes," said Professor Geim.

"We have made proof-of-concept devices and believe the technology transfer to other areas should be straightforward. However, the real challenge is to make such membranes cheap and readily available for large-scale applications."

Source: University of Manchester

Citation: Physicists pioneer new super-thin technology (Update) (2007, February 28) retrieved 28 April 2024 from <https://phys.org/news/2007-02-physicists-super-thin-technology.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.