NEWS FOR KIDS

About Us

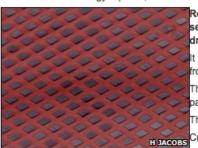
INSIDERS **AMERICAS** WORLD

The solar cell that builds itself BY WIRE NEWS SOURCES ON JANUARY 12, 2010

By Jason Palmer

HOME

Science and technology reporter, BBC News



Researchers have demonstrated a simple, cheap way to create self-assembling electronic devices using a property crucial to salad dressings.

CULTURE

SPORT

TRAVEL

OP ED

It uses the fact that oil- and water-based liquids do not mix, forming devices from components that align along the boundary between the two

The idea joins a raft of approaches toward self-assembly, but lends itself particularly well to small components.

he work is reported in Proceedings of the National Academy of Sciences.

Crucially, it could allow the large-scale assembly of high-quality electronic components on materials of just about any type, in contrast to "inkjet printed"

electronics or some previous self-assembly techniques.

Specific gravity

Such efforts have until now exploited the effect of gravity, assembling devices through so-called "sedimentation".

In this approach, "blank" devices are etched with depressions to match precisely-shaped components. Simply dumped into a liquid, the components should settle down into the blank device like sand onto a riverbed, in just the right places.

BUSINESS

"That's what we tried for at least two years and we were never able to assemble these components with high yield gravity wasn't working," said Heiko Jacobs of the University of Minnesota, who led the research.

SELF-ASSEMBLY EXPLAINED

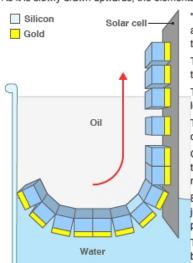
The oil/water mix contains a number of individual solar cell elements

Each is coated with a "water-loving" molecule on the bottom and a "water-hating" one on top

The elements align neatly at the oil/water boundary in a two-dimensional sheet

The "blank" solar cell has pre-cut places for the elements and is dipped through the boundary

As it is slowly drawn upwards, the elements pop into place



"Then we thought if we could concentrate them into a two-dimensional sheet and then have some kind of conveyor belt-like system we could assemble them with high yields and high speed," he told BBC News.

To do that, the team borrowed an idea familiar to fans of vinaigrette: they built their two-dimensional sheets at the border between oil and water.

They first built a device blank as before, with depressions lined with low-temperature solder, designed for individual solar cell elements.

They then prepared the elements - each a silicon and gold stack a few tens of millionths of a metre across - and put different coatings on each side.

On the silicon side, they put a hydrophobic molecule, one that has a strong tendency to evade contact with water. On the gold side, they put a hydrophilic molecule, which has the converse tendency to seek out water.

By getting the densities of the oil- and water-based parts of the experiment just right, a "sheet" of the elements could be made to "float" between the two, pointing in the right direction thanks to their coatings.

The conveyor belt process is to simply dunk the device blank through the boundary and draw it back slowly; the sheet of elements rides up along behind it, each one popping neatly into place as the solder attracts its gold

The team made a working device comprising 64,000 elements in just three minutes.

Having proved that the concept works, the team is now investigating just how small they can go in terms of individual elements, or how large they can go in finished devices.

The approach should also work for almost any material, stiff or flexible, plastic, metal or semiconductor - a promising fact for future display and imaging applications.

Babak Parviz, a nano-engineering professor at the University of Washington in Seattle, said the technique is a "clear demonstration that self-assembly is applicable across size scales".

"Self-assembly is probably the best method for integrating high-performance materials onto unconventional substrates," he told BBC News.

The method tackles what Dr Parviz said is the most challenging problem - the proper alignment of thousands of parts,

each thinner than a human hair. But it also works with the highest-performance materials, he said. "For example, this method allows one to use single-crystal silicon, which is far superior to other types of silicon for

making solar cells." </p

This article is from the BBC News website. @ British Broadcasting Corporation, The BBC is not responsible for the content of external internet sites.

Source

No comments yet.

Leave a comment Name (required) E-mail (required) URI Your Message submit

HEALTH NEWS

SCIENCE

Fathers to be offered more help



Fathers are to be offered more support in bringing up children, under new plans being set out by the government. Ministers will say

Advertise

EN FRANÇAIS

employers and health and children's services

England all need to recognise the role fathers have in caring for children. Fathers will be given more information before a child's

birth to encourage them [...]

'No proof' e-cigarettes are safe



Michelle RobertsHealth reporter, **BBC News**

There is a worrying lack safety of data electronic cigarettes, their despite growing popularity with the public,

two leading Greek researchers have warned

In the British Medical Journal, they say that without more evidence it is impossible to know if such products actually do more harm than good. Some studies [...]

We're pregnant



By Clare MurphyHealth reporter, BBC News More fathers than ever before may attend the birth of their child, but the government is keen to involve them even more closely in pregnancy,

labour and the aftermath as part of its Green Paper on As of next month, fathers-to-be will be the target

audience of new leaflets [...]

English NHS 'the most efficient'



Nick TriggleHealth reporter, BBC News The NHS in England provides better value for money than elsewhere in UK, group's study suggests. The Nuffield Trust found

there were fewer health staff per head in England, but higher levels of activity and productivity, as well as shorter waits.

The differences were most marked when England [...]

IMAGE OF THE DAY

Don't Need Another Satellite



A U.S. interceptor rocket launches to destroy a failing satellite

Copyright @ 2010 Herald de Paris et Cie., Ltd. All rights reserved.