

Scientists invent heat-regulating building material

July 7 2011



(PhysOrg.com) -- A new material that can retain and release heat according to specific temperature requirements could make a significant difference to the cost of heating and cooling buildings, scientists say.

Researchers based at The University of Nottingham Ningbo China (UNNC) believe their [invention](#) — which could be used in existing structures as well as new builds — could offer considerable energy savings.

The novel non-deformed energy storage phase change material (PCM) has the unique advantage of possessing a larger energy storage capacity with faster thermal response than existing materials and could be cheaply manufactured.

If, for example, the required optimum temperature in a room is 22°C, the material can be fixed so that it starts absorbing any excess heat above that temperature.

The heat-regulating material, devised by researchers at the University's Center for Sustainable Energy Technologies, could be applied anywhere, from walls and roofs to wallpaper.

The material looks like a circular tablet with the circumference of a large coin in the laboratory. It can be manufactured in a variety of shapes and sizes, including so small that it can be sprayed as an unobtrusive microscopic film to surfaces.

The [building material](#) was recently awarded a patent application approval in China and patent applications are in the pipeline in other countries.

The scientists responsible for the breakthrough are project leader Professor Jo Darkwa, who is Director of the Centre for Sustainable Energy Technologies, Research Associate Oliver Su and, PhD student Tony Zhou.

Professor Darkwa said: “The construction industry produces more carbon emissions than any other industry in the world — even more than aviation. In China, the building sector is one of the highest energy consuming sectors, accounting for about 30 per cent of total energy usage and also a significant proportion of pollutant emissions.

“This material, if widely used, could make a major impact in the world's efforts to reduce carbon emission.”

The basic structure of the material has to be engineered for a specific temperature before it is used. The next developmental steps will include creating material which can be used for both heating and cooling applications.

“The material won't make air-conditioners obsolete, because you still need an air conditioner to control humidity and air movement. This

material purely reduces the amount of excessive heat energy in a room,” said Professor Darkwa.

The University is looking to develop the material further as well as commercialise it and already has a number of sponsors and partners involved in the research, including the Ningbo Science and Technology Bureau — which provided important funding and support for the initial two-year research — and private companies based in China.

The material could potentially save up to 35 per cent of energy in a building and scientists believe it could also be used in solar panels and LED (light-emitting diode) lighting to enhance the efficiency of these alternative energy-generating technologies.

Also on the cards for further research at UNNC are:

- Exploring which types of paints can be used with the unique material
- Studies to determine the long-term environmental impacts of the use of the [materials](#)
- Ways to improve the production of the material to enhance cost efficiency and ensure the process is environmentally-friendly

The scientists at the Centre for Sustainable Energy Technologies, meanwhile, are involved in various other projects aimed at finding ways to reduce the global carbon footprint emitted by the world’s buildings.

Professor Darkwa and Dr. David Chow, who leads the Architectural Environment Engineering degree programme, have played a major role in work behind new building regulation laws in Ningbo, China. Building developers in the city are compelled to include at least one sustainable energy technology, among other steps, to reduce any environmental harm associated with construction.

China's national government is on a major drive to improve the country's environmental track record and the University's scientists are increasingly involved in making recommendations to policy makers at the highest levels.

In October, UNNC will be the site of China's second international symposium on low carbon buildings when scientists, researchers, government officials and practitioners will gather to present and discuss recent research outputs and demonstration projects.

Professor Nabil Gindy, Vice-Provost for Research and Dean of the Graduate School at UNNC, said: "The University's strategic investment in research infrastructure to facilitate the advancement of knowledge in sustainable energy technologies is reaping rewards.

"We are very proud of the research excellence of this particular team of scientists, who have proven to be world-class specialists in the field of [sustainable energy](#) technologies. The University of Nottingham has a longstanding commitment to the global environmental agenda," he said.

The University's cutting-edge research feeds into all teaching programmes and PhD students, like Mr. Zhou, also get the opportunity to make valuable contributions to the advancement of science, he noted.

Professor Gindy said: "Vital for our scientific progress here, too, is the huge support we receive from the Ningbo city authorities, who also recognize the importance of minimising environmental harm and placing sustainability at the forefront of all endeavours.

"We are, of course, also grateful for assistance from our research collaborators at other universities and in the private sector," he said.

The research project was supported through grants from organisations

that including the Ningbo government, KK Chung Educational Group, Hong Kong-based Sustainable Sourcing Ltd and China's Suntech Ltd.

Provided by University of Nottingham

Citation: Scientists invent heat-regulating building material (2011, July 7) retrieved 25 April 2024 from <https://phys.org/news/2011-07-scientists-heat-regulating-material.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.