Now, a technology that can make reading latent fingerprints faster

Notebook:	office
Created:	07-Feb-19 11:59 AM
URL:	https://www.downtoearth.org.in/news/science-technology/now-a-technology-that-can-make-reading-latent-finger...

SCIENCE & TECHNOLOGY

Now, a technology that can make reading latent fingerprints faster

Since this new nanomaterial is luminescent, it highlights fingerprints, which can be captured by UV lamps and then reconstructed

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By Dinesh C Sharma
Last Updated: Wednesday 16 January 2019

Image: Getty Images

Invisible fingerprints accidentally left behind by criminals are often difficult to decipher because available techniques can't capture all the nuances in them. At times, they may be unclear because of damaged fingers. A new nanomaterial developed by a group of Indian scientists promises to overcome such difficulties and also make the process of reading latent fingerprints faster.

The nanomaterial, consisting of semiconductor particles that are a million times smaller than a millimeter, is luminescent. All one will need to do is sprinkle the nanomaterial on surface where fingerprint has been left behind, capture the image using UV lamp and process it to reconstruct the fingerprint. Researchers said that such fingerprints could be captured using a mobile phone too and transmitted to forensic lab from any crime scene.

The new material has been developed by doping manganese and copper atoms on zinc sulphide nanosystem. By replacing zinc atoms with those of copper and manganese, researchers could change optical properties of zinc sulphide nanosystem. When this material is applied on latent fingerprints, its strong visible luminescence property helps decipher fingerprints.

In laboratory experiments, the nanoparticles could help identify all the minute patterns of fingerprints such as island, fork, core, bifurcation, short ridge and ridge ending even with fingerprints that were

two month old. Researchers used a smartphone for capturing fingerprint images on different surfaces like transparent adhesive tape, smooth paper, optical mouse, a plastic surface and polymer film under the ultraviolet light.

The ridge patterns of human finger produce a unique fingerprint. When human fingers touch a surface, secretions present at the surface of the skin get transferred to the surface leaving an impression of the ridge pattern.

"The finely-resolved intensity patterns of fingerprints that this material yields shows that it has great usefulness in meeting the various demands in latent fingerprint detection," Dr. Chandra S. Tiwary, a member of the research team at Indian Institute of Technology Kharagpur, told *India Science Wire*.

Researchers plan to improve the light emission efficiency of the nanomaterial and also develop smart portable device for application in forensic sector for online retrieval of data and identification of latent fingerprints. The group has also used the new material to develop white LED.

The material has been developed at Nanoscience Laboratory, National Institute of Technology (NIT) Durgapur. The research team included Partha Kumbhakar, Subrata Biswas, Pathik Kumbhakar (NIT); Prafulla Pandey (IIT, Gandhinagar) and Chandra S. Tiwary (IIT Kharagpur). The research results have

been published in journal *Nanoscale*. **(India Science Wire)**

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First life to sprout on the Moon is already dead

A cotton seed that germinated on the Moon could not survive the long lunar night

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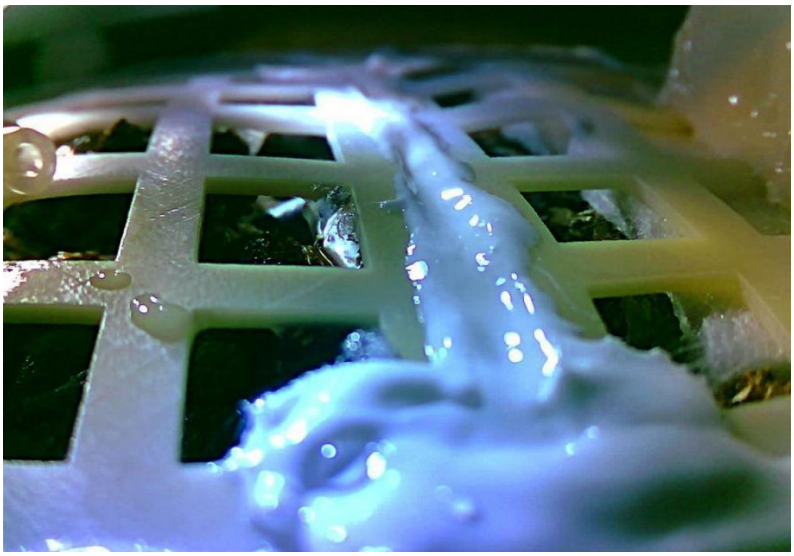
By Akshit Sangomla
Last Updated: Thursday 17 January 2019



The first plant that ever lived on the Moon is already dead. Within three hours of announcing the successful sprouting of the cotton plant, Xinhua news agency also announced that the Chinese experiment is now over as the different species on board the Chang'e-4 probe will not be able to survive the long lunar night which started on January 13 and will last for two Earth weeks.

The probe is currently in sleep mode and will remain so till the lunar night lasts. The minimum temperature on the Moon can fall to as low as -250 degree Celsius, according to the National Aeronautical and Space Administration (NASA) of the United States.

On January 3, 2019, the China National Space Administration's (CNSA) Chang'e-4 became the first human-made object to land on the dark side of the moon. A first-of-its-kind mini biosphere experiment, which the lunar lander carried, contained seeds of cotton, rape, potato and Arabidopsis. Of these, only one of the cotton seeds sprouted after the lander

was instructed from ground control to start watering the seeds and channeling natural light from the Moon's surface to them.

The cylindrical canister, in which the seeds were kept, also had fruit fly eggs and yeast to create a simple bio sphere inside. To support the growth of the plants it also contained water, soil, air and a heat control system. The yeast was kept to regulate the levels of oxygen and carbon dioxide inside the biosphere and the fruit flies were to be the only consumers of these biological products. Also, potato seeds were carried as the vegetable is seen by many scientists as a future source of food for astronauts travelling to and living on human outposts on the Moon, Mars and elsewhere in the solar system.

Earlier, space travelers grew plants on the International Space Station (ISS) and China's Tiangong-2 space lab in low Earth orbit (400 Km above the Earth) but the moon was a much more challenging environment to grow plants which was also difficult to simulate on the Earth.

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"We had no such experience (growing plants on the moon) before. And we could not simulate the lunar environment, such as microgravity and cosmic radiation, on Earth," said Xie Gengxin, senior scientist at the Chongqing University and chief designer of the mini biosphere experiment.

But now the Chinese have declared that the experiment is over and the organisms have started decaying inside the canister. They have also assured that there will not be any contamination of the lunar surface because of this decomposition.

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New science communication platforms launched

Union minister for science and technology Dr Harsh Vardhan launched DD Science and India Science on January 15, 2019

By Sunderarajan Padmanabhan
Last Updated: Wednesday 16 January 2019

Two new science communication platforms—DD Science and India Science—were launched by Union minister for science and technology Dr Harsh Vardhan on January 15, 2019.

DD Science is a joint initiative of Vigyan Prasar, an autonomous organisation under the department of science and technology (DST) and public broadcaster Doordarshan. It has a one-hour slot on Doordarshan national channel, which will be telecast from Monday to Saturday between 5 pm and 6 pm. India Science is an online channel available on all internet-enabled devices. It offers live, scheduled play and video-on-demand science programming.

The two channels will have science-based documentaries, studio-based discussions, virtual walkthroughs of scientific institutions, interviews and short films and will be free to access. The new

initiatives are expected to be first step in creating a national science channel for India.

Speaking on the occasion, Dr Harsh Vardhan said, "Developing scientific temperament is a critical necessity in a country of 1.3 billion and these two science channels will drive that national objective, both through DTH as well as the internet. It would help people understand the benefits of science and integrate it in their daily lives."

Recalling the run up to the launch, he noted that they had been in the making for the past two years, and said the main focus would be to offer quality content for all sections of the society in general and the youth and children in particular. "India has a large population of youngsters and the programmes would help tap the demographic dividend they represent for the social and economic progress of the country," adds Dr Vardhan.

He expressed confidence that the two new initiatives would turn out to be the first step towards a 24x7 science channel. "We are starting with a one-hour programme. I am sure that gradually it would be increased two hours followed by four hours, six hours, 12 hours and finally it will be a 24x7 channel with the top TRP rating," he said.

DST secretary Dr Ashutosh Sharma said the two new channels of science communication were designed to help take science to the common man. "Lot of quality science is happening in scientific

institutions across the country. The fruits of these work need to reach the lay person. The DD Science programme and India Science online channel would help in the task," he said.

Director General of Doordarshan, Ms Supriya Sahu, said DD Science service would be in Hindi in the beginning and efforts would be made to gradually expand its scope to telecast the programme in other Indian languages as well.

Secretary, ministry of information and broadcasting, Amit Khare, and Prasar Bharati CEO Shashi Shekhar Vempati, welcomed the coming together of Doordarshan and Vigyan Prasar to help promote scientific temper in the country. Vigyan Prasar director Dr Nakul Parashar proposed a vote of thanks. **(India Science Wire)**

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SCIENCE & TECHNOLOGY

Reflections from a Nobel winner: Scientists need time to make discoveries

In 2018, Professor Donna Strickland was awarded the Nobel Prize in Physics for her work in high-intensity lasers. Her research has been practically applied in laser eye surgery. But, Strickland writes, scientists shouldn't only be encouraged to do research with practical applications.

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By Donna Strickland
Last Updated: Tuesday 15 January 2019

📷 Professor Donna Strickland delivering the Nobel Lecture in Physics 2018. Credit: Nobel Prize Web site

Since the announcement that I won the Nobel Prize in physics for chirped pulse amplification, or CPA, there has been a lot of attention on its practical applications.

It is understandable that people want to know how it affects them. But as a scientist, I would hope society would be equally interested in fundamental science. After all, you can't have the applications without the curiosity-driven research behind it. Learning more about science — science for science's sake — is worth supporting.

Gérard Mourou, my co-recipient of the Nobel Prize, and I developed CPA in the mid-1980s. It all started when he wondered if we could increase laser intensity by orders of magnitude — or by factors of a thousand. He was my doctoral supervisor at the University of Rochester back then. Mourou suggested stretching an ultrashort pulse of light of low energy, amplifying it and then compressing it. As the graduate student, I had to handle the details.

A goal to revolutionize laser physics

The goal was to revolutionize the field of high-intensity laser physics, a fundamental area of science. We wanted the laser to show us how high-intensity light changes matter, and how matter affects light in this interaction.

Noble Prize winner Donna Strickland in her lab at the University of Waterloo. She was awarded the prize for her groundbreaking inventions in the field of laser physics which has a variety of applications, including corrective laser eye surgery. THE CANADIAN PRESS/Nathan Denette

It took me a year to build the laser. We proved that we could increase laser intensity by orders of magnitude. In fact, CPA led to the most intense laser pulses ever recorded. Our findings changed the world's understanding of how atoms interact with high-intensity light.

It was about a decade before practical uses common today eventually came into view.

Many practical applications

Because the high-intensity pulses are short, the laser only damages the area where it's applied. The result is precise, clean cuts that are ideal for transparent materials. A surgeon can use CPA to slice a patient's cornea during laser eye surgery. It cleanly cuts the glass parts in our cell phones.

Scientists are taking what we know about high-intensity lasers and are working on a way to use the most intense CPA lasers to accelerate protons.

Hopefully, one day these accelerated particles will help surgeons remove brain tumors that they can't today. In the future, CPA lasers might remove space junk by pushing it out of our orbit and to the Earth's atmosphere, where it will burn up and not collide with active satellites.

In many cases, the practical applications lag several years or even decades behind the original findings.

Albert Einstein created the equations for the laser in 1917, but wasn't until 1960 that Theodore Maiman first demonstrated the laser. Isidor Rabi first measured nuclear magnetic resonance in 1938. He received the Nobel Prize for Physics in 1944 for his research, which led to the invention of magnetic resonance imaging, or MRI. The first MRI exam on a human patient took place in 1977.

Certainly, applications deserve a lot of attention. Before you can get to them though, researchers first have to understand the basic questions behind them.

The term fundamental science may give some the false impression that it doesn't really affect their lives because it seems far removed from anything relatable to them. What's more, the term basic has the non-scientific definition of simple that

undermines its importance in the context of basic science.

We must give scientists the opportunity through funding and time to pursue curiosity-based, long-term, basic-science research. Work that does not have direct ramifications for industry or our economy is also worthy. There's no telling what can come from supporting a curious mind trying to discover something new.

Donna Strickland, Professor, Department of Physics and Astronomy, *University of Waterloo*

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