

JUNE 9TH, 2017

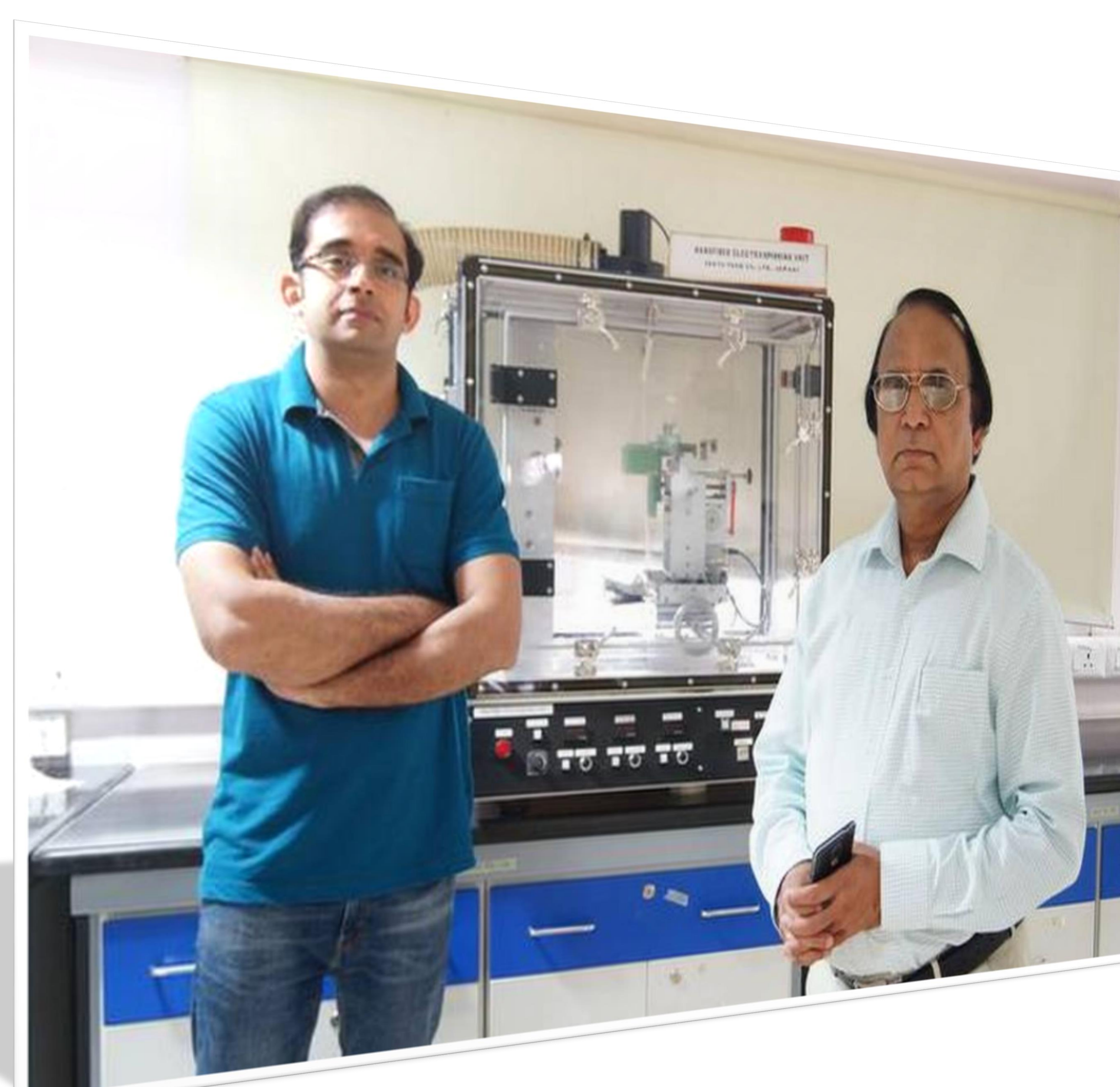
CSIR in Media

A Daily News Bulletin



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Scientists in Hyderabad trick
keratitis-causing fungi in the cornea
into 'committing suicide'

June 8th, 2017

Nanoparticles to treat eye infection

Scientists at the Hyderabad-based CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB) have developed a novel way to treat fungal keratitis. Keratitis is the inflammation of the eye, which starts with redness and itching and might eventually lead to blindness.

Keratitis can be caused by both bacteria and fungi. Fungi attach themselves to the cornea and release enzymes that break down the corneal proteins for their nutritional requirements.

In the process the cornea also gets inflamed. Corneal damage

causes wound and scar formation leading to severe visual impairment. It is estimated that about 30% of keratitis cases in India lead to blindness.

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Treating keratitis infection is currently a challenge because it is difficult to maintain a therapeutic dose at the corneal surface for long periods as blinking and tear formation washes off the drug. To address this challenge, a two-member team led by Ch. Mohan Rao of CCMB has developed protein-based nanoparticles that encapsulate the drug.

Certain antibodies get attached to the outer surface of the nanoparticles, thus anchoring the nanoparticles to the corneal surface.

The infected cornea expresses a set of receptors (TLR4) when infection sets in. The team has used antibodies to these receptors to anchor the nanoparticles to the cornea.

“If the infection is severe, more receptors are expressed on the cornea and more nanoparticles get bound to the receptors. Since they are bound, the residence time in the eye is long; neither blinking nor tear formation washes off the nanoparticles,” says Dr. Rao, the corresponding author of a study published in the journal *Nanoscale*.

The enzymes secreted by fungi breaks down the gelatine protein of nanoparticles that encapsulates the drug, thus releasing the drug. Like in the case of the receptors, more enzyme is secreted when infection is severe leading to more drug being released from the nanoparticles.



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“The gelatine protein acts as an alternative nutrient for the fungi. The fungi also degrade the gelatine-based nanoparticle to derive nutrients thus minimising the damage to the corneal tissue. In the process it releases the drug. In a sense, the fungi are committing suicide by consuming the gelatine protein,” says Saad M. Ahsan from CCMB and the first author of the paper.

The trials carried out on rats were encouraging on all counts.

As the residence time of the nanoparticle containing the drug is longer, the frequency of drug administration gets reduced significantly.

“In animal trials we found that application of the drug once every 12 hours was sufficient to completely clear the infection in seven or eight days,” Dr. Rao says.

As the use of antibodies on the surface of the nanoparticles makes the drug expensive, the researchers are working on designing a short peptide that can be used in place of the antibodies. They are planning to carry out one more animal trial on monkeys or rabbits before starting trials on humans.

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VIA, CSIR-NEERI sign memorandum
of understanding

June 9th, 2017

CSIR-NEERI to function as help-desk centre for industries

CSIR - National Environmental Engineering Research Institute (CSIR-NEERI) celebrated World Environment Day at NEERI. Prof S P Gautam, Member of Madhya Pradesh Public Service Commission and former Chairman, Central Pollution Control Board (CPCB) was chief guest and Ashwin Mudgal, Commissioner of

Nagpur Municipal Corporation was guest of honour.

Dr Rakesh Kumar, Director, CSIR-NEERI; Dr J S Pandey, Science Secretary, CSIR-NEERI and Prakash Kumbhare, Senior Principal Scientist of CSIR NEERI also shared the dais.



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Speaking on the occasion, Prof Gautam said that currently 'green technology' is being referred every where. But it does not mean as it is reflected, he added. He advised to follow a tree for scientific understanding of the environment.

He said, "We should look at ourselves while doing anything from the perspective of environment."

He advised everyone to acquire knowledge, even from spiritual books, to protect the environment.

This knowledge with practical experience turns into science, he added. He appealed to save the earth from climate change and global warming. He said, "A balance is necessary between all

living and non living things for environment protection in particular carbon and ozone." He mentioned that spiritual books were highly scientific.

"We still need to holistically the environment and evolutionary paradigms." he said. He advised to read spiritual books to develop a scientific temper.

Ashwin Mudgal addressed the problems of Nagpur relating to sewage treatment and solid waste management.

He assured that necessary steps would be taken in this regard for public welfare.



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Earlier, Dr Rakesh Kumar in his welcome address said that according to the theme of this World Environment Day – ‘Connecting People to Nature’, the institute has taken several steps to connect with stake holders, industries and general public. He also informed that CSIRNEERI had signed MoUs in the areas of sewage treatment and air pollution control.

Various programmes were organised by the Institute to mark the event. CSIR-NEERI Staff Club organised a cycle rally to spread awareness about the use of fuel less transport options. The rally made people aware of the consequences of the growing pollution. Waste segregation awareness campaign was also been organised.

The institute organised a debate

competition on ‘Free Food and Power: Is this really a sustainable option?’ and panel discussion on ‘Role of citizens in urban environment management’.

Ajay Dwivedi and Vikas Gupta won first and second prizes respectively in the debate competition.

Dr Atya Kapley and Dr JS Pandey moderated the panel discussion. Paryavaran Patrika was released on the occasion. MoU was signed between Vidarbha Industries Association (VIA) and CSIR-NEERI.



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According to the MoU, CSIR-NEERI would function as a help-desk centre for the industries of Nagpur region to provide them support in environment protection and pollution.

Atul Pande, President of VIA and Dr Rakesh Kumar signed MoU. Suresh Rathi, Vice President of VIA and Dr

Suhas Buddhe, Secretary of VIA were present on the occasion.

Dr JS Pandey, Chief Scientist and Science Secretary introduced the chief guest and briefed about the content of Paryavaran Patrika.

Prakash Kumbhare proposed the vote of thanks and Jaya Sabji wale conducted the proceedings.