

# GUINNESS WORLD RECORDS

## TITLE CERTIFICATION CEREMONY



# CSIR

## NEWS

Newsletter of the Council of  
Scientific & Industrial Research

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## CSIR-NPL Solar Cell Calibration Facility

### *Strengthening India's Solar PV Quality Infrastructure*

As India rapidly expands its solar energy capacity, ensuring the accuracy and reliability of solar Photovoltaic (PV) measurements has become increasingly important. Addressing this need, CSIR-National Physical Laboratory (CSIR-NPL), New Delhi, has established the National Primary Standard Facility for Solar Cell Calibration, creating a national reference for accurate measurement and calibration of solar cells.

Developed with support from the Ministry of New and Renewable Energy (MNRE) and in scientific collaboration with Physikalisch-Technische Bundesanstalt (PTB), Germany, the facility uses a laser-based Differential Spectral Responsivity (L-DSR) system for primary calibration of reference solar cells. CSIR-NPL's facility has achieved a measurement uncertainty as low as 0.35% ( $k=2$ ) for the short-circuit current of WPVS reference solar cells, placing its capability among the most advanced solar-cell calibration facilities globally.

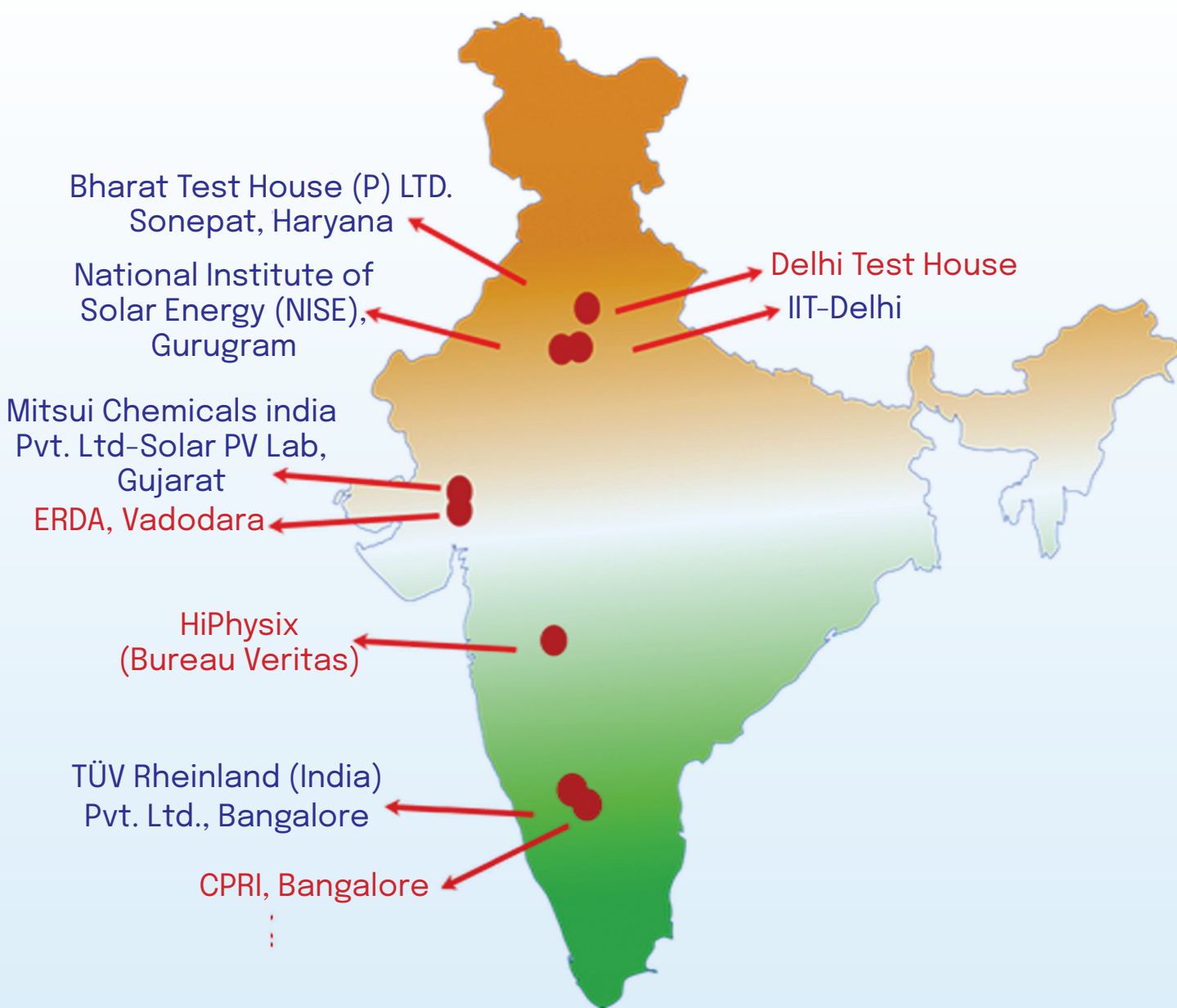
The significance of the facility extends well beyond laboratory measurements. Reference solar cells are used by PV testing laboratories and industry to establish accurate measurements of solar-cell and module performance. With primary calibration now

available within India, PV stakeholders can obtain traceable calibration services domestically, reducing dependence on overseas facilities, saving time and foreign exchange, and strengthening the country's solar PV quality infrastructure.

The facility is capable of supporting calibration across a wide range of solar-cell sizes — from WPVS reference cells of about 2 cm × 2 cm to industrial solar cells of around 6 × 6 inches. Its services are intended to support PV testing laboratories, research institutions, manufacturers and other stakeholders across the country.

CSIR-NPL is also extending its capabilities towards filtered reference solar cells and advanced tandem-cell technologies, with the aim of improving measurement traceability for emerging photovoltaic technologies such as perovskite-silicon tandem cells.

With this facility, CSIR-NPL is helping establish a robust measurement chain for India's rapidly growing solar sector — ensuring that what is measured, tested and certified is accurate, internationally traceable and trusted.



**Services of the facility to PV stakeholders across the country**

Contributed by Science Communication and  
Dissemination Directorate (SCDD), CSIR, New Delhi.  
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# Steel Slag Roads Can Cut Construction Cost by 40%, Deliver Four Times Higher Strength: Dr Jitendra Singh



Steel Slag Road Technology can reduce road construction costs by around 40 per cent while delivering four times the strength of conventional roads, Union Minister of State (Independent Charge) for Science & Technology and Earth Sciences, MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr Jitendra Singh, said on 12 September 2026. He said the technology can also substantially extend the maintenance cycle, with maintenance required only after about 15 years in suitable applications, making it a breakthrough with implications not only for road engineering but also for the overall infrastructure economy.

Dr Jitendra Singh called for the indigenous technology to move from one project to many

projects and from one State to many States, with its adoption extending beyond the Ministry of Road Transport and Highways to Railways, other Government departments, State Governments and private builders, contractors and infrastructure operators.

Dr Jitendra Singh was speaking at the conferment of the Guinness World Record for the "World's Longest Road Built with Processed Steel Slag Aggregates", jointly pursued by CSIR-Central Road Research Institute (CSIR-CRRI) New Delhi and Jindal Steel Limited. The 1.85-km road at Raigarh, Chhattisgarh, marks a major scale-up of an indigenous technology that converts processed steel slag, a by-product of steel production, into aggregates for road construction. The programme



*Dr Jitendra Singh was speaking at the conferment of the Guinness World Record for the “World’s Longest Road Built with Processed Steel Slag Aggregates”, jointly pursued by CSIR-Central Road Research Institute (CSIR-CRRI) New Delhi and Jindal Steel Limited.*

also witnessed the virtual inauguration of the road, release of a scientific documentary, signing of a Technology Transfer Agreement between CSIR-CRRI and Jindal Steel, launch of the “Steel Grit” brand and recognition of the project team.

Dr Jitendra Singh said this successful initiative simultaneously lives up to more than one flagship priority of this government, including PM Shri Narendra Modi’s repeated emphasis on “Waste to Wealth” recycling options.

Among those present were Shri Naveen Jindal, Member of Parliament, Chairman, Jindal Steel and President, Indian Steel Association; Dr N Kalaiselvi, Secretary, DSIR and Director General, CSIR; Dr VK Saraswat, former Member, NITI Aayog and former Director General, DRDO; Dr Ch. Ravi Sekhar, Director, CSIR-CRRI; representatives of Guinness World Records, scientists, engineers, industry leaders and members of the media.

Dr Jitendra Singh said the achievement demonstrates how industrial waste can be transformed into infrastructure wealth through Indian science, technology and industry working together. He said India’s rapidly expanding highways, expressways, industrial corridors, ports and urban infrastructure also bring a growing responsibility to conserve natural resources, particularly natural aggregates obtained through mining and quarrying. The Steel Slag Road initiative provides a technology-driven pathway to address both challenges, productive utilisation of an industrial by-product and conservation of natural resources.

The Minister said the significance of the technology becomes even greater in a geographically diverse country like India, where conventional roads often face durability challenges in difficult terrain and high-rainfall regions. Recalling his seven-year association with the Northeast, he said road construction in several areas is restricted to four or five months because of heavy rainfall, while portions constructed during one season can suffer damage before the next construction cycle begins. Stronger and more durable road technologies can therefore provide particular value in such challenging geographies.

The Minister said the objective should now be to take the technology “from one project to many projects, from one State to many States” and eventually make proven indigenous innovations part of mainstream infrastructure practice. CSIR-CRRI’s scientific guidelines, processing protocols and quality-control framework provide the basis for technically sound adoption, while Government agencies, scientific institutions, industry and infrastructure developers can work together to accelerate implementation wherever the technology is technically and economically appropriate.

Dr Jitendra Singh described the initiative as an example of “whole-of-government plus whole-of-nation” collaboration, bringing together Government, research institutions, industry and engineers. He said the technology is indigenous in both its conception and application, and that the next phase must focus on creating greater awareness and stronger pathways for home-grown technologies to move from laboratories and demonstration projects to large-scale field implementation.

The Minister placed the Steel Slag Road initiative within the larger Waste to Wealth and circular economy vision. He said India must increasingly



*The Minister placed the Steel Slag Road initiative within the larger Waste to Wealth and circular economy vision.*

move away from the mindset that any material is simply waste, as science and technology can unlock new economic value from such resources. Referring to CSIR initiatives involving biofuels from used cooking oil and the recovery of value from electronic scrap, he said recycling and resource recovery will form an increasingly important part of the next phase of industrial development.

Dr Jitendra Singh also congratulated Dr Satish Pandey and the CSIR-CRRI team for their sustained work and passion in taking the technology from research to the field. He said scientific talent requires an opportunity to demonstrate its potential, and credited Jindal Steel for providing the scale and platform through which the technology could be demonstrated in real-world infrastructure. He expressed hope that more steel companies would come forward to collaborate with scientific institutions on similar technology-led solutions.

The technology has already travelled through a series of landmark applications. Beginning with a major demonstration at Hazira, Gujarat, processed steel slag aggregates were used in a six-lane road connecting the industrial area with Hazira Port. It subsequently reached the NH-66 Mumbai-Goa Highway, where approximately 80,000 tonnes of steel slag were converted into processed aggregates for a one-kilometre, four-lane road

section. The technology was also deployed for heavy-duty road infrastructure in Arunachal Pradesh, including the strategic border region.

The technology has also entered port infrastructure through a 1.1-km steel slag road inside Hazira Port, connecting the multi-Purpose Berth with the coal yard. The application demonstrates the potential of processed steel slag aggregates for demanding industrial and logistics environments when supported by appropriate processing, pavement design and quality control.

The 1.85-km Guinness World Record is already paving the way for a much larger milestone. Dr N Kalaiselvi, Secretary, DSIR and Director General, CSIR, said the achievement comes as CSIR prepares to enter its 85<sup>th</sup> year and represents a particularly significant milestone for the organisation. She announced that CSIR-CRRI has received a work order for a 40-km road in Odisha from Jindal Steel's Angul plant, taking the technology from the present 1.85-km Guinness record towards a 40-km implementation. She said CSIR-CRRI and Jindal Steel are now poised to break their own record with this next milestone.

Dr Jitendra Singh said the Guinness World Record should be regarded not as the destination but as the beginning of the next phase of adoption. He said the real success would come when



*The Minister said the real success would come when the technology is replicated across the country wherever technically and economically suitable.*

the technology is replicated across the country wherever technically and economically suitable. The Minister called for stronger engagement with Government departments, States and private infrastructure players so that an innovation developed in India can become a widely used infrastructure solution in India.

He said the Steel Slag Road initiative brings together science and industry, waste and wealth, innovation and infrastructure, and research with the needs of society. The achievement, he said, demonstrates that India is increasingly moving beyond developing indigenous technology to

taking indigenous technology to scale, creating infrastructure that is economically efficient, environmentally responsible and technically sound.

Dr Kalaiselvi said the achievement reflects the strength of the partnership between CSIR-CRRI and Jindal Steel, and thanked Shri Naveen Jindal and his team for their collaboration with CSIR. She congratulated the scientists and engineers, particularly Dr Satish Pandey, whose work has helped take the technology from its initial applications in Gujarat to the National Highway network, Arunachal Pradesh and now the Guinness World Record.

With the next 40-km Odisha project already in the pipeline, the journey now moves from a world record to wider national adoption, turning one successful project into many, one State into many States, and an industrial by-product into a valuable infrastructure resource.

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Adapted from PIB

## CSIR-AMPRI and PWD, Government of Madhya Pradesh Join Hands to Implement Indigenous Sustainable Construction Technologies for Infrastructure Development

**O**n the occasion of Engineers' Day in India on 15 September 2026, CSIR-Advanced Materials and Processes Research Institute (CSIR-AMPRI), Bhopal, signed a Memorandum of Understanding (MoU) with the Madhya Pradesh Public Works Department (MPPWD) to promote research-driven, sustainable, and innovative solutions for infrastructure development across the state of Madhya Pradesh.

The MoU was formally exchanged at Kushabhau Thakre Convention Centre in the august presence of Dr Mohan Yadav, Hon'ble

Chief Minister of Madhya Pradesh; Shri Rakesh Singh, Hon'ble Minister, Public Works Department, Government of Madhya Pradesh; and Shri Sukhveer Singh, Principal Secretary, MPPWD. Minister of PWD briefed on different technologies of CSIR-AMPRI based on his recent visits to CSIR-AMPRI on 19 August and 2 September 2026, especially cement-free concrete, radiation-shielding concrete, amongst others. Hon'ble Chief Minister admired the eco-friendly cement-free geopolymetric concrete developed by CSIR-AMPRI and stressed on its adoption in the state of Madhya Pradesh as a



green and sustainable alternative to cement-based concrete construction practice in different public works departments (MPPWD, MPRDC & MPBDC).

MoU was exchanged by Prof. Thallada Bhaskar, Director, CSIR-AMPRI & Dr (Er) Manish Mudgal, Scientist 'G' and Head, Sustainable Construction Materials Division-Centre for Advanced Radiation Shielding & Geopolymeric Materials (SCMD-CARS&GM), CSIR-AMPRI with Sh. Bharat Yadav, Managing Director, MPRDC; Shri Sibi Chakravarthy M, Managing Director, MPBDC; Shri RL Verma, EnC, MPPWD (Road); Shri SR Baghel, EnC, MPPWD (Building); Shri KPS Rana, EnC, MPRDC; Shri RK Mehra, Technical Advisor, MPRDC; Shri Ajay Srivastava, EnC, MPBDC; and Sh. BP Bourasi, CE, MPPWD, along with senior officials and scientists from respective organisations.

The MoU envisages a strategic collaboration between CSIR-AMPRI and MPPWD to jointly undertake research and development, technology transfer, and field-level implementation of advanced

construction materials and methodologies. The partnership aims to facilitate the adoption of innovative, low-carbon, and sustainable technologies directly within the road infrastructure network of Madhya Pradesh.

Key areas of cooperation include development and deployment of alternative construction materials such as fly ash-based (Cement-Free) Geopolymeric Concrete, Utilisation of industrial by-products like Fly Ash and Red-Mud, enhancement of durability and performance of road assets, and promotion of environmentally responsible engineering practices. The collaboration will also focus on pilot-scale demonstrations in an allocated road stretch by MPRDC, capacity building, and validation of emerging technologies under real field conditions.

Speaking on the occasion, the dignitaries emphasised the importance of integrating scientific innovation with public infrastructure development to achieve long-term sustainability goals. The initiative aligns with national priorities

*The MoU envisages a strategic collaboration between CSIR-AMPRI and MPPWD to jointly undertake research and development, technology transfer, and field-level implementation of advanced construction materials and methodologies.*

of reducing carbon footprint, promoting circular economy principles, and strengthening resilient infrastructure systems. On Engineers' Day, both the organisations stressed the need for training and exchange of engineers, scientists, and students under the purview of the signed MoU.

This partnership marks a significant step towards bridging the gap between laboratory-scale research and large-scale implementation by the state of Madhya Pradesh, ensuring cutting-edge technologies developed by CSIR-AMPRI are effectively translated for societal benefits.

## Prof. Venu Gopal Achanta Re-elected to the International Committee for Weights and Measures (CIPM)

**Re-election strengthens India's presence in the global measurement science community.**

Prof. Venu Gopal Achanta, Director of CSIR-National Physical Laboratory (CSIR-NPL), New Delhi, has been re-elected to the International Committee for Weights and Measures (CIPM). Prof. Achanta became the seventh Indian to be elected to the CIPM when he was elected in 2022. He was re-elected on 15 October 2026 during the 28<sup>th</sup> meeting of the General Conference on Weights and Measures (CGPM).

Prof. Achanta's re-election is a proud moment for India and recognises his contribution to metrology (the science of measurement). It also reflects India's growing role in international efforts to make measurements accurate, reliable and consistent across the world.

Accurate measurements are important in our everyday lives, from ensuring the quality of products to supporting scientific discoveries and new technologies. The CIPM is an international body responsible for promoting the worldwide consistency of measurement standards and the International System of Units (SI). It operates



under the General Conference on Weights and Measures (CGPM). Through its work, the CIPM helps in building trust in measurements used across countries. The CIPM has 18 members from different countries and works to ensure that measurement standards are followed consistently worldwide.

The resolutions made in the 28<sup>th</sup> CGPM, held once every four years, include the following:

- Universal adherence: to bring smaller non-member economies into the Metre Convention.
- Further Digitalisation: to continue the activities on digital transformation of metrology.
- Redefinition of the Second: a consensus has not been fully reached, but an ensemble of Sr, Yb, Al, and Ca will be further looked at. The aim is to have a definition of the second in place of the Cs fountain (or in addition to the Cs fountain).
- Continuous UTC: leap second corrections are removed and will no longer be practised.
- Lunar time: member states agreed to work on a lunar time that is linked to UTC. This will help moon missions planned by several countries, including India.

*Prof. Achanta's re-election to CIPM is a matter of pride for the entire Council of Scientific and Industrial Research (CSIR) family and the Indian scientific community.*



These resolutions aim to make measurement standards more consistent worldwide and suitable for the emerging needs of science and technology.

As Director of CSIR-NPL (National Metrology Institute of India), Prof. Achanta leads efforts to strengthen measurement science and maintain the country's national measurement standards. His re-election will help India continue to participate in

international discussions and activities related to measurement standards.

Prof. Achanta's re-election to CIPM is a matter of pride for the entire Council of Scientific and Industrial Research (CSIR) family and the Indian scientific community. This achievement highlights India's continued commitment to advancing measurement science and contributing to global scientific progress.

## CSIR-National Aerospace Laboratories Unveils Indigenous Micro and Small Gas Turbine Engines, Boosting India's Unmanned Defence Capabilities



**From Left to Right: Dr (Smt) N Kalaiselvi, Director General (CSIR) & Secretary (DSIR), Air Marshal Tejinder Singh PVSM, VSM, VM (Chief Guest & CISC) and Dr Abhay A Pashilkar, Director (CSIR-NAL) at the unveiling of the indigenous Micro and Small Gas Turbine Engines at the SSB Auditorium, New Delhi**

In a significant step towards self-reliance in advanced aerospace propulsion, CSIR-National Aerospace Laboratories (CSIR-NAL) on 25 August 2026 unveiled three indigenous Micro and Small Gas Turbine Engines — NJ-05 with 5 kg thrust, NJ-50 with 50 kg thrust and NJ-100 with 100 kg thrust — at the SSB Auditorium, CSIR Headquarters, New Delhi. Developed to address critical requirements in indigenous defence technologies, these compact propulsion systems are envisaged for applications including tactical Unmanned Aerial Vehicles (UAVs), drone interceptors and compact missile systems.

The event brought together senior leadership from India's defence and scientific communities. Air Marshal Tejinder Singh, PVSM, AVSM, VM, Chief of Integrated Defence Staff to the Chairman Chiefs of Staff Committee (CISC), graced the occasion as the Chief Guest.

Welcoming the gathering, Dr Abhay A Pashilkar, Director, CSIR-NAL, highlighted the laboratory's evolving role as a multi-stage integrator for the country's growing drone ecosystem. He

emphasised that Indian industry, including the rapidly expanding aerospace start-up ecosystem, has the potential to manufacture these advanced engines at scale to meet the requirements of the Indian defence sector.

The CSIR-NAL scientific team, led by Shri R Prathapanayaka, made a detailed technical presentation on the development of the gas turbine engines. The presentation highlighted the advances in high-RPM turbomachinery and high-temperature combustion technologies that have enabled the development of these indigenous propulsion systems.

Addressing the gathering, Dr N Kalaiselvi, Director General, CSIR and Secretary, DSIR, commended the collaborative efforts of the project team. She underscored that indigenous development of such highly specialised and critical subsystems marks an important milestone in advancing Atmanirbhar Bharat in aerospace engineering.

Unveiling the propulsion systems, Air Marshal Tejinder Singh emphasised the strategic importance of developing advanced gas turbine engine



*Dr N Kalaiselvi, DG, CSIR and Secretary, DSIR, underscored that indigenous development of such highly specialised and critical subsystems marks an important milestone in advancing Atmanirbhar Bharat in aerospace engineering.*

technologies within the country. He observed that indigenous capabilities in such critical technologies would strengthen national security and enhance the technological self-reliance of the Armed Forces.

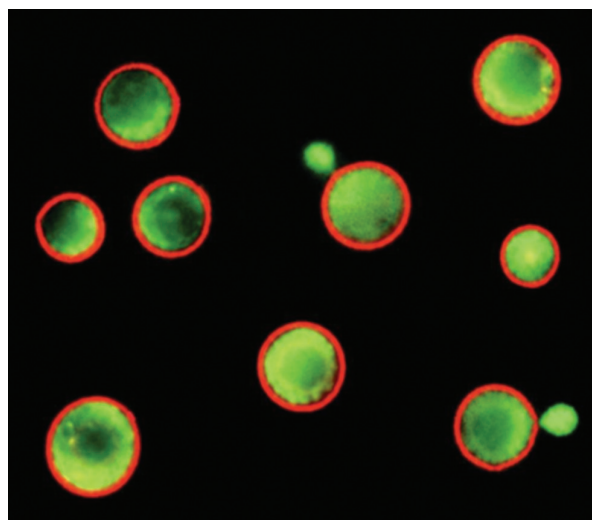
The successful development of the NJ-05, NJ-50 and NJ-100 represents an important step towards building an indigenous ecosystem for the design, development and manufacture of miniaturised gas turbine propulsion systems. Together with emerging domestic manufacturing capabilities, these technologies are expected to contribute significantly to India's growing UAV, drone and defence aerospace ecosystem.

R&D

## CSIR-CCMB Scientists Discover the Hidden Mechanism that Helps a Deadly Fungus Infect the Brain

Fungal infections are increasingly emerging as one of the world's most serious yet overlooked public health threats. Invasive fungal pathogens are responsible for hundreds of thousands of deaths every year, particularly among people with weakened immune systems. Yet treatment options remain alarmingly limited. Antifungal drugs are few in number, can be toxic, and resistance to them is steadily increasing. Recognising this growing crisis, the World Health Organization (WHO) has identified several fungal pathogens as critical priorities for research and new drug development. Among the deadliest of these is *Cryptococcus neoformans*.

Unlike many fungal infections that remain confined to the skin, *Cryptococcus neoformans* begins as a lung infection but can spread through the bloodstream to the brain, causing cryptococcal meningitis — a devastating disease responsible for nearly one in every five AIDS-related deaths worldwide. Although relatively unknown outside



***Cryptococcus neoformans* Giant Cells**

the medical community, cryptococcal meningitis affects more than 150,000 people annually across the globe, including thousands in India, and continues to carry an unacceptably high mortality rate.

## **The Bigger, the Better: A Deadly Fungal Survival Strategy**

One of the greatest “superpowers” of *Cryptococcus neoformans* is its remarkable ability to transform itself after entering the lungs. While most fungal cells are only a few micrometres in diameter, some enlarge dramatically to become enormous “Titan cells” — giant fungal cells several times larger than their normal counterparts. These oversized cells are far more difficult for immune cells to engulf and destroy, allowing the fungus to survive, evade immune attack, and establish persistent infections inside the body.

Scientists have known about titan cells for nearly two decades. However, despite their central role in cryptococcal infection, one fundamental question has remained unanswered:

### **How does the fungus decide to become a Titan cell?**

Researchers led by Dr Sriram Varahan at the CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB), Hyderabad, have now uncovered an unexpected answer. Their study identifies a previously unknown biological circuit that enables *Cryptococcus neoformans* to form titan cells by linking the fungus’s energy metabolism to one of its most important cellular signalling systems. The discovery reveals an entirely new layer of regulation governing fungal virulence and opens promising possibilities for developing future antifungal therapies.

### **A Hidden Circuit Inside the Giant Cells**

Scientists have long regarded metabolism as the process that simply provides cells with energy. But the new study reveals that metabolism also acts as a powerful decision-making system that determines whether the fungus can become more dangerous.

*“We uncovered an unexpected biological connection between the fungus’s energy hub and one of its most important survival pathways,”* said Dr Sriram Varahan. *“Our findings show that metabolism is not merely supplying fuel — it is actively controlling the cellular signals that allow the fungus to transform into titan cells.”*

The researchers discovered that efficient glucose metabolism helps the fungal cell maintain a proper balance of intracellular calcium. While calcium is best known for building strong bones, inside living cells it functions differently. It acts as a tiny molecular messenger that carries information from one part of the cell to another. When calcium levels are maintained, they activate “Calcineurin”, a master signalling pathway that enables the fungus to survive stressful conditions inside the human body and ultimately grow into giant titan cells.

### **Disarming One of the Fungus’s Deadliest Weapons**

The discovery establishes, for the first time, a direct connection between the fungus’s energy metabolism, calcium signalling, and calcineurin activation in controlling Titan cell formation. Rather than acting as independent processes, these systems work together as a coordinated biological network that allows the pathogen to adapt and survive within its host.

By identifying this hidden vulnerability, the study suggests an entirely new strategy for combating cryptococcal disease. Instead of simply trying to kill the fungus, future therapies may be designed to prevent it from ever producing titan cells — effectively disarming one of its most powerful disease-causing weapons before severe infection can become established.

### **A New Direction for Antifungal Therapy**

At a time when invasive fungal infections are rising worldwide, and new antifungal drugs are desperately needed, these findings reveal a previously unrecognised weakness in one of the world’s deadliest fungal pathogens. By targeting the metabolic circuitry that drives titan cell formation, scientists may be able to develop therapies that weaken the fungus, improve immune clearance, and ultimately reduce the burden of cryptococcal meningitis.

Rather than attacking fungal growth alone, the next generation of antifungal drugs may instead prevent the pathogen from activating the very survival strategy that makes it so dangerous.

## Prof. K Venkataraman Memorial Lecture

CSIR-National Chemical Laboratory (CSIR-NCL), Pune, organised the Prof. K Venkataraman Memorial Lecture on 25 August 2026 at SSBLT (PAML Building), Pune. The programme began with welcome remarks by Dr Samir Chikkali, Chief Scientist, CSIR-NCL. Prof. S Sivaram, Former Director, CSIR-NCL, introduced the speaker, Prof. Ila, Hindustan Lever Research Professor and INSA Honorary Scientist, New Chemistry Unit, JNCASR, Bengaluru.

Prof. Ila delivered the memorial lecture titled "Flashbacks and Reflections from Six Decades in Chemistry: 1964–2025." She shared highlights from her six-decade journey in chemistry, covering her education, research, teaching and experiences as a scientist. Recalling her early years at IIT Kanpur, she spoke about the mentors who influenced her scientific career, her PhD training and her distinction as the first woman to receive a PhD from IIT Kanpur. She also spoke about her



early work at the Central Research Institute, where she was involved in medicinal chemistry, including the synthesis of compounds for biological testing and the development of new synthetic methods.

Prof. Ila then shared her experiences at North-Eastern Hill University, Shillong, where she and her husband contributed to building research facilities and developing a research group with students from different parts of India. Together they discovered a reaction, which is named after them, called the “Junjappa-Ila Heteroaromatic Annulation” reaction. She highlighted the importance of mentoring, student training and creating a strong research environment. She also discussed her

research in synthetic organic chemistry, including work on aromatic synthesis, domino reactions, transition-metal-mediated reactions, C–H functionalisation, cross-coupling and heterocyclic chemistry. Her later research included transition-metal-free cross-coupling and electron-catalysed reactions involving single-electron transfer and radical anions.

Prof. Ila emphasised the importance of scientific curiosity, reading, persistence, rigorous training and good mentorship in building a successful research career. She also acknowledged the contributions of her students and collaborators to her six decades of work in chemistry. The lecture was followed by a vote of thanks.

## VISITS

# NBA Chairman Visits CSIR-IMTECH *Reviews Microbial Resource Conservation, Research and Technology Capabilities*



Dr Alka Rao, Director, CSIR-IMTECH welcoming Shri Virendra R Tiwari, IFS (Retd), Chairman, National Biodiversity Authority (NBA)

**S**hri Virendra R Tiwari, IFS (Retd), Chairman, National Biodiversity Authority (NBA), visited CSIR-Institute of Microbial Technology (CSIR-IMTECH), Chandigarh, on 5 September 2026. The visit underscored the importance of strengthening linkages between biodiversity conservation and microbial resource science, of which CSIR-IMTECH is an important stakeholder as a National Research Laboratory. During the visit, the Chairman of NBA interacted with scientists and researchers and visited the institute's key facilities, including the Microbial Type Culture Collection and Gene Bank (MTCC), Fermentation Division and the Protein Centre.

This visit by Shri Tiwari marked a significant occasion, being the first time that the top leadership of the NBA has formally visited a repository to directly interact with scientists and students and appreciate its operations. The repository safely maintains tens of thousands of authenticated microorganisms — including bacteria, fungi, yeasts, and actinomycetes — that serve as essential biological fuel for multiple commercial sectors, including agriculture (bio-fertilisers),

food processing, industrial enzymes, and pharmaceuticals. A major focus of the visit was a strategic interaction between the NBA leadership and IMTECH scientists regarding the regulatory frameworks governing these resources. The scientific community highlighted the critical need to include microbial type cultures, which comprise a large number of reference standards, in the Normally Traded as Commodities (NTAC) list governed under Section 40 of the Biological Diversity Act.

It was emphasised during the discussion that over 1300 MTCC references serve as reference standards for various scientific verification and quality control. Streamlining access to these authenticated materials directly aligns with the Government of India's vision for 'Ease of Doing Business' by reducing administrative procedures for academic researchers and industries. Furthermore, providing unhindered access to these reference cultures is vital to maintaining absolute precision, reproducibility, and maximising scientific rigour across the country's research ecosystem. The NBA Chairman highly appreciated the world-class maintenance of the facility and its adherence to



**Shri Virendra R Tiwari, IFS (Retd), Chairman, National Biodiversity Authority (NBA) visiting MTCC in CSIR-IMTECH**

global quality standards, acknowledging MTCC's contribution as a vital organ for national microbial conservation. Dr Alka Rao, the Director of CSIR-IMTECH, also serves as an official member of the National Biodiversity Authority. The interaction concluded with a shared commitment to further strengthen legal and scientific partnerships to protect and sustainably utilise India's microscopic bioresources.

MTCC is India's premier International Depository Authority (IDA) under the Budapest Treaty for patent-related biological deposits and was established in 1986. The facility also received major

statutory recognition in 2007 when it was formally notified as a Designated National Repository (DNR) under Section 39 of the Biological Diversity Act, 2002 and contributes to the implementation of the Biodiversity Act as one of the nodal Voucher deposition agencies on behalf of the National Biodiversity Authority. CSIR-IMTECH is a national centre of excellence in microbial sciences and was established in 1984. IMTECH's vision and mission are to create a translational ecosystem strengthened by fundamental discoveries and to address unmet healthcare and industrial needs with state-of-the-art processes and platforms, respectively.

## EVENTS

# CSIR-IMMT Inaugurated Advanced E-Learning Centre under CSIR Integrated Skill Initiative

The CSIR-Institute of Minerals & Materials Technology (CSIR-IMMT), Bhubaneswar, inaugurated its Advanced E-Learning Centre under the CSIR Integrated Skill Initiative on 27 July 2026, marking a significant milestone in promoting digital learning, capacity building and skill development.

The programme commenced with a tree plantation drive led by Dr Vinay Kumar, Scientist-G and Nodal Scientist, CSIR Integrated Skill Initiative, CSIR-HRDC. The Advanced E-Learning Centre was formally inaugurated by Dr Vinay Kumar in the presence of Dr Ramanuj Narayan, Director, CSIR-IMMT.

The inaugural ceremony was followed by a Skill Development Meeting attended by scientists, research scholars, students and staff of the institute.

Welcoming the gathering, Dr Ramanuj Narayan, Director, CSIR-IMMT, highlighted the institute's commitment to strengthening digital education,

innovation and skill development through modern learning infrastructure. He emphasised that the newly established centre would play an important role in expanding access to quality learning resources and enhancing the professional competencies of students, researchers and industry personnel.

Dr Santosh Kumar Behera, Scientist-F and Skill Development Coordinator, CSIR-IMMT, presented an overview of the institute's skill development initiatives under the CSIR Integrated Skill Initiative. He highlighted the successful implementation of various training programmes, industry-oriented courses and capacity-building activities that have benefited students, professionals and researchers from across the country.

Addressing the gathering, Dr Trupti Das, Scientist-G, Chief Scientist and Chairperson (HRD), CSIR-IMMT, stressed the importance of continuous learning, human resource development



and technology-enabled education in preparing a skilled workforce for emerging industrial and research challenges.

Dr LD Besra, Scientist-G and Head, CSIR-IMMT, highlighted the importance of skill development programmes in enhancing employability, fostering innovation and bridging the gap between academic learning and industry requirements. He emphasised that continuous skill upgradation is essential for building a competent and future-ready workforce.

Delivering the keynote address, Dr Vinay Kumar underscored the vision of the CSIR Integrated Skill Initiative in creating a nationwide ecosystem for technology-enabled education, digital learning and industry-relevant skill development. He appreciated the efforts of CSIR-IMMT in establishing the Advanced E-Learning Centre and expressed confidence that it would serve as an important platform for online training, hybrid learning programmes, webinars, workshops and collaborative knowledge-sharing activities. The formal vote of thanks was delivered by Dr Manish Kumar, Scientist-F.

The newly inaugurated Advanced E-Learning Centre is equipped with modern digital infrastructure and is expected to significantly strengthen the institute's efforts in delivering high-quality online and hybrid training programmes under the CSIR Integrated Skill Initiative, thereby contributing to the development of a future-ready skilled workforce.

## Membrane Solutions for Global Water Security Discussed at UNGA81

CSIR-Central Salt & Marine Chemicals Research Institute, Bhavnagar organised a virtual technical session at the 81st United Nations General Assembly Science Summit (SSUNGA81) on 17 September 2026. Focused on "Sustainable Materials and Processes from Marine Resources," the session underscored CSIR's vision of Connect, Collaborate, Converge and Convert (5C) for global sustainable development. In the opening remarks, Dr Arup Ghosh, Director, CSIR-CSMCRI, highlighted the growing importance of water security and the Institute's efforts in developing indigenous membrane technologies for water purification, desalination, wastewater treatment, water reuse and Zero Liquid Discharge (ZLD) and other marine resource innovations.

A key highlight of the session was the indigenous membrane technologies developed



by CSIR-CSMCRI and licensed to Uniqflux Membranes LLP, New Delhi. Mr Vikram Karunakaram, MD, outlined the company's manufacturing of Ultrafiltration (UF), Nanofiltration (NF), and Reverse Osmosis (RO) membrane elements using CSIR-CSMCRI's technologies. He emphasised that these membranes deliver

high rejection with optimized permeability, stable performance, enhanced durability, and energy-efficient low-pressure operation. Designed for high water recovery and consistent permeate quality, they support reuse and recycling across industrial wastewater, municipal treatment, ZLD, desalination, and process-water purification, while reducing chemical use and freshwater demand.

Mr Karunakaram further highlighted the deployment of the technology through its sister concern, Delta Pure, which operates approximately 4,500 RO outlets across India 2,100 on rental basis and 2,400 sold outright. According to the presentation, these outlets, serving about 100 persons per day, collectively deliver approximately 16.2 crore litres of purified water. The presentation also reported around 4,000 elements of the 4040 model and 30,000 elements of 250-LPH capacity, with the latter reported as delivering about 18 crore litres of purified water.

Mr Karunakaram also highlighted the geographical spread of Water ATM installations, with deployments reported across Karnataka (8,000+), Rajasthan (2,500+), Punjab (1,000+), Chhattisgarh (500+), New Delhi (130+), Odisha (50+), Maharashtra (1,000), Gujarat (2,000) and the Armed Forces (500+). These decentralised systems extend access to purified water across diverse geographical and institutional settings. In addition to decentralised drinking-water applications, the

membrane technologies are being deployed in industrial wastewater treatment and ZLD systems, contributing to water recovery, recycling and reduced freshwater demand. The presentation emphasised the role of advanced membrane separation in addressing water-treatment requirements across industrial, municipal and community applications.

The session also featured Dr Divesh N Srivastava on seawater electrolysis for producing green hydrogen and its linkage with wastewater remediation and sustainable development, while Mr Anoop Singh, President, Special Projects, DCM Shriram, discussed biomass processing for energy and platform chemicals, highlighting its potential for reducing carbon footprint. Dr Mangal S Rathore delivered the welcome remarks, Dr Kamalash Prasad discussed CSMCRI's research and technical capabilities including biostimulant as value added product from seaweeds, Dr Puyam Sobhindro Singh highlighted on how CSIR-CSMCRI has revolutionised water security through advanced membrane technologies, providing scalable solutions for desalination, industrial wastewater management, and absolute water recovery, Dr S Adimurthy proposed the vote of thanks, and Dr Kanti Bhooshan Pandey, a Principal Scientist told that the deliberations of the session reinforced CSIR's commitment to translate marine-resource research into sustainable applications.

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