



## R&D News

### MoU Signed with CBMR



IIT Kanpur and **Centre of Bio Medical Research (CBMR)**, Lucknow signed an MoU to undertake translational research with special reference to patient care. The areas identified for collaboration

are AI in healthcare, biomedical devices, identification & synthesis of small molecules for drug discovery.

### MoU Signed with CMTI

An MoU has been signed between IIT Kanpur and **Central Manufacturing Technology institute (CMTI)**, Bangalore to collaborate as strategic partners for undertaking R&D activities in Laser Technology, Photonics Sciences & Engineering, Advanced Manufacturing, Machine tools and related thrust areas of technology.



### MoU Signed with NHIDCL



**National Highways Infrastructure Development Corporation Limited (NHIDCL)** and IIT Kanpur signed an MoU to establish the basis of collaboration to take up various activities of common interest such as sharing knowledge on innovative ideas and technologies in the field of highway engineering and others as per mutually agreed terms and conditions.

Institute Lecture  
(April 2022- June 2022)



**Prof. Vikram Mathews**  
*Evolving cell therapy program: Challenges and regulatory pathway in India*



**Prof. Miguel A. Alonso**  
*The Poincaré sphere, its generalizations, & their several applications in optics*



**Dr. Pravin Bhagwat**  
*Ideas to ventures: 3 short stories*

<https://www.iitk.ac.in/dord/outreach-2/institute-lecture-series>

## Foundation Stone Laying Ceremony of Gangwal School of Medical Sciences and Technology & Yadupati Singhania Super-speciality Hospital

On July 16, 2022 Union Minister of Education, Skill Development and Entrepreneurship, Shri Dharmendra Pradhan laid the foundation stone of the Gangwal School of Medical Sciences and Technology and Yadupati Singhania Super Speciality Hospital. The event was graced by Dr. K Radhakrishnan, Chairman, Board of Governors, Prof. Abhay Karandikar, Director IITK, Prof. S Ganesh, Deputy Director IITK, distinguished alumni and donors Mr. Rakesh Gangwal, Mr. Muktesh Pant, Mr. Hemant Jalan, and Smt. Sushila Singhania, Dr. Nidhipati Singhania, IITK faculty members and other invited dignitaries. Hon'ble minister also visited the National Centre for Flexible Electronics and interacted with the incubated companies.



## MoU with Defence Innovation Organization

SIIC, IIT Kanpur and Defence Innovation Organization have signed an MoU on 22nd April, 2022 at Vigyan Bhawan, New Delhi, in the presence of Hon'ble Defence Minister Shri Rajnath Singh. The incubation centre has been onboarded as the partner incubator under their flagship program iDEX by the Ministry of Defence. The program will foster an ecosystem that will support innovation and encourage technology development in the Defence sector to strengthen the border security of the nation.



## Technopark @ IITK

IIT Kanpur Research and Technology Park Foundation (Technopark@iitk) signed an MoU with the **UP Expressways Industrial Development Authority (UPEIDA)**, the nodal agency for the UP Defence Industry Corridor (UPDIC). With UPEIDA inviting the defence industry to set up their production and manufacturing units in the UP Defence Corridor, and Technopark@iitk reaching out to companies to set up their R&D units in its premises, this partnership will strengthen the ecosystem for the defence industry in the state. The MoU was signed on 7th June, 2022 during an event held in Lucknow at UPEIDA office by Mr. Awanish K Awasthi, CEO, UPEIDA and Prof. Gopalakrishna M Kamath, Professor-in-charge, Technopark@iitk.



## C3i Innovation Hub

C3iHub launched the second cohort of startups with the aim to make India self-reliant in cybersecurity. The startups were chosen from all cybersecurity domains, including UAV Security, Blockchain, Intrusion Detection, and Cyber-Physical Systems. They aim to innovate in the cyber security space, focusing on the design and development of services and products to safeguard India's critical infrastructure. The event was graced by Prof. Ajay K. Sood, Principal Scientific Advisor, Govt. of India; Dr. Srivari Chandrasekhar, DST Secretary; Dr. Rajesh Pant, National Cyber Security Co-ordinator; Shri Naveen Singh, Director General, NCIIPC and Dr. Ekta Kapoor, Mission Director, NMICPS, DST.



## Visit of ICMR official

ICMR officials visited the campus on May 13th, 2022 to have a look on ongoing activities under ICMR-DHR-CoE at IIT Kanpur project. This Centre of Excellence (CoE) has been set up for Make-in-India product development and their commercialization in medical devices and diagnostics space. The current status of the health technologies proposed under this project were showcased by the involved start-ups. The team from ICMR and the domain experts appreciated the work ecosystem of IIT Kanpur and the quality of infrastructure including centralised facilities, Central Experimental Animal Facility, MedTech prototyping facility.



## Technology Transfer

Translation through technology transfer has come up with pace in the recent times. **B2B models** have been developed with a primary objective to create more use-cases for the start-ups and translate the existing novel technologies into Products. FY 2021-22 is an eventful year with eight successful technology transfers of innovative technological solutions. This is the **highest number of technology transactions** at the institute in a financial year.

### 8 Licensed Technologies

#### Polymer composite scaffolds for bone regeneration



Licensee: Ortho Regenics Pvt. Ltd.

Inventor: Prof. Ashok Kumar, Mr. Arun Kumar Teotia

#### Portable soil testing device



Licensee: : AgroNxt Services Pvt. Ltd.

Inventor: Prof. Jayant Kumar Singh

#### Air sampling device



Licensee: Airshed Planning Professionals Pvt. Ltd.

Inventor: Prof. Tarun Gupta, Mr. Amit Singh Chauhan

#### Oxygen concentrator



Licensee: Albot Technologies

Inventor: Prof. J. Ramkumar, Mr. Siddhant Shrivastava, Dr. Shikha K. Jha

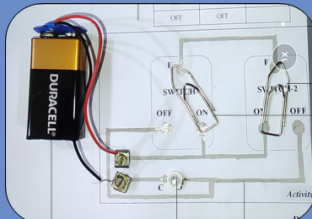
#### Conductive aqua nano ink formulation



Licensee: Likhtronics Tech Pvt. Ltd.

Inventor: Dr. Ashish, Prof. Y N Mohapatra, and team at IITK

#### A process of creating flexible paper circuitry



#### Eco-friendly ink for roller ball pen



#### Oxygen concentrator



Licensee: StemRev Refineries Pvt. Ltd.

Inventor: Prof. Shikhar K. Jha Mr. Vijay Kumar Yadav, Mr. Om Prakash

### An initiative to increase the technology transfer and spin-out success in India and Denmark.

I PR cell, SIIC, IIT Kanpur took part in the international conference jointly organized by the Department for Promotion of Industry and International Trade, Government of India and Denmark Patent Office. The conference was conducted on 10th May, 2022 at New Delhi, on Commercialization of Innovation and Intellectual Property, and launched the report "IP Commercialization in an interconnected world – recommendations for policy and practical application".

IIT Kanpur has contributed in the development of the report as an IP expert and a knowledge partner for a report on 'Lessons and Policy Opportunities on IP commercialization in India & Denmark' to promote IP commercialization globally.



## Technology Transfer

### Bhu-Parikshak: A smart soil testing device

**B**hu-Parikshak, one of the licensed technologies of IITK, is launched as a product in the market within a short span of time. The technology was licensed to AgroNxt Services with the aim to bring a revolutionary change in the Indian Agriculture ecosystem. The product launch event was organized on 26th May, 2022 at the outreach centre of IIT Kanpur in Noida.



The soil testing device provides real-time information about soil health in 90 seconds. Live demonstration of the device was done during the event, by instantly detecting six important soil parameters namely - Nitrogen, Phosphorus, Potassium, Organic Carbon, Clay contents and cation ion exchange capacity, with the use of only 5 grams of dry soil sample and generating soil health report, which can be easily accessed on Bhu Parikshak mobile application with a unique ID.

## Recent Projects

### Jaivik Yatra - a television series on sustainable organic farming

PI: Prof. Satyaki Roy (satyaki@iitk.ac.in)

Dept. of Design

Co-PI: Prof. Deepu Philip (dphilip@iitk.ac.in)

Dept. of Industrial & Management Engineering

Prof. Shatarupa Thakurta Roy (stroy@iitk.ac.in),

Dept. of Humanities & Social Sciences

Sponsor: Prasar Bharati



**A**ccording to the Assocham and Techsi, organic farming in India has the potential to feed 1.5 billion people by the end of 2030. To leverage this prospect, a discourse entailing practitioners and stalwarts in the field is a need of the hour. The television series begins with an issue-based discussion on where and how organic farming scores over conventional agriculture. The series explains the sustainability quotient for a farmer during conversion period and the indices that need to be taken into account. These indices include soil rejuvenation, composting, seed preservation, designing of a model farm, training and certification. This 26-episode series begins in the alluvial plains of Uttar Pradesh and reaches to the snowy altitudes of the Himalayas in Uttarakhand. The journey introduces the viewers to different practicing farmers, methods of growing staple food crops, horticulture crops, medicinal plants and certain cash crops by implementing organic means and methods.



Different aspects of Organic Farming like developing a food forest and biodynamic agriculture have received special attention in the series. Revival of indigenous varieties of crops, ecological preservation of certain land areas and importance of value addition have been discussed. With proper intervention and appropriate initiatives, India will reach the desired quantum in terms of production, acreage and export. The project aims to help India achieve the required goal in the Organic Agricultural Sector, by reaching out to farmers and consumers and generate awareness amongst them.

## Recent Projects

### High Throughput Determination of the Neural Basis of Olfactory Preference

PI: Prof. Nitin Gupta (guptan@iitk.ac.in)

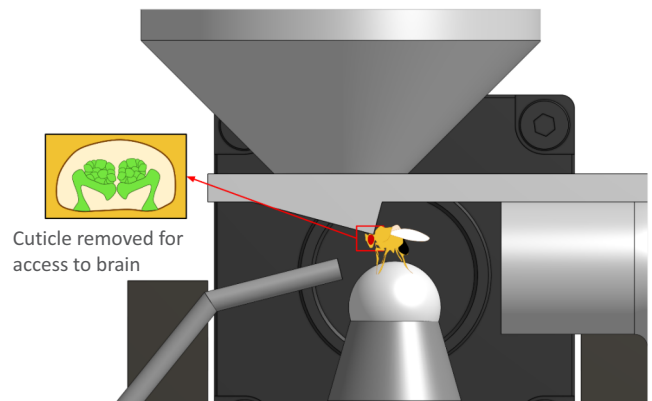
Dept. of Biological Sciences & Bioengineering

Sponsor: Science & Engineering Research Board



Understanding how the brain activity results into behavioral choices is one of the fundamental questions in the field of neuroscience.

This SwarnaJayanti Fellowship project aims to address this question using experiments on the brains of simpler organisms such as flies. A technique called optogenetics will be used to activate neurons in the fly brain, while the fly walks over a custom-built treadmill-like setup. Using this approach, Specific neurons can be activated to see their effect on the behavior of the fly. The experimental setup proposed in this project will allow to generate a large number of activation patterns and use them to identify the logic that governs the translation of the neural activity in the insect brain into behavioral preference. It is planned to extend these experiments to mosquitoes.



*Experimental system for measuring behavior and brain activity simultaneously*

### Design and Development of Autonomous Power Substation Inspection Robot (SIR)

PI: Prof. Bishakh Bhattacharya (bishakh@iitk.ac.in)

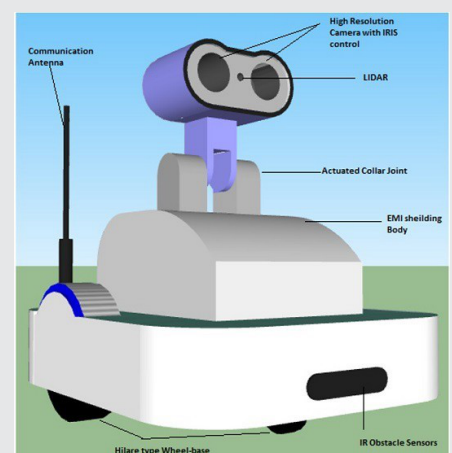
Department of Mechanical Engineering

Sponsor: Power Grid Corporation of India Limited



The project aims to develop an autonomous mobile robot for inspection of substations to take care of repetitive and time-consuming inspection activities on a regular basis. The robot will be equipped with a wide array of sensors (IRIS control cameras, IR thermal sensors, LIDAR, fire alarms) and an autonomously (along with tele-operation feature) navigating platform which will roam around a substation and perform regular inspection for any damages in components that are essential for continuous running of the sub-station.

The robot will utilize advanced vision processing and machine learning algorithms to independently identify and flag any damages or failure to any critical components in the substation and automatically trigger an alarm. Use of such robot will also allow ground staff to access areas in a substation that are manually difficult to inspect. The robot will be trained using condition monitoring algorithms based on machine learning.



# Recent Projects

## DST-Materials Map Centre

PI: Prof. Kanwar Singh Nalwa (ksnalwa@iitk.ac.in)

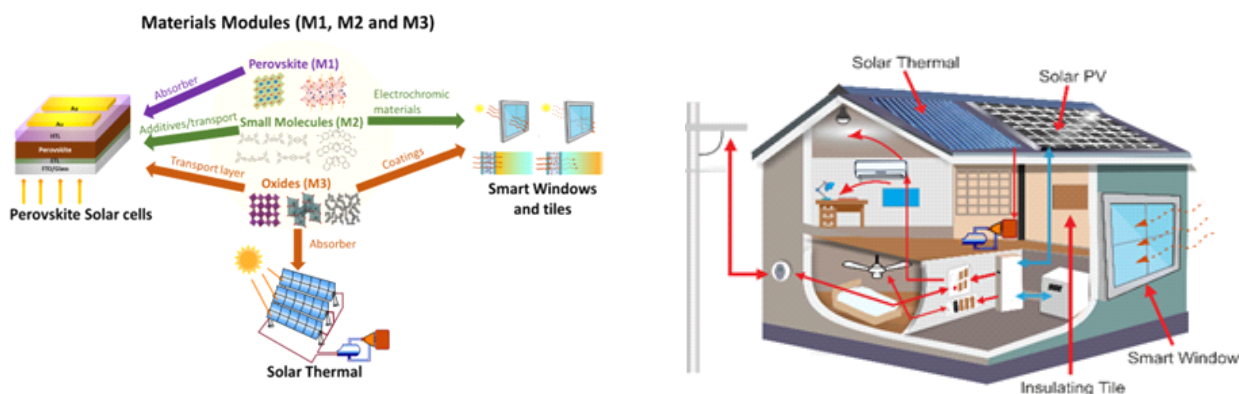
Dept. of Sustainable Energy Engineering

Sponsor: Department of Science & Technology



The DST-IIT Kanpur center was launched at the MI Annual Gathering session on 4th April 2022 in the presence of the honourable Minister of Science and Technology Dr Jitendra Singh. This material acceleration platform would leverage emerging capabilities in state-of-the-art computing, artificial intelligence (AI), machine learning (ML), and robotics to speed up the materials discovery up to 10 times faster.

One of the objectives of this center is to scale up the synthesis of materials and devices to TRL 5-7 and commercialize numerous clean energy technologies such as Perovskite solar cells, smart windows and thermo-regulating tiles. A kickstart meeting of the project was recently organized on 27th and 28th of May, 2022 at IIT Kanpur.



## DST Storage Map

PI: Prof. Sri Sivakumar (srisiva@iitk.ac.in)

PI: Prof. Raj Ganesh S. Pala (rpala@iitk.ac.in)

Department of Chemical Engineering

Sponsor: Department of Science & Technology



The intermittent nature of renewable energy sources and increased focus on Li-ion batteries as the power source in electric vehicles have pushed the development of batteries with significantly lesser charging time, higher energy density, and better safety. The replacement of conventional liquid electrolytes with solid lithium-ion conducting membrane as the electrolyte promises all-solid-state batteries (ASSB) with improved safety due to the absence of flammable organic solvents. Apart from enhanced thermal stability, ASSBs are expected to be better in terms of energy density as it allows the use of high specific capacity lithium metal as the anode. Further, in all-solid-state batteries, various cells can be stacked together in a module without casing for the individual cell, which results in a simpler fabrication process and additional improvement in energy density at the module level.

This proposal focuses on the development of prototype solid-state Li ion batteries. This is a consortium project of fifteen institutes under DST-IC-MAP program.

# Recent Projects

## Integrated Clean Energy Materials Acceleration Platform (IC-MAP) on Bioenergy & H<sub>2</sub>

PI: Prof. Anandh Subramaniam (anandh@iitk.ac.in)

Dept. of Materials Science & Engineering, Dept. of Sustainable Energy Engineering & Centre for Environmental Science and Engineering

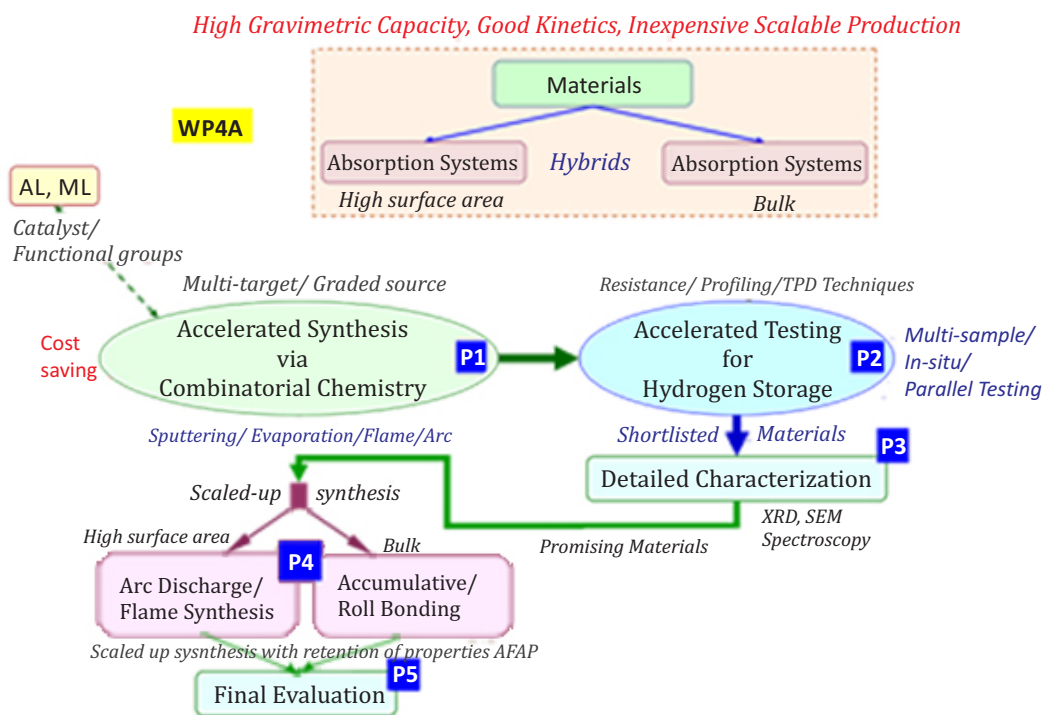
Sponsor: Department of Science & Technology

Collaborator: Deepshikha Jaiswal Nagar, School of Physics, IISER Thiruvananthapuram.



**H**ydrogen storage forms a key link towards the realization the 'hydrogen economy'. The consortium on IC-MAP: Bioenergy & H<sub>2</sub>, has ten investigators across nine institutes and is under the ambit of Mission Innovation theme of DST. The team on hydrogen storage in materials is supported by the AI/ML team towards accelerated development of hydrogen storage materials.

The goals of the project are as follows. (1) Material Targets. Rapid development of optimal catalyst for hydrogen storage. Accelerated synthesis to develop hybrids with enhanced hydrogen storage properties. (2) Process Targets. Develop processes for synthesis of catalyst and storage hybrids which are amenable to scaled-up production. Retain the nanostructured components, which will provide enhanced hydrogenation kinetics. (3) Characterization/Device Targets. Develop protocols and equipment/accessories for rapid screening of materials. Characterize the materials for catalytic activity and hydrogen storage performance. Develop new instrumentation/apparatus/set-ups (including augmentation of existing apparatus). Demonstrate the use of the material in a reactor/canister.



*An overview of the scheme/platform towards accelerated search for hydrogen storage materials*

## Feedback/Suggestions

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