

**Department of Science & Technology**  
**Monthly Report**  
**October, 2023**

**I. Important policy decisions taken and major achievements during the month:**

**A. Science for Society**

- MACS-Agharkar Research Institute (ARI) organised a “Fossil Festival” for school students, where more than 600 students participated, on the occasion of the **Earth Science Week 2023**.
- Aryabhata Research Institute of Observational Sciences (ARIES) inaugurated a new science centre at the Devasthal Observatory campus of ARIES. The centre will soon be open for public visits.
- Centre for Nano and Soft Matter Sciences (CeNS) organized an International Conference on "Materials, Methods, Devices for Futuristic Technologies (MDFT)-2023 at Hubli during 29-30 Sept 2023.
- Indian National Academy of Engineering (INAE) organized the Engineers Conclave 2023 (EC-2023), an annual mega event, jointly with major engineering institutions of the country, from October 5<sup>th</sup>-7<sup>th</sup>, 2023 at the Raja Ramanna Centre for Advanced Technology (RRCAT) in Indore. With the two themes focusing on "Laser Technologies for Emerging Engineering Challenges" and "Engineering and Technology for Clean and Green India @2047," the event aimed to bring together engineers, scientists, researchers, and industry leaders to explore and discuss cutting-edge technologies and sustainable solutions.
- INAE Chennai Chapter & IIT Madras jointly organized the first Indian Conference on Micro Nano Fluidics -From Soft Matter to Bioengineering, ICOM 2023 from 29th September - 1st Oct 2023.
- Institute of Nano Science Technology (INST), Mohali and CNRS France jointly organized an Indo-France Seminar on Metal Nanoclusters, supported by Indo French Centre for the Promotion of Advanced Research [from 02-05 October, 2023](#). The meeting brought together eminent scientists and young researchers from both countries to discuss latest discoveries in the field of metal nanoclusters and future collaborations.
- National Academy of Sciences (NASI) & Pt. Ravishankar Shukla University, Raipur jointly organized a two days' workshop on '**Science & Technology for Women Empowerment & Rural Development**' on October 13-14, 2023 at Raipur.
- North East Centre for Technology Application and Reach (NECTAR) organized 10 days Residential training program on Bamboo Bottle Making from 07-19 October, 2023. 21 participants from different SHG's and Social organizations participated in the training program and successfully acquired skill in Bamboo Bottle Making.
- North East Centre for Technology Application and Reach (NECTAR) reported that a training on "Honeybee Farming and its value addition" in Biswanath Chariali, Assam for 4-days has been done with Practical training on honey processing and wax extraction. Also, a 5 days training on Scientific Beekeeping and Value Addition at St. Joseph's *Rural Resource Training Centre* (RRTC) Meghalaya has been done.

- National Innovation Foundation (NIF) conducted 19 district level sensitisation workshops for mobilising the submissions for Innovations in agriculture. Village level Agricultural workers (VAWs) and Agricultural Overseers, Assistant Agricultural officers and Assistant Executive Engineers of 19 districts of Odisha had participated. NIF also has organised Hands-on training program on innovations such as Cow dung pot making machine, Cow dung log making machine, and multi-purpose food processor to the VSS representative from the nearby areas of Balagir district, Odisha for increasing livelihood opportunities.
- Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) conducted Home visits and a medical camp at Karimadom colony slum in Thiruvananthapuram, along with Urban Health and Wellness Centre, Chala on 20/10/2023.
- Indian Institute of Astrophysics (IIA) organized the first Star Party at the Hanle Dark Sky Reserve between 12<sup>th</sup>-15<sup>th</sup> October, 2023. About 30 amateur astronomers traveled to Hanle with their telescopes and cameras, from Bengaluru, Chennai, Delhi, Mandi, Ahmedabad, Lakshadweep, and Mumbai.
- Institute of Advanced Study in Science and Technology (IASST) under the SC/ST Community Development program, successfully organized a transformative 5-day outreach program titled “Safe Processing of Fermented Fish -Xindol and its Marketing” from October 9<sup>th</sup> to October 13<sup>th</sup>, 2023 at Bakrapara, Rani.
- Indian Academy of Sciences, Bangalore organized an outreach activity in Jammu and Kashmir during October 10-14, 2023, jointly with the University of Kashmir as the host. The program involved student participants from several colleges in the region.
- A lecture by Prof. Rabinarayan, Director General, Central Council for Research in Ayurveda Science was organized in Technology Bhawan on ‘**Ayurveda for Holistic Health**’ on 31<sup>st</sup> October, 2023 to celebrate **Ayurveda Day 2023**.
- The Department received overwhelming response and **945 proposals** submitted under the WTC Call of Proposals 2023 that aim to mobilize development and application research proposals with a strong solution science orientation to support thematic R&D on issues related to Water Availability, Water Distribution, Water Quality Analysis/Treatment, Industrial wastewater recycle, Reuse and Management, etc.
- Evaluation of the **8 DST-NWO (Indo-Dutch) Water Disaster Management** proposals along with the joint review meeting were done.
- DST’s support to the National Centre of Excellence in Carbon Capture and Utilisation (NCoE-CCU) at IIT Bombay was further strengthened in the month of October 2023, NCoE-CCU IIT Bombay team has been granted a patent for CO<sub>2</sub> to CO conversion technology. The innovation is published recently in the prestigious international journal, Nature Communications (<https://doi.org/10.1038/s41467-023-42638-z>).
- An expert panel project review meeting was held on 09<sup>th</sup> - 10<sup>th</sup> October, 2023 against the call on 1. Integrated Clean Energy Materials Acceleration Platform (IC-MAP) 2. Advanced Hydrogen and Fuel Cell (AHFC) at BHU Varanasi. Also, the success story of DST sponsored project title “Cutting-edge quantum-technology backed green hydrogen production unveiled to power a green future “under the call of HFC-2018 has been published on DST website & PIB. The technology developed by the Green Keplerate Team from Banaras Hindu University, was inaugurated, by Head of the Climate Change & Clean Energy

Division, DST at BHU, Varanasi.

- A new call on Hydrogen & Fuel Cell (HFC-2023) has been announced on 20<sup>th</sup> October, 2023.

## **B. Technology Development**

- International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad developed high-performance double-layer broadband Antireflective coating at Lab-scale, on single-side PV glass exhibited >3% Transmittance for Photovoltaic cell application. ARCI also reported that they developed a prototype for hard chrome replacement Ni based alloy coating (by Pulsed Electro-Deposition) inside the actual gun barrel has been developed. Also, 40 kg of Fe-Mn-Si-Cu powders have been synthesized by Inert Gas atomization process and the powders are currently being characterized.
- Centre for Nano and Soft Matter Sciences (CeNS) in collaboration with Aligarh Muslim University have developed magnetic hybrid nanomaterials ( $\text{Fe}_3\text{O}_4/\text{rGO}$  and  $\text{Ni}/\text{Fe}_3\text{O}_4/\text{rGO}$ ) through a sol-sol-gel-assisted green synthetic technique that shows remarkable adsorptive desulfurization of dibenzothiophene (DBT). Also, CeNS in collaboration with Yogi Vemana university have developed a bifacial tandem dye-sensitized solar cell (DSSC-DSSC), which exhibits a high solar power conversion efficiency (PCE) of 12.76% with a current density of 27.61  $\text{mA}/\text{cm}^2$ .

## **C. Human Capacity Building**

### **Achievement under Vigyan Jyoti Scheme**

- **Career counseling session:** Thirty-three Career counseling sessions have been conducted at different JNVs.
- **Role Model interaction:** Seventy-three Role Model Sessions have been conducted by different JNVs.
- **Visit to Knowledge Partners (KP):** Sixty KP visits have been conducted during September.
- **Tinkering Activities:** Forty-two tinkering workshops have been organized for Vigyan Jyoti scholars.
- **Science Camps:** Thirteen Science camps have been conducted during September.
- **Sparkle Series:** Two online workshops focused on conceptual understanding and critical thinking of *Mathematics*, *Science*, and *Computational Thinking* for Vigyan Jyoti Scholars of Class XII were conducted.
- **C-STEM:** Eight sessions of C-STEM were conducted for Vigyan Jyoti Scholars of Class X.
- **Interaction with India's Science Geniuses:** An interactive session has been conducted on 30<sup>th</sup> September 2023 with Dr. Ashish Mahabal, Astronomer and lead computational and data scientist, Center for Data Driven Discovery, Caltech, USA.
- **Knowledge Centre Nagpur** organized a session on "Science Quiz for Vigyan Jyoti Scholars on 18th October 2023.
- **Knowledge Centre Gumla** organized a session on "Psychology & Health,

Stress Management” on 19th October 2023.

- **Vidyarthi Vigyan Manthan Examination** Vigyan Jyoti scholars of Class IX-X attempted the **Vidyarthi Vigyan Manthan (VVM 2023)** examination (first level) on 29<sup>th</sup>/30<sup>th</sup> October 2023. VVM is an initiative of Vijnana Bharati (VIBHA) in collaboration with NCERT and is India's largest online science-based Talent Search Examination.
- **WISE Internship in IPR (WISE-IPR):** Interviews have been conducted under WISE-IPR Programme as a final round of selection in different subject areas.
- **Consolidation of University Research for Innovation and Excellence (CURIE):** Programme Advisory Committee (PAC) meetings have been conducted to review the progress of two women universities namely, Indira Gandhi Delhi Technical University for Women (IGDTUW), Delhi and Bhagat Phool Singh Mahila Vishwavidyalaya, Sonapat supported under CURIE programme for research facilities under Basic and Applied Sciences. Further, another CURIE project related to Artificial Intelligence facility at IGTUW, Delhi was also reviewed.

### ***INSPIRE Awards - Million Minds Augmenting National Aspirations and Knowledge (Manak)***

- INSPIRE- MANAK organized the **10th National Level Exhibition and Project Competition (NLEPC)** at **Indira Gandhi Indoor Stadium and Vigyan Bhawan, New Delhi, during 9-11 October 2023.**
- **Secretary Department of Science and Technology, Prof. Abhay Karandikar** inaugurated the 10th National Level Exhibition and Project Competition (NLEPC) of INSPIRE- MANAK at Indira Gandhi Indoor Stadium, Delhi, on 9<sup>th</sup> October 2023, where the innovative ideas of **441 selected students** from schools across the country were displayed.
- The **selected winners (top 60)** were felicitated by **Shri Jitendra Singh Ji, Hon'ble Minister, Science and Technology, Govt of India** on **11<sup>th</sup> October 2023** at **Vigyan Bhawan, New Delhi.**

### ***INSPIRE Scholarship:***

- An amount of **₹32,54,40,000/-** was released towards **Scholarship** for **6806 ongoing** students (**Direct Mode**).
- An amount of **₹1,60,80,000/-** was released towards **Scholarship** for **267 ongoing** students in (**Institutional Mode**).
- An amount of **₹1,38,56,000/-** was released towards **KVPY fellowship** for **158 ongoing** students.

### ***INSPIRE Fellowship:***

- An amount of **₹11,17,16,543/-** was released towards **Ongoing Fellowship** for **244 INSPIRE Fellows.**
- INSPIRE Fellowship **SEC meeting** pertaining to **Agricultural & Veterinary Sciences and Engineering Sciences** was held at **ARCI, Hyderabad** during **19-20<sup>th</sup> October 2023.**

- INSPIRE Fellowship **SEC meeting** pertaining to **Mathematics & Statistics and Physical Sciences** was held at **ARIES, Nainital** during **26-27<sup>th</sup> October 2023**.

### ***INSPIRE Faculty Fellowship:***

- An amount of **₹1,09,00,000/-** has been approved for the sanction of first instalment grant to **07 INSPIRE Faculty Fellow** during this month.
- New **Expert Committee** is constituted for **'Translational research'** under INSPIRE Faculty Fellowship component.

### **D. Scientific Research**

- Birbal Sahni Institute of Palaeosciences (BSIP) reported that a study analysed the palynological data from the Core Monsoon Zone (CMZ) of India on the Indian Summer Monsoon (ISM) rainfall variability since the Last Glacial Maximum (LGM: ~20,000 calyrBP) and its correlation with the marine and continental records from the Indian subcontinent.
- Centre for Nano and Soft Matter Sciences (CeNS) researchers in collaboration with scientists of CSIR-NCL, have shown that in an evaporation-driven self-assembly process, the three topological phases, namely crystalline, hexatic, and isotropic-fluid phases, can coexist within the same nanoparticle monolayers.
- S.N. Bose National Centre for Basic Sciences (SNBNCBS) reported the piezoelectric characteristics of large area, chemically exfoliated ultrathin two-dimensional transition metal dichalcogenides (TMDCs) and their heterostructures for the first time, as verified by piezoelectric force microscopy measurements. In another study researchers of SNBNCBS presented a detailed time-domain and frequency-domain terahertz (THz) spectroscopic investigation to understand the solvation of CRN in the presence of two model antioxidants, mostly used to treat elevated CRN level: N-Acetyl-l-cysteine (NAC) and ascorbic acid (ASC). Another study by SNBNCBS showed Strong tripartite magnon-phonon-magnon coupling in a two-dimensional periodic array of magnetostrictive nanomagnets deposited on a piezoelectric substrate, forming a 2D magnetoelastic "crystal".
- Wadia Institute of Himalayan Geology (WIHG) executed the following studies:-

ERT survey at two places in Chakrata region (Uttarakhand) for understanding hydrogeology of the sites; Interpretation of Structural and metamorphic evolution of the Bhagirathi Valley; A study between years 2000 and 2020 for Chorabari Glacier, Central Himalaya, which shows that the glacier's lower ablation zone has very coarse and thick debris (1-3 m); The stress budget analysis in the Uttarakhand region, which proposes that the lithology is not rigid enough to withstand significant stress accumulation for a long time; A study on Stress Tensor inversion of earthquake data indicate the direction of the maximum horizontal stress axis nearly perpendicular to the Himalaya-Eurasia plate boundary where thrusting/subduction occurs implying the convergence tectonics.

- Indian Institute of Astrophysics (IIA) studied the impact of directional and frequency couplings between the incident and scattered photons (the so-called angle-dependent partial frequency redistribution - AD-PRD) on resonance line polarization formed in a spherically symmetric extended and expanding medium.
- Raman Research Institute (RRI) showed that the thermal current values grow significantly near the topological phase transition related to a study of non-equilibrium transport in various open bath systems.
- Indian Association for the Cultivation of Science (IACS), Kolkata have successfully synthesized two nitrogen-rich Porous Organic Polymers (POPs) by extended Schiff-base condensation reactions. Among these two porous polymers, TBAL-POP-2 exhibits high CO<sub>2</sub> uptake capacity at 30 bar pressure (57.2, 18.7, and 15.9 mmol g<sup>-1</sup> at 273, 298, and 313 K temperatures, respectively).

## **E. Publications & Patents by Research Institutes**

- MACS-Agharkar Research Institute (ARI), Pune published 03 papers, Aryabhata Research Institute of Observational Sciences (ARIES) published 09 research papers, Birbal Sahni Institute of Palaeosciences (BSIP) published 07 research papers, Centre for Nano and Soft Matter Sciences (CeNS) published 04 articles, Indian Institute of Geomagnetism (IIG) published 05 research papers, Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) published 26 research papers, Indian Institute of Astrophysics (IIA) published 12 research papers, Institute of Advanced Study in Science and Technology (IASST) published 04 research articles, Raman Research Institute (RRI) published 03 research papers, Indian Association for the Cultivation of Science (IACS), Kolkata published 02 research papers in refereed journals.
- International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad reported that 03 national patents are granted. CeNS is granted 01 and SCTIMST is granted 02 national patents. National Innovation Foundation (NIF) facilitated in granting 16 patents. Indian Academy of Sciences, Bangalore approved 117 articles to be published in their 11 journals during October, 2023.

## **F. National Technology Mission**

- The **3<sup>rd</sup> National Workshop on Technology Innovation in Cyber Physical Systems (TIPS)** under NM-ICPS was organized from October 5-6, 2023 at IIT Kanpur, to assess the progress made by the Technology Innovation Hubs (TIHs) and the theme-wise presentations were made by the TIHs, focusing on five areas of national importance: Agriculture, Environment (including Energy, Water, etc.), Health, Defense, and Infrastructure (includes Industry, Transportation, Communication etc.).
- The Workshop also included two days **Exhibition (Expo)**, where the achievements and impactful technologies/technology products developed by each TIH were exhibited. The TIPS was attended by the members of Mission Governing Body (MGB), Scientific Advisory Committee (SAC) and various stakeholders from Industries, line ministries & PSUs alongwith the Project Director/CEOs of all the 25 TIHs and representatives from the Startups

supported.

- A Quarterly Bulletin (Oct, 2023 edition) on the activities undertaken by each Technology Innovation Hubs (TIHs) indicating highlights of their achievements brought out by the Mission Office, NM-ICPS and Bulletin was released during the Workshop.
- The 3<sup>rd</sup> meeting of the re-constituted Mission Governing (MGB) of **NM-ICPS** was held on 6<sup>th</sup> Oct **2023** at IIT Kanpur through hybrid mode **with an agenda** to overview the Action Taken Reports & achievements of NM-ICPS
- The Department of Science & Technology has participated during India Mobile Congress 2023 (IMC-2023) inaugurated by Hon'ble Prime Minister, held during 27th- 29th October, 2023 at Pragati Maidan, New Delhi where seven (7) Technology Innovation Hubs (TIHs) established under NM-ICPS, showcased their technologies/products in advanced technology verticals.
- The Mission Office, NM-ICPS has conducted site visit at I-Hub on Autonomous Navigation Foundation (TiHAN), IIT Hyderabad on 31<sup>st</sup> Oct 2023, to review the current progress of activities.

## **G. Scientific Infrastructure Building**

- Officers of the Department participated in a one-day conference and stakeholder workshop organized by Survey of India on 12th October, 2023, at Stein Auditorium, India Habitat Centre. The goal of the workshop was to bring all stakeholders together to improve the applicability of the newly built and operationalized CORS network and the generation of ORI and DEM for the entire country so that it is available to end users for the nation's socioeconomic development.
- Annual user meet/ Outreach Symposium of National Geospatial Program (NGP) - National Spatial Data Infrastructure (NSDI) Divisions on '**Strengthening Country's Geospatial Ecosystem through National Geospatial Policy (NGP-2022)**' was organized on 18<sup>th</sup> October, 2023 at Hyderabad as a part of the "23<sup>rd</sup> Edition of Geo-smart India, 2023" held on 17<sup>th</sup> -19<sup>th</sup> October, 2023 at Hyderabad International Convention Centre (HICC), Hyderabad. More than 30 participants attended the above User meet including academicians, Industry representatives, geospatial startups and Students etc. Details of the user meet and other activities as a part of the Geosmart 2023 are as follows:
  - Presentation/ discussion of on Geospatial Data Ecosystem, Strengthening Country's Geospatial Science Landscape, Geospatial Technology Ecosystem, and Geospatial Capacity Building & Awareness
  - Panel discussion on 'Research issues in Geospatial Science & Technology: Future Roadmap' to seek inputs from the Stakeholders for NGP division's way forward in meeting the current challenges in geospatial research and in the industry.
  - Along with User Meet, division had an exhibition setup during the GeoSmart 2023, where achievement related to divisional various projects have been showcased along with what has been the impact since the inception and how the relevant stakeholders can be benefitted.
  - A meeting with PIs of NGP's projects having a capacity building component— NCG at IIT Kanpur, Bharati Vidyapeeth University, Pune and GISE Hub, IIT Bombay, along with representatives from Survey of India (including NIGST) and

Bureau of Indian Standards was organized on 18<sup>th</sup> October, 2023 at HICC, Hyderabad with an aim to synergize the geospatial capacity building efforts.

- A meeting chaired by JS (Geospatial) to discuss on proposal for creation of a Skill Council for Geospatial Sector was held on 20.10.2023. The aim of the meeting was to discuss the draft proposal submitted to DST and initiate the process for its further submission to NSDC.
- Series of online meetings were held amongst the representatives of NGP-DST, IIIT Tirupati and NIGST-SOI to finalize the draft MOU/ Agreement for establishing the Geospatial Innovation Hub (as a pilot). It is envisaged that the proposed hub will strengthen Country's Innovation capabilities in the domain.
- Minutes of the EC Committee meeting held on 14<sup>th</sup> September, 2023 at the Bharati Vidyapeeth Institute of Environment Education and Research in Pune, to review and possible recommend the 114 proposals received online against a Geospatial Capacity building Call under various categories has been prepared and approved by the Chairman.

### **R&D Support was provided for the following:**

- Financial support was provided to Dr. Virendra Tiwari, CSIR National Geophysical Research Institute, Hyderabad for Central Facilities and Coordination of the Project - "Assessment of Regional Hydrological systems using Space Borne Gravity Observations".
- Financial support was provide to Geospatial Media and Communications Pvt. Ltd. Geospatial media communications, Noida for becoming Knowledge Partner and participation in exhibition in GeoSmart India 2023 held on 17th-19th October, 2023 at Hyderabad International Convention Centre.
- The 28<sup>th</sup> Fund for Improvement of S&T Infrastructure in Universities and Higher Educational Institutions Advisory Board (FISTAB) meeting was held on October 13, 2023. A total of 121 proposals were recommended in seven subjects (Chemical Sciences, Earth and Atmospheric Sciences, Engineering Sciences, Life Sciences, Mathematical Sciences, Physical Sciences, and PG-Colleges) with financial support of Rs. 193.07 crore for 5 years.
- Survey of India has organized one-day Conference & Stakeholder Workshop on 12th October, 2023 at India Habitat Centre (IHC), New Delhi. The focus of this workshop was to bring convergence amongst all stakeholders for better applicability of the newly established CORS network and generation of ORI & DEM for entire country so that it is available for use/ re-use by all the Indian entities for the Socio-economic Development of the Nation. During the event, the countrywide CORS network which has been recently established by Survey of India was inaugurated by Dr. Jitendra Singh, Hon'ble MoS (I/C) Minister of Science & Technology.
- Organized the final evaluation meeting for the proposals received under the 5th call of Waste Management Technology (WMT) program under the Thrust area of "Agricultural Waste" during 16th to 18th October 2023 at IIT, Delhi.
- Organized the final evaluation meeting for the proposals received under the 4th call for proposals invited under Advanced Manufacturing Technologies (AMT) program on 20th & 21st October 2023 at CSIR-NIIST, Thiruvananthapuram.
- 21 new projects supported under AMT program, 1 new project supported under TEC program and 4 new projects supported under TDP.
- Organized a final evaluation meeting for the proposals received under open call



for proposals under Technology Development Programme (TDP) under thrust area Advanced Materials on 25-26<sup>th</sup> October 2023 at Bangalore.

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