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Government of India
Ministry of Science and Technology
Department of Science and Technology
(CDN Section)

Technology Bhawan,
New Mehrauli Road
New Delhi-110016
Dated: 20 .01.2023

OFFICE MEMORANDUM

Subject: Monthly Summary to the Cabinet for the month of December, 2022.

The undersigned is directed to enclose herewith a copy of the Monthly Summary of important policy decisions taken and major achievements of the Department of Science & Technology for the month ending 31.12.2022 for information.

2. This issues with the approval of Secretary, DST


(Anil Kumar Pandey)

Deputy Secretary to the Govt. of India

To,

All Members of the Council of Ministers

Copy with enclosures, forwarded to:-

- i. Vice Chairman, NITI Aayog, NITI Bhawan, New Delhi. (vch-niti@gov.in)
- ii. The Chairman, Union Public Service Commission (chairman-upsc@gov.in)
- iii. Chief Executive Officer, NITI Aayog, NITI Bhawan, New Delhi (ceo-niti@gov.in)
- iv. The Principal Secretary to the Prime Minister, Prime Minister Office, South Block, ND (pkmishra.pmo@gov.in)
- v. All members of NITI Aayog, NITI Bhawan, New Delhi. (vk.saraswat@nic.in, rc. niti@gov.in, vinodk.paul@gov.in)
- vi. Secretary to the President of India. (secy.president@rb.nic.in)
- vii. Secretary to the Vice-President of India. (secyvp@nic.in)
- viii. Principal Scientific Advisor to the Govt. of India. (vijayraghavan@gov.in)
- ix. All Secretaries to the Government of India (secy-goi@lsmgr.nic.in)
- x. The Principal Director General, Press Information Bureau, Ministry of Information and Broadcasting. (pdg-pib@nic.in)

- xi. The Director, Cabinet Secretariat, New Delhi. (cabinet@nic.in)
- xii. Dr. Rabindra Kumar Panigrahy, Sc. 'E', DST for uploading the Monthly Summary on DST's website. (rabindra.p@gov.in)
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Department of Science & Technology

Monthly Report

December, 2022

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

A. Science for Society

1. Asian Stroke Summer School 2022 (ASSS 2022), a four-day teaching course which involved the acute interdisciplinary stroke treatment was conducted at Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram. The previous editions of this training programme were conducted mostly in European nations and this is the first time that such an event is held in India. ASSS 2022 was organized in collaboration with the University of Bern, Switzerland.
2. A three-day 3rd ASEAN India Grassroots Innovation forum was organized by the ASEAN Committee on Science, Technology and Innovation (COSTI) in partnership with the Department of Science and Technology (DST), Government of India and the National Innovation Foundation (NIF) – India, Ahmedabad at the Institute of Technology of Cambodia in Phnom Penh during 19-21 December, 2022. By bringing together key players viz. government officials, grassroots innovators, student innovators, academics, business actors, and the wider community, this forum provided a platform to promote and strengthen the development of the grassroots innovation ecosystem.
3. National Innovation Foundation-India (NIF), Ahmedabad facilitated granting of following 6 patents which inter-alia includes, topical herbal composition for wound healing and methods thereof; A Noise Reduction Device; Variable Stroke Painting Brush; Device For Extracting Lac Or Similar Products From Plants; Biophysiological Monitoring And Alerting Device; A Fish Dryer and Novel Serving Tray.
4. Science Outreach project “Showcasing the Indian S&T Prowess at Srinagar and Jammu Airports and other Outdoor Sites (Phase II)” was initiated through Vigyan Prasar.

B. Technology Development

1. International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad has synthesized (at lab-scale) cobalt-free high voltage cathode material by adopting solid-state technology.

C. Human Capacity Building

1. Pune Knowledge Cluster (PKC), in collaboration with the Department of Science and Technology, GoI, CSIR- National Chemical Laboratory, and MAHAPREIT organized a

stakeholder meeting on "Vision Setting for Hydrogen Valley in the state of Maharashtra" on 15th December at CSIR-NCL Pune.

2. Under the Vigyan Jyoti Programme of DST for empowering girls in different fields of Science and Technology, Engineering and Mathematics many classes, lab activities, science camps, workshops and career counseling sessions were organized for Vigyan Jyoti scholars.
3. **Women Scientists Scheme:** The financial support has been extended toward implementation of 78 new and ongoing projects under Women Scientists Scheme-A (WOS-A) to conduct research in basic and applied sciences.
4. The TECH-□□□@75 was initiated by the Ministry of Science & Technology and the Ministry of Earth Sciences (MoES) on 15th November, 2021 as a part of the celebration of Azadi Ka Amrit Mahotsav. A National Conclave was conducted on 21st December 2022 as a concluding event of the year-long programme "TECH-□□□@75" to showcase the significant outcomes, key learnings during the "TECH-□□□@75" and the way forward. The conclave was attended by experts, policymakers, scientists, and stakeholders of the livelihood system. A panel discussion was held during the conclave to capture plans and policies to strengthen the local innovation system in collaboration with the formal innovation system. Under the TECH-□□□@75, online sessions of a total of 75 hours were conducted to highlight the impact of Science, Technology, and Innovation (STI) in creating social equity and inclusion.
5. **INSPIRE Awards - Million Minds Augmenting National Aspirations and Knowledge (Manak)**
 - Out of 7,96,189 nominations received under Inspire MANAK from all States and UT's across the country, a total of **43,381 students** have been sanctioned @ **Rs. 10,000/-** to participate in the **District Level Exhibition Project Competition (DLEPC)**.
 - District Level Exhibition Project Competition were organized in **Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Telangana and Uttar Pradesh for the 2021-22.**
 - **State Level Exhibition and Project Competition** were organized in **Goa, Ladakh, Meghalaya and Tripura for the 2021-22.**
6. **INSPIRE Scholarship:**
 - An amount of **₹5.53 crore** was released towards **Scholarship** for **921** students and **₹9.2 lakhs** was released towards **Mentorship** for **46** students in December 2022 (**Institutional Mode**).
 - An amount of **₹42.85 crore** was released towards **Scholarship** for **4528** students and in December 2022 (**Direct Mode**).
 - **Total number applications** received under INSPIRE-SHE call is **16522.**

7. **INSPIRE Fellowship:**

- An amount of **₹1.88 crore** was released towards **Fresh Fellowship** for **40 Fellows** in December 2022.
- An amount of **₹2.56 crore** was released towards **Ongoing Fellowship** for **96 Fellows** in December 2022.

8. **A special research cum training programme for the students of North East and J&K:** Released grant to **six Institutes** namely Jawaharlal Nehru Centre for Advanced Scientific Research (**JNCASR**), Bengaluru (Physical Sciences), CSIR-Indian Institute of Chemical Technology (**IICT**), Hyderabad (Chemical Sciences), International Advanced Research Centre for Powder Metallurgy and New Materials (**ARCI**), Hyderabad (Engineering Sciences), Sri Chitra Tirunal Institute for Medical Sciences and Technology (**SCIMST**), Trivandrum (Biomedical Sciences), CSIR-North East Institute of Science and Technology (**NEIST**), Jorhat (AI and Machine Learning) and Institute of Nano-Science and Technology, Mohali (**INST**) for implementing the "**Research Exposure cum Training Programme**" for **Students from North- Eastern States and UTs of Jammu & Kashmir and Ladakh region.**

9. **INSPIRE Faculty Fellowship:**

An amount of **₹9.13 crore** was released towards both **Fresh and Ongoing Faculty Fellowship** for **91 Faculty Fellows** in December 2022.

D. Scientific Research

1. A study has been conducted by Birbal Sahni Institute of Palaeosciences (BSIP), Lucknow to analyze the lignite material of the early Paleogene age (55Ma) using various methods in order to unravel the constituents of the paleovegetation of western Rajasthan, which was previously believed to be dominated by angiosperms.
2. A recent study conducted by Bose Institute (BI), Kolkata explored the microbiome structure, function and anti biotic resistome of Indian Sundarban.
3. Researchers at Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru has demonstrated that sea urchin MoO_3 loaded with a very small amount of silver (Ag/SUMoO_3) forming hierarchical micro-nano structures as surface enhanced Raman scattering (SERS) substrates.
4. Researchers from CeNS and National Chemical Laboratory have shown that nanoparticle (NP) alloys can be prepared from a physical mixture of NP dispersions via the digestive ripening (DR) process.
5. CeNS researchers have synthesized 2D coordination polymers (COPs) of various metals with 1,2,4,5- benzene tetramine ligand and demonstrated their capability to sense high energy materials (HEM) such as nitroaromatic and non-nitro aromatic systems in the solution phase via fluorescence quenching phenomena. Among all the explosives,

trinitrophenol and trinitrotoluene showed very high sensitivity as low as 0.2 μM and also selectivity. This selective and sensitive quenching was used to devise a prototype device capable of detecting TNP at very low concentrations visually.

6. Scientist from Indian Association for the Cultivation of Science (IACS), Kolkata show's that G-quadruplexes can template the synthesis of macrocyclic gene inhibitors. Macrocyclic ligands have promising therapeutic potential but their chemical synthesis is difficult involving multiple steps. DNA G-quadruplexes contain planar surfaces which provides a appropriate reaction site for the macro cyclization reaction. Macrocyclic ligands of similar structure have been synthesized to understand their mechanism of binding to G4s and their functional role in gene regulation. The lead ligand (M1) generated by G4s, exhibited excellent binding towards G4 DNAs. The fluorescence properties of M1 enabled scientists to visualize its localization inside cells by microscopic imaging. M1 also exhibited inhibition of cancer causing genes (oncogenes) in cervical cancer cells. Since G4s are abundantly present in the human genome, the macrocyclization reaction with corresponding building blocks (bis-azide and bis-alkyne) has also been achieved inside live cancer cells. Hence the in-cell synthesis of ligands, shown in this work can be explored using other biologically important targets to achieve target specific synthesis of inhibitors.
7. Modulation of drug binding ability and augmented enzymatic activity of lysozyme stabilized in presence of surface-active ionic liquids. In a study conducted at S N Bose National Centre for Basic Sciences (SNBNBS), Kolkata significant modulation in binding behavior in presence of surface-active ionic liquid (SAIL) indicates that the drug transportation capacity of lysozyme can be controlled even in the pre-micellar concentration and could further be exploited in advanced drug delivery techniques.
8. Using first-principles density functional theory (DFT), the problem of water incorporation in iron bearing wadsleyite ((Mg,Fe) 2SiO_4) at transition zone pressures and temperatures under varying conditions of vacancy and ferric ion concentration have been studied by SNBNBS.
9. In a collaborative research with Aryabhata Research Institute of Observational Sciences (ARIES), Nainital, observations through the 3.6 m Devasthal Optical Telescope (DOT) has detected and provided vital information on an unexpected Kilonova emission from a long-duration gamma ray burst (GRB).
10. Using an Ohmic bath model and a non-Markovian Drude bath model with finite memory, the study conducted by the researchers at Raman Research Institute has derived a quantum Langevin equation for a quantum spin in the presence of a magnetic field coupled to a bath. Results, which have qualitatively agreed with the findings in spin noise spectroscopy experiments, can further the overall understanding of the Quantum Brownian motion. It is an important class of possible dynamics for an open quantum with continuous degree of freedom.

E. Scientific Infrastructure Building

1. **Fund for Improvement of S&T Infrastructure in Universities and Higher Educational Institutions (FIST) Program:** Using the DST-FIST-supported facilities Mercury Intrusion Porosimetry, a research group at Department of Civil Engineering at IIT Bombay developed a new method of archaeological estimation to identify the chemical composition of the potsherd, propose and estimate the firing temperature, and measure porosity and pore size distribution. This new method will allow the archaeologists and conservators to study the ancient pottery and the firing temperature of the potsherds to establish the relationship among production technique, mineralogical changes, and changes in the microstructure.

2. **Support for Upgradation, Preventive Repair, and Maintenance of Equipment (SUPREME):** The Department of Science and Technology has announced a new program "Support for Up-gradation, Preventive Repair, and Maintenance of Equipment" (SUPREME) to provide financial support for repair, upgrade, maintenance, retrofitting, or acquiring additional attachments to increase the functional capabilities of existing analytical instrumentation facilities (AIFs) supported by DST in various institutions/laboratories/academic institutions.

The proposals will aid in the revitalization of facilities established by DST projects worth Rs.40 lacks. The projects will be awarded in an institutional/organizational mode with a maximum ceiling of Rs.4.0 crore and will not be sanctioned to any specific department, individual, or research group.

3. **Promotion of University Research and Scientific Excellence (PURSE)**

Twelve Universities under Special Call were recommended for support with a total budget of Rs.117.5 crores over a period of four years.

4. **Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI)**

Eleven STUTI PMUs have identified several DST supported Department/Institutes which have conducted 26 training programs and 01 Science Awareness Week across the country that imparted training to over 950 researchers and school students.

5. **R&D Support was provided for the following:**

- Indian Institute of Technology-Madras, Tamil Nadu to study the 'Recent advances in Marine Geospatial Techniques and Applications'.
- Indian Institute of Technology-BHU, Uttar Pradesh for 'Development of Movable Mono-static Radar Mapping System for Soil Moisture Retrieval'.
- National Institute of Technology-Rourkela, Odisha for Development of 'UAV-based Near Real-time Surface Fire Detection and Delineation System for Coal Mining and Forest Regions'.

- Indian Institute of Technology-Patna, Bihar to Channel State Information Based Joint Localization and Activity recognition using Deep Learning Methods.
- University of Burdwan, West Bengal for Development of Low-cost GNSS RTK Base for Precise Geo-location and Handheld Precise Geo-location Enabled Multi-sensor Rover System HGS.
- Motilal Nehru National Institute of Technology, Allahabad for 'Mapping Groundwater Quality Depleted Area, Potential Groundwater Recharge Zones and Evolving the Farmers Need Based Groundwater Recharge Structures' in District Mahoba of Bundelkhand Region of Uttar Pradesh.
