5. Important events

5.1 Internatinal conference on Multifunctional Electronic Materials & Processing (MEMP-2021)

The hon'ble Shri Sanjay Dhotre, Minister of State, Electronics and Information Technology delivered the presidential address and appreciated the C-MET's efforts in the areas of material development useful in various sectors. The C-MET foundation day lecture was delivered by Prof. Rodney Ruoff, S. Korea, on graphene. About 29 speakers from Academics, Research institutes and Industries delivered invited talks. Seven hudnred participants have registered for the conference. About 275 abstract and 153 posters were presented.

Prof. Sanjay Mathur, University of Cologne, Germany and Prof. G. D. Yadav, former VC, ICT, Mumbai described the various ways of photo utilization for the H_2 generation and brief overview about the hydrogen economy, past, present and future. Prof A. Sumant from Argonne Research Lab, USA delivered a talk about diamond-based electronics. Prof. Yury Gogsti, Drexel University, USA delivered a talk on Mxene, a newly invented materials having enormous applications in electronic field and received more attention of the researchers to work in this new field.

Another important collaboration came from Neutrino Energy Group, Germany in the area of neutrino-voltaics. This is the upcoming technology where neutrino energy can be absorbed by the 2D materials and converted into useful form. Prof. Holger, CEO of Neutrino energy group, introduced the new terminology of neutrino-voltaics. These neutrinos are available 24 hrs everywhere and need to develop the materials for absorbing its kinetic energy. Neutrino energy group is interested in signing the MoU with C-MET related to the materials development. Accordingly, C-MET have signed the MoC documents and now formulating the MoU documents for further collaboration.

At the end of the conference the panel discussion was arranged to discuss the commercialization of Materials Research Pathway to Aatmanirbhar Bharat. This discussion provided the proper guideline for the technology oriented research.

5.2 Virtual workshop on “Microsensor Applications in Defence and Aerospace" ISSS Pune Chapter in association with AISSMS, Pune

ISSS Pune Chapter in association with AISSMS, Pune organised a one day Virtual workshop on ”Microsensor Applications in Defence and Aerospace" on 16th March 2021. There were six speakers who spoke on varied topics including microsensor applications, MEMS and Microsystems, fabrication of MEMS based sensors, Bio Sensors, TeraHertz Spectroscopy, Packaging aspects and processes. Dr Girish Phatak and Dr Sunit Rane were part of the organising team. Dr. Vasudev K. Aatre, Former Secretary to Raksha Mantri and Dr K Vijayaraju, Scientist 'G' ADA, Bangalore also shared their views on the topic.

5.3 Activities related to Covid-19

(A) C-MET, Pune

5.3.1 Development of polymer swab for testing of COVID-19

Considering the acute shortage of testing kits in the country, Centre for Materials for Electronics Technology (C-MET), Pune, under the aegis of scientific society of Ministry of Electronics and Information Technology (MeitY) has developed polymer swabs. These swabs are made up of polymer rod/stick and polymer fibres with locally-sourced materials. The polymer rod is developed with thermoplastic polypropylene materials through injection moulding. Polymer fibers are then crimp pressed on the polymer rod. Sri Research for Tissue Engineering Pvt Ltd., Bengaluru has been chosen to carry out clinical and ethical trials, in which satisfactory results have been observed. Further, the developed polymer swabs were also tested and considered as satisfactory by ICMR-NIV, Pune. Additive Manufacturing Society of India, Bengaluru is now considering the production of these indigenous kits in the country.

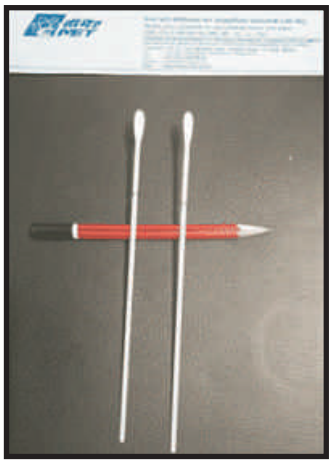

Figure 71: Polymer swab for testing of COVID-19

5.3.2 Synthesis of nanoparticles and its coatings on cotton/ polyester fabric for having antiviral and antibacterial properties

Centre for Materials for Electronics Technology (C-MET) Pune, under the aegis of scientific society of Ministry of Electronics and Information Technology (MeitY) has developed antiviral and antibacterial masks with metal/metal-semiconductor nanoparticles as a cost-effective alternative of N95 masks for the Indian market. Yashwantrao Chavan Institute of Science, (YCIS), Satara, Maharashtra, has been chosen to carry out testing of the masks for antibacterial properties and pathogen tests. Around 2000 masks have been distributed to rural hospitals, police-stations and other front-line workers.

Figure 72: Antiviral and Antibacterial masks with metal/metal-semiconductor nanoparticles

(B) C-MET Hyderabad

A Covid-19 committee was constituted by the Director, C-MET Hyderabad on 4th June 2020 to effectively implement Covid protocols issued by GoI from time to time.

Major activities carried out:

1. Digital Thermo-meters arranged at Main Gate with Security Guard / officer for screening of the Staff as well as visitors in the C-MET premises. Security staff was trained on SOPs for measuring and recording the data.
2. Awareness sessions conducted to all housekeeping staff, garden staff and security staff and strict instructions given for cleaning of common areas, workplace, tables, reception area, toilets, door handles etc. and also on proper use of chemical and disinfectants.
3. Posters / Banners and Stickers were printed and fixed in all common areas as regular reminders for precautions.
4. Regular Inspections were carried out on day-to-day basis by checking the compliance of Covid-19 protocol.

5. Automated and manual sanitizer dispensers were placed at various locations.
6. Sufficient masks, gloves and goggles were given to all security and housekeeping staff and ensured the proper use of the same. All other staff have also been instructed to wear face mask and keep social distancing.
7. Arranged cleaning facility with foot operated wash basin and boric acid-based foot cleaner at entrances.
8. PPE Kits procured and distributed to security / gardner for disinfection works and for emergency evacuation of infected persons, if any found.
9. Pulse Oxygen meter procured and recorded daily oxygen levels of staff.
10. Arranged UV chamber for disinfecting parcels, files and day to day used items.
11. To maintain the physical distancing, all meetings were conducted through Video Conference only.
12. Conducted COVID tests for the staff by involving ICMR recognized labs for PCR test and Primary health centre for Antigen tests.

Figure 73: Automatic hand sanitizer cleaning of lab and premises

Figure 74: Test conducted at laboratory

Figure 75: Awareness programme by medical officer on COVID

5.4 National science day celebrations 2021

5.4.1 National science day celebrations at C-MET, Pune

National Science Day 2021 was celebrated in C-MET, Pune on 28.02.2021 with great enthusiasm. An online talk was delivered by Prof. O. N. Shrivastava, “Padma Shri” awardee and Emeritus Professor, Banaras Hindu University, Varanasi on the topic “Remenances of Raman effect”. The talk included Prof. C.V. Raman’s personal life and how he won Noble prize.

5.4.2 National science day celebrations at C-MET, Hyderabad

National Science Day 2021 was celebrated in C-MET, Hyderabad on 28.02.2021. Activities like Science Quiz and lectures were organized and prizes were distributed. An expert talk entitled," Technology Development: Elements and Considerations" was delivered by Shri. Arbind Kumar, Senior scientist on 26.02.2021.

Figure 76: National Science Day celebrations at C-MET, Hyderabad

5.4.3 National science day celebrations at C-MET, Thrissur

Every year C-MET Thrissur celebrates National Science Day by (i) inviting eminent scientists/technologists, who have developed indigenous material-based technology for the betterment of the society, to give a lecture and (ii) kept the lab open for the public and students. However, this year, due to Covid Pandemic, the laboratory was not to open for public and students. Instead, two online lectures were conducted by two eminent external experts. Dr. Ketankumar Vadodaria, Associate Senior Faculty (Scientist), Textile Design, National Institute of Design, Paldi, Ahmedabad, and Mr. Niranjan Kumar K R M, Managing Director, KPI Healthcare India Pvt Ltd., Kozhikode were delivered online science day lectures. They discussed various aspects of the indigenous developments of products for various societal and medical applications.

5.5 Vigilance Awareness Week

C-MET, Hyderabad laboratory has observed vigilance awareness week during 27th October 2020 to 2nd November 2020. The observance of Vigilance Awareness week has commenced in C-MET, Hyderabad with the integrity pledge. The staff has taken the pledge on 27th October 2020 at 11:00 AM. Two lectures were arranged inside the C-MET campus to create awareness amongst staff on the issues related to anti-corruption. The first lecture (virtual mode) was delivered on 29.10.2020 by Shri R.Vijay Kumar, former Chief Finance & Administrative Officer, ARCI, Govt.of India, Hyderabad. The second lecture was delivered by Shri Mahesh Muralidhar Bhagwat, IPS, Commissioner of Police, Rachakonda Commissionerate on 02.11.2020 at 3:00 PM in C-MET campus. All the employees attended the lectures strictly following Covid-19 protocols.

Figure 77: Vigilance awareness lecture by Chief Guest

Figure 78: Staff participated in the lecture

5.6 Swachhata Pakhwada

As per the guidelines of MeitY, Govt. of India, C-MET Pune, Hyderabad and Thrissur laboratories have organized swachhata pakhwada from 1-15th February 2021. Several activities were undertaken for this swachhata pakhwada 2021 to make C-MET premise clean and tidy. Most of the staff of C-MET has participated in this event towards the special cleanliness drive. All three centers of C-MET have displayed the banners at main gate along with details of activities planned on notice board as well as on electronic display system. One day National Workshop on E-waste Management organized jointly by C-MET & C-DAC on 9th February 2021 in virtual mode through WebEx platform. More than 4300 delegates participated in the deliberations. E-certificate was issued to all registered participants.

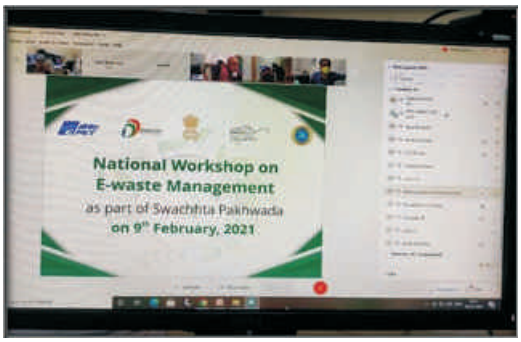

Figure 79: National Workshop on E-waste Management

Figure 80: Cleaning activity at C-MET Pune

Figure 81: Cleaning activity at C-MET Hyderabad

5.7 150th Birthday of Mahatma Gandhi at C-MET, Pune, Hyderabad & Thrissur

C-MET observed as an open day from 10.00 to 15.00 hours for public on 2nd October, 2020. Many people including students, researchers and faculties were visited C-MET. The e-waste plant was demonstrated to the visitors and interacted with C-MET scientists. Trees were planted inside the campus and essay writing competition was held on topic “Cleanliness is next to Godliness” by students. E-waste was also collected from students/public. A lecture on "Gandhian Thoughts" was delivered by C-MET scientist.

6. Collaborative research activities

1. C-MET Thrissur is collaborating with Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram, an institute under DBT, Govt. of India for development of a cost-effective portable biosensor. The project is funded by the Biomedical Device and Technology Programme of DST.
2. C-MET Thrissur is collaborating with IGCAR, Kalpakkam, under DAE, Govt. of India for the development of Transparent conducting oxides and metal nitrides as low Plasmonic materials in near IR and visible frequencies
3. C-MET Thrissur is collaborating with Malabar Cancer Centre, Thalassery for proof-of-concept studies for developing nucleic acid based portable plasmonic devices for biomarker detection.
4. CMET Thrissur is collaborating with Electronics Corporation India Limited (ECIL) Hyderabad, organization under DAE, Govt. of India for the development of power module for VVPAT machine used in Electronic Voting Machine under MeitY sponsored project.

6.1 Memorandum of understandings (MoUs)

1. C-MET signed MOU with M/s H2e Technologies Pune on 25th February 2021 for the Development of Micro Solid Oxide Fuel Cells (μ-SOFC) in Low Temperature Co-Fired Ceramic (LTCC) Technology. M. Amarnath Chakradev from H2e Technologies. Dr Bharat Kale Director General (A), C-MET along with Registrar, Programme Coordinator, and the Electronic Packaging Team Members were present on the Occasion.

Figure 82: MoU between C-MET and H2e Technologies for Development of μSOFC in LTCC

2. MoU with CST UP Incubation Centre, Indian Institute of Technology (BHU), Varanasi for R & D interactive program in the area of additive manufacturing, 3-D printing for solar photovoltaic applications, solar cell, efficiency improvement of solar photovoltaics.
3. MoU with School of Applied Sciences, Under Kalinga Institute of Industrial Technology (KIIT) Deemed to be University, Bhubaneswar for academic collaborations in the area of nanomaterials synthesis characterization.
4. MOU and NDA have been signed with SPEL Technologies Pvt. Ltd. as the industrial partner under Centre of Excellence in Rechargeable Battery Technology (Pre-Cell) on 6th August 2020

Figure 83: MoU Signing

5. C-MET, Hyderabad singed MoU with Research and Innovation Circle of Hyderabad (RICH) on December 11, 2020 to promote and facilitate networking opportunities between C-MET, Industries and research institutes in the areas of e-waste management.

6. C-MET, Hyderabad signed MoU with Space Applications Centre (SAC), ISRO, Ahmadabad and Ministry of Electronics and Information Technology, New Delhi, for Technical Collaboration for Design & Development of Indigenous Antennas for NavIC on March 25, 2021.

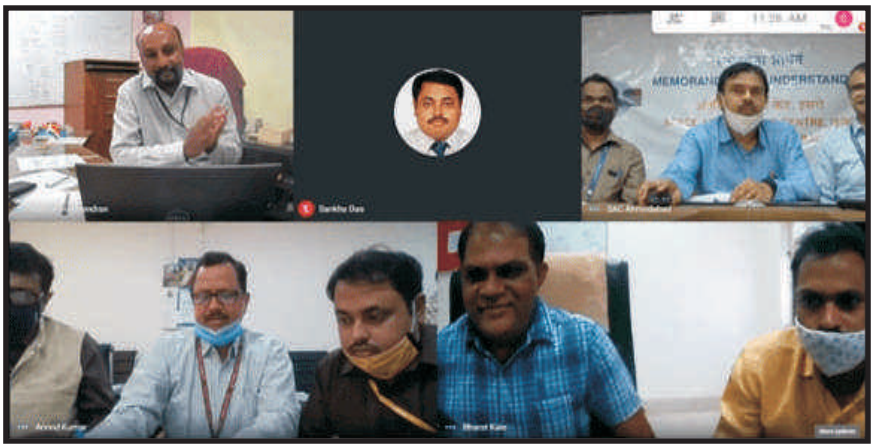

Figure 84: MoU signing ceremony

6.2 Distinguished visitors
C-MET, Hyderabad

Dr. B. R. Mishra, DGM (R&D) and Member Secretary IRELTDC visited C-MET, Hyderabad on February 19, 2021 to discuss about future collaboration between C-MET and IREL on recycling of spent permanent magnets and recovery of rare earth oxides from it.

Figure 85: Discussions with Dr. B. R. Mishra, DGM (R&D) and Member Secretary IRELTDC

6.3 International research activities

1. Dr. B.B. Kale has visited the University of Leeds under the Royal society, UK project on 16th April, 2020.

7. IPR & Publications

7.1 National / International patents awarded

1. A low temperature co-fired ceramic substrate miniature fuel cell and manufacturing method thereof, S. Dimble, S. Kulkarni, T. Patil, R. Pushpagandhan, G. Phatak and S. Duttagupta, US patent no. 10608267 granted on 31.03.2020.

2. Piezoelectric composition, methods and applications thereof, A.Anil, V.Priyadarsini, M. Sathyanarayanan and V. Kumar, US Patent No.10720565; granted on 21.07.2020.

3. A Process for Preparing Pseudoboehmite from Aluminium Metal, S N Potty, I Packia Selvam and A K Sivadasan, Indian Patent No.332519. Date of grant: 20 02 2020

7.2 National / International patents filed

1. Design and Development of Polymer Swab for the sample collection & testing of COVID-19 and other viral diseases. M. V. Kulkarni & B. B. Kale, Indian patent (filed on 28.04 2020)

2. Design and fabrication of novel, cost effective induction zone refining system for purification of scrap Germanium, Y. Purushotham, N. R. Munirathnam, S.T.Ali, M. Srivastava, V. K. Gandotra submitted to ER&IPR, DRDO on 05.06.2020 for joint Indian patent.

3. Development of process methodology for minimizing major metallic impurities in scrap Germanium by induction zone refining, Y. Purushotham, N. R. Munirathnam, S. T. Ali, S. Verma, M. Srivastava, V. K. Gandotra submitted to ER&IPR, DRDO on 08.01.2021 for joint Indian patent.

4. A process for recovery of metals from waste printed circuit boards, P. Parthasarathy, M. R. P. Reddy, S. R. Kumar, S. Chatterjee, docket No. 14923 dtd. 12/2/2021.

5. A transparent heater and a method of preparation thereof, S. N. Potty, I. P. Selvam, P. Prabeesh, Sajeesh V. G. and Vysakh K, Indian patent filed on 18.06.2020.

6. Aluminium-air battery using activated carbon derived from bamboo, R. Prasada Rao, B.B. Kale, G. H. Chandra, N. R. Munirathnam, Indian patent filed on 30.03.2021.

7.3 Books and Monographs

1. Pesticides as an occupational hazard facts and figures, N. Tarannum, M. Singh, R. Hawaldar, in a book entitled "handbook of research on the adverse effects of pesticide pollution in aquatic ecosystems", 2019, pages:201-214, publisher:IGI global.

7.4 Publications in peer-reviewed journals

1. Facile synthesis of SnO_2@ carbon nanocomposites for lithium-ion batteries, A. A. Ambalkar, R. P. Panmand, U. V. Kawade, Y. A. Sethi, S. D. Naik, M. V. Kulkarni, P. V. Adhyapak, B. B. Kale, New J. of Chem. 44 (8), 3366-3374, (2020).

2. Unique N doped Sn_3O_4 nanosheets as an efficient and stable photocatalyst for hydrogen generation under sunlight, S. Balgude, Y. Sethi, A. Gaikwad, B. Kale, D. Amalnerkar, P. V. Adhyapak, Nanoscale 12 (15), 8502-8510, 2020.

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4. Sunlight driven highly efficient degradation of methylene blue by CuO-ZnO nanoflowers, S. P. Mardikar, S. Kulkarni, P. V Adhyapak, J. Environ. Chem. Eng., 8 (2), 102788 (2020).

5. Palladium-decorated vanadium pentoxide as NOx gas sensor, S. Birajdar, P. V. Adhyapak, Ceramics International, 46 (17), 27381-27393, (2020.)

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42. High dielectric constant, flexible and easy-processable calcium copper titanate/thermoplastic polyurethane (CCTO/TPU) composites through simple casting method, L. Variar, M. N. Muralidharan, S. K. Narayanankutty and S. Ansari, J. of Mat. Sci.: Mat. in Electronics 32 (2021) 5908–5919.

43. "Breast tumor parameter estimation and interactive 3D thermal tomography using discrete thermal sensor data", L. Antony, K Arathy, N. Sudarsan, M. N. Muralidharan and S. Ansari, Biomed. Phys. Eng. Express 7 (2021) 015013.

44. High reliability thermistor probes for early detection of breast cancer using skin contact thermometry with thermal imaging, K. Arathy, S. Ansari, and K. A. Malini, Mater. Express, 10 (2020) 620–628.

45. Conductive Coatings of 2D MXene-in Water for Electronics Applications, T. Radhika, U.M. Uzma Sulthana and K. G. Vasanthakumari, AIP Conference Proceedings, (2020), 2263, 050003.

46. Ultra high Sensitive Carbon-Based Conducting Rubbers for Flexible and Wearable Human–Machine Intelligence Sensing, A. Ajeev, B. H. Javaregowda, A. Ali, M. Modak, S. Patil, S.Khatua, M.Ramadoss, P. A. Kothavade, A.K.Arulraj, Adv. Mat. Tech., (2020), 2000690, 1-10 (Impact Factor – 6.0).

47. Technical Report: Indigenous 6H SiC wafers for GaN Device Structures, October 2020. (DRDO-DMRL-EMG-235-2020). S. Mahajan, M. V. Rokde, S.T. Ali , et. al.

7.5 Presentations in Conferences and Symposia

1. Efficient Ammonia Sensing at Room Temperature by Ru Decorated Layered V_2O_5 Quasi-2D Nanostructure, S. Birajdar, P. Adhyapak, B.B. Kale, and D Amalnerkar, Int. Conf. Microelectronics and Plasma Technology (ICMAP) and the 9th International Symposium on Functional Materials (ISFM) organized by KFE and Sungkyunkwan University, S. Korea, 17th-20thJanuary, 2021.

2. Synthesis of CuZnO by chemical route for micro-SOFC Applications, Adithya K R, P. Kulkarni, R.Deshmukh, S. N. Tadka, S. Joseph, G.Phatak, Proceedings of International conference on Multifunctional Electronic Materials and Processing (MEMP-2021), 8th-10th March, 2021, Centre for Materials for Electronics Technology, Pune.

3. Nano crystalline structure of Rare-Earth doped Ceria by oxalate co-precipitation method for micro-SOFC Applications, S. N. Tadka, Adithya K R, R. Deshmukh, P. Kulkarni, S. Joseph, G. Phatak, Proceedings of International conference on Multifunctional Electronic Materials and Processing (MEMP-2021), 8th-10th March, 2021, Centre for Materials for Electronics Technology, Pune.

4. Patterning and releasing of SU-8 photoresist using sacrificial layer for flexible Electronics, J. Joseph, S. Joseph, G. Phatak, Proceedings of International conference on Multifunctional Electronic Materials and Processing (MEMP-2021), 8th-10th March, 2021, Centre for Materials for Electronics Technology, Pune.

5. In house developed LTCC compatible resistor paste for microheater application, P. Jagdale, Y. Arthamwar, A. Hute, M. Sarawade, K. Mokashi, A. Shirkande, V. Chaware, V. Giramkar, G.Phatak, Proceedings of International conference on Multifunctional Electronic Materials and Processing (MEMP-2021), 8th-10th March,2021, Centre for Materials for Electronics Technology, Pune.

6. Optimization of BBSZ glass as a sintering aid for NiCoZn ferrite for LTCC applications, S. L. Chaudhari, R. B. Deshmukh, V. A. Rane, and G. J. Phatak, Proceedings of International conference on Multifunctional Electronic Materials and Processing (MEMP-2021), 8th-10th March, 2021 Centre for Materials for Electronics Technology, Pune.

7. Synthesis of copper-chromium-oxide (Cu-Cr-O) using thermal plasma route for propellant application, S.S. Puranik, V. L. Mathe, S. V. Bhoraskar and S. B. Rane, at Raman Memorial Conference, Department of Physics, SPPU, Pune, 3th-5th February, 2020.

8. Hydrothermal Synthesis of TiO_2 Nanostructures and its Photocatalytic performance study, N. S. Jawale, S. S. Arbuj, G. G. Umarji, S. B. Rane, at International Conference on Multifunctional Electronic Materials & Processing (MEMP-2021), organized by C-MET, Pune 8th-10thMarch, 2021.

9. Synthesis of Titanium Oxide loaded Graphene Oxide hybrid nanostructures for Gas & UV-visible Sensing Applications, N. Pardeshi, Y. Waghadkar, S. Bhalekar, G. Umraji, S. Arbuj, S. Rane, M. Shinde and R. D. Kale at International Conference on Multifunctional Electronic Materials & Processing (MEMP-2021), organized by C-MET, Pune 8th -10th March, 2021.

10. Preparation of Ion Selective Membrane for Fabrication of Solid-State Electrochemical Nitrate Sensor, C. M. Ghorpade, G. G.Umarji, S. S. Arbuj, M. D. Shinde, S. B. Rane at International Conference on Multifunctional Electronic Materials & Processing (MEMP-2021), organized by C-MET, Pune 8th-10thMarch, 2021.

11. Electrochemistry of Dicationic Ionis Liquids-Polymer Solid Electrolyte, A. Patil, N. Khupse, M. V. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10thMarch, 2021.

12. Nickel Oxide Nanostructures as an Anode Material for Li-ion Batteries, R. S. Kalubarme, M. V. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th -10th March, 2021.

13. Deformation Effect on Prototype Flexible Lithium-Ion Battery M. V. Kulkarni, S. Tekale, R. S. Kalbarme, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10thMarch, 2021.

14. An approach for fabrication of flexible, current collector free, light weight distorted CNFs with hetero-atom-doping for SIBs, S. B. Kale, U. P. Chothe, B. B. Kale, M. V. Kulkarni, S. Pavitran, S. W. Gosavi, MEMP 2021, C-MET Pune, 8th-10thMarch, 2021.

15. Benzoic Naphthalene Tetracarboxylic Di□imide Organic Cathode for Lithium-Ion Battery, S. More, N. Khupse, M. Bhosale, J. Ambekar, M. V. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10thMarch, 2021.

16. Thermal Plasma Synthesis of Tin Metal Nanoparticles for Sodium-Ion Battery Anode, S. A. Raut, B. B. Kale, R. Kalubarme, V. L. Mathe, M. V. Kulkarni, MEMP 2021, C-MET Pune, 8th-10thMarch, 2021.

17. Development of Highly Flexible/ Bendable Lithium-Ion Full Cell Using Carbon Cloth for Wearable Electronics Gadgets, S. Tekale, S. Bhand, S. Takbhate, R. Kalubarme, Y. Khollam, M. Kulkarni and B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

18. $Na_3V_2(PO_4)_3$ as a Cathode Material for Sodium-ion Battery, S. K. Khore, R. S. Sonawane, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

19. One Pot Synthesis of Sn_3O_4/Graphene Nano heterostructure as an Anode for Lithium and Sodium Ion Battery, A. A. Ambalkar, U. V. Kawade, Y. A. Sethi, S. C.Kanade, M.V. Kulkarni, P. V. Adhyapak, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

20. Orthorhombic $LiFePO_4$ with Optimum Carbon Coating for Lithium-Ion Battery Applications, C. Ugale, U. Chothe, A. Ambalkar, M. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

21. Synthesis, Characterization and Microwave Properties of Fe(II) Doped TiO2, P. Febin, A. Vishwanath, K. Sandeep, T. P. Sinju, N. S. Arun, K. Prasad, N. Raghu, B. B. Kale, R. Panmand, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

22. Nanosphered Zinc Orthotitanates for Photocatalytic Application, L. K. Nikam, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

23. Deformation Effect on Prototype Flexible Lithium-Ion Battery, S. Bhand, S. Tekale, R. Kalubarme, M. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

24. Biomass Derived Electrospun Nanofibers as Flexible Anode Material for Li-Ion Batteries, P. S. Misal, M. V. Kulkarni, S. R. Chaudhari, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

25. Effects of Nitrogen Doping on $Li_4Ti_5O_{12}$ Negative Electrode Materials for Lithium-Ion Battery Applications, R. Ballal, M. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

26. Electrospun Designed Fibrous and Highly Porous Separators for Flexible Li-Ion Batteries, T.Y. Shaikh, R. Ballal, A. Jagtap, M. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

27. Synergy of Heteroatom (P-F) in Nanostructured Triclinic Sn_3O_4 as an Anode, for Sodium Ion Battery, U. Chothe, A. Ambalkar, C. Ugale, M. Kulkarni, B. B. Kale, MEMP 2021, C-MET Pune, 8th-10th March, 2021.

28. Oral presentation on 'Futuristic Semiconductor – Crystal Growth and Challenges', M. V. Rokade, S. Mahajan, R. Ratheesh in National e-Conference on Materials for Emerging Technologies- 2021" (MET-2021) organized by School of Physical Sciences, P.A.H. Solapur University, Solapur on 22nd March, 2021.

29. "Direct laser writing on silicon surface for large area nanoplasmonic devices," Akshdeep Sharma, Bhargav G., A Kaushal, K. N. Bhat, A. Ghosh, Proc. SPIE 11610, Novel Patterning Technologies 2021, 116100I, 22nd Feruary, 2021.

30. Enhanced energy storage density for novel antiferroelectric composition, A. Choudhary, V. Priyadarsini, Athulpradeep, Varna V., V. Kumar, in International Conference on Multifunctional Electronic Materials & Processing (MEMP-2021) organized by C-MET, Pune on 8th-10th March 2021.

31. Stabilization of cubic phase in B-site acceptor doped Barium titanate, Jumana P.J., A. Anil, V. Kumar, in International Conference on Multifunctional Electronic Materials & Processing (MEMP-2021) organized by C-MET, Pune on 8th-10th March 2021.

32. Investigation of plasmonic properties in spin coated and spray coated IZO thin films, Soumya K., I. P. Selvam, S.N. Potty, 5th National Conference on Advanced Materials and Radiation Physics (online) organized by Department of Physics Sant Longowal Institute of Engg. & Technology Longowal, Distt. Sangrur (Punjab) during 9th-11th November, 2020.

33. Effect of RF power on structural, electrical, optical properties and surface plasmon resonance of sputtered AZO thin films, Soumya K, I P. Selvam, S.N. Potty, 5th International Conference on Emerging electronics (ICEE 2020) organized online by IEEE and hosted by IIT, Delhi, 26th-28th November, 2020.

34. "Fabrication of 16V, 70 F supercapacitor module using 200F graphene supercapacitors", P. J. Joy, F. Paul, P. B. Silpa, A. Seema in the "International Conference on Multifunctional Electronic Materials and Processing (MEMP 2021)" organized by C-MET Pune during 8th-10th March, 2021.

35. “Preparation and characterization of low temperature NTC probes”, C. J. Jithu, A. S. M. Haris, M. V. M. Raashid, S. Ashna, N. T. A. Paul, A. Seema in the “International Conference on Multifunctional Electronic Materials and Processing (MEMP 2021)” organized by C-MET Pune during 8th-10th March, 2021.

36. “Low-cost epoxy/carbon black composites for EMI shielding applications”, C. V. L. Variar, R. Sridharkrishna, M. N. Muralidharan, A. Seema in the “International Conference on Multifunctional Electronic Materials and Processing (MEMP 2021)” organized by C-MET Pune during 8th-10th March, 2021.

37. “Electrochemical studies of rGO/$NiMn_2O_4$ electrode material for supercapacitor applications”, H. Antony, P. B. Silpa, M. Pulikkottil, P. J. Joy, F. Paul, M. N. Muralidharan in the “International Conference on Multifunctional Electronic Materials and Processing (MEMP 2021)” organized by C-MET Pune during 8th-10th March, 2021.

38. “A comparative study on effect of charging parameters on hybrid supercapacitor, supercapacitor and battery packs”, V. M. Vishnu, V. Deepa, J. Varghese, P. A. Renny, E. B. Sreekumar, M. N. Muralidharan in the “International Conference on Multifunctional Electronic Materials and Processing (MEMP 2021)” organized by C-MET Pune during 8th-10th March, 2021.

39. "Biomass derived activated carbon and its suitability for high-performance supercapacitor electrode applications" M. Pulikkottil, P. J. Joy, M. N. Muralidharan, A. Seema in International Conference on green energy for environmental sustainability (ICGEES-2020) organized by Department of Chemical Engineering, NIT Calicut, 5th - 6th August, 2020.

40. “Development of thermal imaging from discrete thermal sensors in a wearable device and application in early detection of breast cancer” K. Arathy, E. Ignatious, M. N. Muralidharan, R. S. Sudheesh, A. Seema, in Online 2nd International Conference on Technology Convergence in Engineering, Energy and Sustainability (ICTCEES-2020) organized by Vimal Jyothi Engineering College, Kannur, 18th-19th July, 2020.

41. “Sacrificial salt for prelithiation of Lithium-ion capacitor” Anugragha M. G., A. K. Udayan, Abraham P. A, R. Panicker N, N.C. Pramanik, S. JacobK. InInternational Conference on Multifunctional Electronic Materials and Processing (MEMP-2021) organised by C-MET Pune during 8th-10th March, 2021.

42. "Controlling the pore size distribution of Carbon aerogel for lithium-ion capacitor" A. K. Udayan, Anugragha M. G, Abraham P. A, R. Panicker N, N.C. Pramanik, S. JacobK. InInternational Conference on Multifunctional electronic Materials and Processing (MEMP-2021) organised CMET Pune during 8th-10th March, 2021.

43. "Effect of chemical activation method on the properties of carbon aerogel for super capacitor application" H. Venu, A. Kumar P J, A. Madanan, Nithin K, Sumesh K R,Vishnuprasad V, Abraham P.A, R. Panicker N and S. Jacob K In International Conference on Multifunctional Electronic Materials and Processing (MEMP-2021) organised by C-MET Pune during 8th-10th March, 2021.

44. "Electrochemical Impedance spectroscopic analysis of carbon aerogel Based supercapacitor" A. Madanan, Vishnuprasad V, Ajithkumar P.J., Nithin K, H. Venu, Sumesh K. R, P.A. Abraham, R. Panicker N, S. Jacob K and A.Seema, inInternational e-Conference on Advancements in Materials Science and Technology,i-CAM 20 organisied by Sathya Bhama Institute of Science and Technology in association with Gyeongsang National University, Republic of Korea during 23rd-25th November, 2020.

45. "Activated Carbon as Positive Electrode material for Lithium-Ion capacitor", Anugragha M. G, A. K Udayan, Abraham P. A, R. Panicker N, N.C. Pramanik, S. JacobKinInternational e-Conference on Advancements in Materials Science and Technology,i-CAM 20 organized by Sathya Bhama Institute of Science and Technologyin association with Gyeongsang National University, Republic of Korea during 23rd-25th November, 2020.

46. "Importance of Positive electrode Composition on the performance of the Lithium-Ion capacitor", A. K Udayan, Anugragha M. G, Abraham P. A, R. Panicker N, N.C. Pramanik,S.JacobKinInternational e-Conference on Advancements in Materials Science and Technology, i-CAM 20 organized by Sathya Bhama Institute of Science and Technology in association with Gyeongsang National University, Republic of Korea during 23rd-25th November, 2020 (Best paper award).

47. MXene/Biopolymer composite films for EMI shielding applications, International Conference on Multifunctional Electronic Materials and Processing, M. Shajahan, V. kumari K. G. and T. Radhika, Multifunctional Electronic Materials & Processing (MEMP-2021) held at C-MET, Pune, 8th-10th March, 2021.

48. MXene coated nonwoven cotton fabrics for electronics applications, T. Radhika and K.G. Vasanthakumari, International Conference on Multifunctional Electronic Materials and Processing (MEMP-2021), held at C-MET, Pune 8th-10th March, 2021.

49. Polymer Composites based Wearable Smart Bands for Biomedical Sensing Applications, A. P Nair, Sivalekha T S, S.Khatua, A. K. Arulraj. International Conference organized by C-MET Pune on Multifunctional Electronic Materials and their Processing (MEMP-2021) from 8th-10th March, 2021.

50. Flexible and Wearable Semiconducting Polymer-based pH sensor, Sivalekha T S, Anjali P Nair, S. Khatua, and A. K. Arulraj, International Conference organized by C-MET Pune on Multifunctional Electronic Materials and their Processing (MEMP-2021) from 8th-10th March, 2021.

51. Ultrahigh Sensitive Carbon-Based Conducting Rubbers for Flexible and Wearable Human–Machine Intelligence Sensing, A. Ajeev, B. H. Javaregowda, A. Ali, M. Modak, S. Patil, S. Khatua, M. Ramadoss, P. A. Kothavade, and A. K. Arulraj, International Conference organized by C-MET Pune on Multifunctional Electronic Materials and their Processing (MEMP-2021) from 8th-10th March, 2021(Best poster award).

52. Thermally stable electrostrain and energy storage density in Lead-free $Na_{0.5}Bi_{0.5}TiO_3$ based ceramics, A. Joji, Y. Chandran, K. Ravindran, Susanth S, Sunny E K, R. Natarajan, Karthik T, at Presented at International Conference on Multifunctional Electronic Materials and Processing (MEMP) held on 8th-10th March, 2021, organized by C-MET Pune. (Best Poster Award).

7.6 Invited lectures by C-MET Scientists

1. **Dr. B. B. Kale** delivered invited talk at one day International Workshop on Advances in Functional Materials – A Virtual Event Jointly Organized By MRSI, MASc and Parner college on 15th December, 2020.

2. **Dr. B. B. Kale** delivered invited talk at one day International Webinar on Innovations in Materials for Energy and Environment 9th August 2020.

3. **Dr. B. B. Kale** delivered talk at Live Webinar on Materials Research and Sustainable Technologies (MRST) Organized by Maharashtra Academy of Sciences (MASc) July, 28th 2020.

4. **Dr. B. B. Kale** delivered invited talk at one day international conference on “2D Nanomaterials: Recent Developments and Future Avenues” held on 24th-26th February, 2021.

5. **Dr. B. B. Kale** delivered talk at Webinar on Faculty orientation Program under MeitY, Govt of India sponsored project Creation of R&D Culture in Electronic Materials among SC/ST Students in Maharashtra on22nd January, 2021.

6. **Dr. B. B. Kale** delivered talk at Live Webinar on Thin Film Solid State Batteries under Scheme for Promotion of Academic and Research Collaboration (SPARC) Ministry of Human Resources and Development, Government of India & UK-India Education and Research Initiative (UKIERI).

7. **Dr. B. B. Kale** delivered talk at Amity University Maharashtra, Mumbai on 30th September, 2020 organizing online Guest Lectures/Webinars free to audience by Industry experts, Eminent Scientists / Academicians for knowledge sharing, knowing each other’s work etc.

8. **Dr. B. B. Kale** delivered PLENARY TALK in FMT 2020,13th-14thOctober, 2020, KIIT deemed to be University.

9. **Dr. B. B. Kale** delivered talk at Vaibhav Summit on topic Advanced Functional Materials & Recycling of Materials 2nd- 31st October, 2020.

10. **Dr. G. J. Phatak** delivered an invited talk on “Heterogeneous Integration and Packaging” during Vaishwik Bharatiya Vaigyanik (VAIBHAV) Summit on 09th October, 2020.

11. Invited talk on Microsystems Packaging was delivered by **Dr. G. J. Phatak** in One Day Virtual Workshop on "Microsensor Applications in Defense and Aerospace, ISSS on 16th March, 2021.

12. **Dr. G. J. Phatak** delivered an invited talk on 3d Printing; Material Aspects on 26th March 2021 during Future Skill Training Workshop on "3D printing and Design" under the aegis of NPIU, TEQIP III at College of Engineering Pune during 27th Feb - 27th March, 2021.

13. **Dr. Milind V. Kulkarni** delivered an invited lecture on "Nanomaterials and Nanocomposites for Advanced Multifunctional Applications" International Workshop on Research Methodology APS College B'lore on 19.06.2021.

14. **Dr. Milind V. Kulkarni** delivered an invited talk on 'Li – ion Battery Development: Mobile to Mobility' 1st World Rechargeable Cell Technology Conference (WRCTC-1) 1-3rd 2021, C-MET, Pune.

15. **Dr. Milind V. Kulkarni** delivered an invited lecture on "Nanomaterials and Polymer Nanocomposites for Multifunctional Applications" at College of Military Engineering (CME), Pune on 12th August 2021.

16. **Dr. Milind V. Kulkarni** delivered an invited lecture on "Development of an Indigenous Polymeric Swab for COVID-19 Testing" at National Webinar on "Challenges, Innovations and Adaptations of COVID-19: Science and Society Perspectives" organized by K. J Somaiya College Mumbai, on 29th October 2021.

17. **Dr. Milind V. Kulkarni** delivered an invited lecture as a Resource Person on "Different Form Factors of Lithium-ion Batteries" at SAEISS and IESA academy organized online lecture series on 'Advanced Lithium-ion Battery for EV' on 6th-10th December 2021

18. **Dr. Milind V. Kulkarni** delivered an invited lecture on "Future Advancement of Lithium-ion Battery" at SAEISS and IESA academy organized online lecture series on 'Advanced Lithium-ion Battery for EV' on 6th-10th December 2021

19. **Dr. Milind V. Kulkarni** delivered an invited lecture on "Development of Battery Material for EV Applications" at Refresher Program on 'Recent Advancement in Electric Vehicle Technology' sponsored by AICTE –Indian Society for Technical Education (ISTE) and organized by G. H. Raisoni Institute of Engineering & Technology, Pune on 10th -16th, December 2021.

20. **Dr. S. Joseph** delivered an invited talk on LTCC & Lead-free Activity @ C-MET during the special seminar conducted by MRSI for "Women in Material Science" on 30th March, 2021.

21. **Dr. R. S. Kalubarme** has delivered an invited talk on Advanced Energy Storage Devices in International Seminar on Energy Conversion and Energy Storage, K.B.P. College Vashi. Navi Mumbai, 12th January, 2021.

22. **Dr. S. B. Rane** delivered an invited online talk on "Green materials for electronics and energy applications" on 12th June, 2020 at "Five Days Online Faculty Development Programme on Green Energy and Renewable Energy for Physics and Electronics Teachers" jointly organized by Dhanaji Nana Mahavidyalaya, Faizpur and Faculty Development Centre, HRDC, Savitribai Phule Pune University, Pune during the period from 8th – 12th June, 2020.

23. **Dr. S. B. Rane** delivered an invited online talk on "Controlled Synthesis of Nanomaterials for Advanced Applications" on 27th June 2020 at One-week national webinar organised by Department of Physics, TC college, Baramati during 24th-29th June, 2020

24. **Dr. S. B. Rane** delivered an invited talk on "Development of Electronic Materials at C-MET" at HPT RYK College, Nashik on 7th November, 2020.

25. **Dr. S. B. Rane** delivered an invited talk on "Materials Development at C-MET for Energy, Environment and Sustainable Development" on 8th January, 2021 at AICTE approved Quality Improvement program-short term course on Energy Environment Management for sustainable Development during 7th -12thDecember, 2020 at Department of Mechanical Engineering, IIT-BHU, Varanasi.

26. **Dr. S. B. Rane** delivered an Invited online Talk on "Development of Advanced Materials for Electronics and Energy Applications" at AICTE-ISTE Sponsored Refresher Program "Recent Development in Advanced Materials" organized by G H Raisoni College of Engineering & Management, Pune on 6th March, 2021.

27. **Dr. S. B. Rane** delivered an invited talk on "Materials for Electronics Packaging and Additive Manufacturing (3D Printing) Technology" on 16th March, 2021 at Spring 2021, Tokushima University, Japan.

28. **Dr. M. Shinde** delivered an online Talk at "National Webinar on Industrial Nanotechnology" organized by Department of Nanoscience and Technology, Yashavantrao Chavan Institute of Science (YCIS), Satara on 20th March, 2021 on the topic 'Nanomaterials for Sensor Applications'.

29. **Dr. M. Shinde** delivered an online Talk at AICTE-ISTE Sponsored Refresher Program "Recent Development in Advanced Materials" organized by G H Raisoni College of Engineering & Management, Pune on 6th March, 2021 on the topic 'Nanomaterial Synthesis & Characterization Techniques'.

30. **Dr. M. Shinde** delivered an Online Talk at "Basics of Nanoscience Course" organized by Modern College of Arts, Science and Commerce, Pune on 13th February, 2021 on the topic 'Structural and Morphological Characterization Nanomaterials'.

31. **Dr. M. Shinde** delivered an Online Talk at One-Day National Level Webinar on Hybrid Nanomaterials for Energy Applications, Organized by G. M. Vedak College of Science, Tala, Raigad on 20th March, 2021 on topic 'Applications of Nanomaterials'.

32. **Dr. R. P. Rao** has delivered an invited talk on X-ray diffraction for structural characterization of materials at A five-day online faculty development programme on characterization of materials, organized by JNTUK-University College of Engineering Vizianagaram on 5th August, 2020.

33. **Dr. R. P. Rao** has delivered an invited talk on Rietveld refinement for crystal structure determination at Synthesis, at Characterization and applications of advanced materials, organized Department of Physics, APIIIT-Nuzvid on 17th September, 2020.

34. **Dr. R .P. Rao** has delivered an invited talk on Solid electrolytes for Lithium sulfur rechargeable batteries: An overview, at Nanoscience and Nanotechnology Web series, organized Department of Physics, Pandit Deendayal Petroleum University, Gandhinagar on 11th September, 2020.

35. **Dr. R. P. Rao** has delivered an invited talk on All-Solid-State batteries present, at Virtual International Workshop on Energy Storage Technologies for E-Mobility, organized SRM University, Chennai on 26th March, 2021.

36. **Dr. R. Ratheesh** delivered an invited lecture on "Microwave Printed Circuit Board Activities at C-MET" in the Working Group on Printed Circuit Boards of National Aeronautics and Space Administration (NASA), USA on 5th August, 2020.

37. **Dr. R. Ratheesh** delivered an invited talk titled "Sustainable Environmental Friendly E-waste Recycling Technology in India: Challenges and Opportunities" in the Emerging Technologies & Methodologies in Analytical Sciences webinar organized by Indian Society of Analytical Scientists on 8th August, 2020.

38. **Dr. R. Ratheesh** delivered an invited talk titled "Environmental Friendly Recycling of Polymer/Ceramic Printed Circuit Boards" in the 3rd International Round Table Symposium on Frontiers of Advanced Ceramic Materials organized by University of Cologne, Germany on 4th December, 2020.

39. **Dr. R. Ratheesh** delivered an invited talk on High end Microwave Circuit Materials: Sustainable Development and Management in Informative, Invigorating and Inspirational (I^3T) Talk Series on 22^{n}d January, 2021 at ARCI in connection with Golden Jubilee Celebrations of DST.

40. **Dr. R. Ratheesh** delivered plenary lecture on High End Microwave Printed Circuit Boards: Indigenous Development and Commercialization on 26th March, 2021 in the International Symposium on Advanced Materials organized by Material Research Society of India.

41. **Dr. Y. Purushotham** delivered an invited talk on Materials Processing & Technology organized by Department of Physics & Chemistry, Mahatma Gandhi Institute of Technology, Hyderabad on 27th June, 2020.

42. **Dr. R. C. Reddy** delivered an Invited talk on Ultra High Purification of Metals for Electronics at Faculty Development Program on Recent Innovations in Chemical Engineering (RICE), organized by Bheemanna Khandre Institute of Technology (BKIT), Bhalki, Bidar, Karnataka on 2nd July, 2020.

43. **Dr. Y. Purushotham** delivered an invited talk on Current research in materials Science organized by Department of Physics, University PG College, Palamuru University, Mahabub Nagar on 25th July, 2020.

44. **Dr. Y. Purushotham** delivered an invited talk on Engineering Physics and Materials Science organized by Department of Physics, Chaitanya Bharathi Institute of Technology, Hyderabad on 7th August, 2020.

45. **Dr. R. C. Reddy** delivered an Invited talk on Recent Developments in Materials and Technology at Faculty Development Program on "Recent developments in Tools, Technologies and materials in Mechanical Engineering organized Alva's Institute of Engineering and Technology, Moodbidri, Karnataka on 21st November, 2020.

46. **Dr. S. R. Kumar** delivered a talk on "E- Waste management opportunities and challenges" at One day National Workshop on E-waste Management organized jointly by C-MET & C-DAC on 9th February, 2021.

47. **Dr. U. Rambabu** delivered a lecture on "Toxicity of Restricted Substances in E-waste" at One day National Workshop on E-waste Management organized jointly by C-MET & C-DAC on 9th February, 2021.

48. **Dr. D. S. Prasad** delivered a lecture on "New Challenges in E-waste Management – Recycling of EoL Si Solar Cell Modules" at One day National Workshop on E-waste Management organized jointly by C-MET & C-DAC on 9th February, 2021.

49. **Dr. A. Kaushal** delivered a lecture on "Extended Producer Responsibility (EPR) for Waste Electronics: Need and Implementation" at One day National Workshop on E-waste Management organized jointly by C-MET & C-DAC on 9th February, 2021.

50. **Dr. R. C. Reddy** delivered an Invited talk on Process Stabilization and Optimization in Solvent Extraction Process of Hafnium at the AICTE Sponsored one week online Short Time Training Programme on Design of Experiments (DOE) and Optimization Techniques organized VEMU Inst. of Technology, P. Kothakota, Andhra Pradesh on 13th February, 2021.

51. **Dr. S. R. Kumar** delivered a lecture on "Science, Technology and Innovation: success stories from CMET for Atmanirbhar Bharat" Science Day lecture, at St. Xavier's College, Trivandrum on 6th March, 2021.

52. **Mr. A. Kumar** delivered an Invited talk on "E-waste Recycling: Journey from Waste to Wealth" at CEP course on Metal extraction and recycling technologies, organized by DMRL, Hyderabad (15th-17th March, 2021) on 16th March, 2021.

53. **Dr. V. Kumar** has delivered the inaugural talk on "Chemistry of Materials" in the online Refresher course in Chemical Sciences organized by UGC ASC, Kannur University Kannur on 14th August, 2020.

54. **Dr. S. N. Potty** has delivered an invited talk on "Indigenous development of electronic materials and devices" in the online Refresher Course in Physical Science for the teachers conducted by UGC-Human Resource Development Centre, Kannur University on 15th October, 2020.

55. **Dr. S. N. Potty** has delivered an invited talk on "Introduction to electronic materials" in the online National Webinar series organized by Department of Physics, Sree Narayana College, Punalur on 5th January, 2021.

56. **Dr. S. N. Potty** has delivered an invited talk (online) on "An overview of Electronic Materials" in the National Day Celebrations held at the P.G Department of St. Cyrils College, Adooron 27th February, 2021.

57. **Dr. A. Seema** has delivered an invited talk "Indigenous Technology on Graphene Supercapacitors" in the Webinar "Supercapacitors as Energy Storage Device" conducted by CPRI for showcasing the innovative technologies developed to the relevant stakeholders on 16th June, 2020.

58. **Dr. A. Seema** has delivered an invited talk "Women in Science-Facts and Prejudice" in Webinar Conduced by Dept. of Physics, Christ College (Autonomous), Irinjalakuda, Thrissur on 30th September, 2020.

59. **Dr. A. Seema** has delivered an invited talk "Self-Reliance in Electronic Materials and Devices: An R&D Perspective" in Women Scientists and Entrepreneurs Conclave conducted CSIR-CECRI held on 8thDecember,2020 in connection with India International Science Festival-2020.

60. **Dr. A. Seema** has delivered an invited talk "Self-Reliant India: An R&D Perspective" in Third webinar of Series 'Women Leaders in STEM' 2020 conducted by KSCSTE, Govt. of Kerala held on 17th December,2020.

61. **Dr. A. Seema** has delivered an invited talk "Contact thermometry for Early Detection & Mass Screening of Breast Cancer" in the National Science Day 2021 programme conducted by Amrita School of Pharmacy on 2nd March, 2021.

62. **T. Radhika** has delivered a talk in School of Chemical Sciences, Kannur University, Kannur on 15th August, 2020.

63. **T. Radhika** has delivered a talk in Dept. of Chemistry, St. Mary's College (Calicut University), Thrissur, on 27th February, 2021.

64. T. Radhika has delivered a talk in Dept. of Chemistry, SNGS College, Pattambi (Calicut University) on 27th February, 2021.

65. **Dr. A. A. Kashmir** has delivered an invited talk in the Webinar on "Wearable Biomedical Devices – Synthesis, Fabrication and Applications" conducted by Haribhai V. Desai College of Commerce, Arts and Science, Pune, Maharashtra on 26th June, 2020.

66. **Dr. A. A. Kashmir** has delivered an invited talk in the Webinar "Human Brain Diseases - Chemistry and Physics Aspects of Early Diagnosis and Treatment" conducted by VPMM college of Arts and Science for Women, Tamil Nadu on 25th July, 2020.

67. **Dr. Karthik T** has delivered an Invited Talk on " Intelligent Sensor Systems, Internet of Things (IoT)nand Artificial Intelligence (AI) for future Technologies", at International Workshop organized by IDC Foundation in association with IEEE-PDM-SB, IEEE-IMS/EMBS Chapter on 24th September, 2020.

68. **Dr.Karthik T** has delivered an invited talk on "Piezoelectric Materials and Devices-A technological Perspective" at Two day Faculty Development :Programme on Advanced Computational and Experimental Resaerch in Physics organized by SRM Institute of Science and Technology, Chennai on 27th July-8th August, 2020.

7.7 Honors and recognitions

1. **Dr. B. B. Kale** has received an international award Fellow of Asian Pacific Advanced Material Society (APAM) Academician, Singapore.

2. **Dr. B. B. Kale** has elected as a Fellow of Royal Society of Chemistry, (FRSC) London, UK.

3. **Dr. B. B. Kale** has elected as a Life Time Fellow of Indian Chemical Society, Kolkata.

4. **Dr. S. B. Rane** has been elected as a Secretary, MRSI, Pune Chapter.

5. **Dr. R. S. Kalubarme** has been elected as a Young Associate of Maharashtra Academy of Science.

6. **Dr. R. R. Hawaldar** has been elected as a Young Associate of Maharashtra Academy of Science.

7. **Dr M. V. Rokade** received 1st prize in oral presentation on his paper in National e-Conference on Materials for Emerging Technologies- 2021" (MET-2021) organized by School of Physical Sciences, P.A.H. Solapur University, Solapur on 22nd March 2021.

8. **Dr. R. Ratheesh** is nominated in the Advisory Board of Indian Society for Analytical ScieWntists.

9. **Dr. D. S. Prasad** has been nominated as Member of Board of Studies (BoS) in Physics, Department of Physics, Vignan Bharati Institute of Technology, Hyderabad for the year (2020-21).

10. **Dr Y. Purushotham** has been nominated as Member of Board of Studies (BoS) in Physics, Department of Physics, Chatanya Bharathi Institute of Technology, Hyderabad for three years (2021-24).

11. **Dr Y. Purushotham** has been nominated as Member of Board of Studies (BoS) in Physics, Department of Physics, Teegala Krishna Reddy Engineering College, Hyderabad for three years (2021-24).

12. **Dr. S. N. Potty** has been nominated as Member of Board of Studies (BoS) of Engineering (PG) of the APJ Abdul Kalam Technological University, Kerala.

8. C-MET's future area of research

8.1 Future area of research

The following activities are planned to explore the cutting-edge technologies in advanced electronic materials;

- Development of multilaterals 3-D printing machine and inks, microwave devices for strategic and commercial applications.
- Development of metal, ceramic and semiconductor based FFF filaments for 3D printing of electronic components.
- Development of conductive inks for RFID tag antenna and flexible applications.
- High energy storage devices by researching on active materials for batteries for e-vehicle applications (supercapacitors, lithium-ion battery).
- Development of 3-D printing inks and microwave devices for strategic and commercial applications.
- Development of 3-D printing machine and materials for fabrication of LTCC packages and circuits.
- LTCC based liquid cooling devices for high performance computing.
- Development of Perovskite and thin film Solar Cells.
- Development of Li-S battery, Na-Ion battery and solid-state battery.
- Development of Organic battery.
- Indigenous sensors for internet of things (IoT) and smart cities applications.
- Microwave substrates, terahertz and millimeter wave materials.
- Cost effective and environmentally friendly recycling technologies and RoHS testing.
- Silicon carbide electronic device grade substrates for strategic and commercial applications.
- NTC materials for low temperature applications for air port weather monitoring system (-90°C to +50°C).
- EMI-shielding materials, nano powders of aluminum, iron, boron, Boron nitride, boron carbide, aluminum nitride for strategic applications.
- Graphene based electrical, optical and acoustic attenuators for medical, consumer and strategic applications.
- Cost-effective plasmonic materials based portable biosensors and gas sensors
- Plasmonic for photostable nanoparticles in medical applications such as Plasmonic devices for cancer detection.
- Stretchable electronic devices.
- MXene based 2D materials for electronics applications.

C-MET's Roadmap for 2025

C-MET Pune

1. Centre of Excellence in Rechargeable Battery Technology
Funded by: MeitY; Duration: 13.09.2019 to 12.09.2024; Total cost: 2087.67 Lakh

Vision : Nurture Indian industry for manufacturing of rechargeable battery (Li-ion/Na-ion).

Mission : To build capacity in all verticals of Indian rechargeable battery (Li-ion/Na-ion) manufacturing eco-system through focused and coordinated R&D.

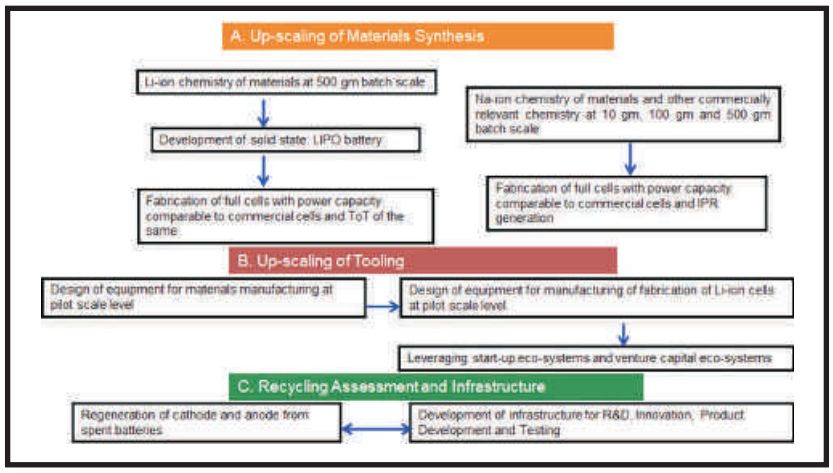

Figure 86: CoE in RBT

Manpower to be trained under COE

- **About 25 project students and 60 number of R&D personnel from industries will be trained under this CoE.**
- **About 25 start-ups will also be targeted to generate from this CoE.**

2. Center of Excellence on Additive Manufacturing (CoE AM)
Funded by: MeitY; Duration: 3 years; Total cost: 5711.88 Lakh

Vision : Nurture manufacturing in India through the process of Additive Manufacturing

Mission : To build capacity in all verticals of Indian Additive Manufacturing Eco-system, through focused and coordinated research, design and development.

The objective of the project includes creation of a self-sustaining Center of Excellence on Additive Manufacturing which will support to Indian Additive Manufacturing Eco-system with a focus on developing indigenous materials (metal, ceramic, semiconductor and composite) and machine for AM technology for current and next generation electronic components / products.

C-MET, Hyderabad

3. Center of Excellence in E-waste Management (CoE E-waste)
Funded by: MeitY; Duration: 30.09.2019 to 29.09.2024; Total cost: 3580.00 Lakh

Vision : To create an e-waste management ecosystem in India
Mission : To lead transformation by creating a conducive e-Waste Management ecosystem which nurtures innovation, entrepreneurship, and capability building

Centre of Excellence will host physical infrastructure and knowledge hub for cost-effective technology solutions on E-waste management and recycling for SMEs, start-ups dismantlers, formal and informal recyclers. The CoE also encompasses accelerated program through grand challenge for swift technology solutions on pan India basis. Signing of MoU with pioneered academic/R&D institute for PhD and MTech is another strategy considered under CoE to create expert manpower within the country on E-waste management. CoE will enable the empowerment of informal E-waste recyclers in the country, safe disposal of end of life electrical and electronic devices, recovery of precious metals from E-waste, strengthening of current engineering ecosystem to improve the process efficiency, skill development for prosperous entrepreneurs and nurturing of start-ups, through skill development trainings and awareness programs. This facility will also nurture start-ups to develop their ideas, offer training to MSMEs for dismantling practices, attract informal E-waste recyclers to practice environmentally benign recycling practices, providing training to empower the Indian electronic and electrical industries on the E-waste Management Rule (2016) etc. The RoHS facility available at C-MET, Hyderabad will be helpful in this respect. CoE is also aiming at design & development of automated process equipment for e-waste recycling which can be roll out in the country along with technology dissemination.

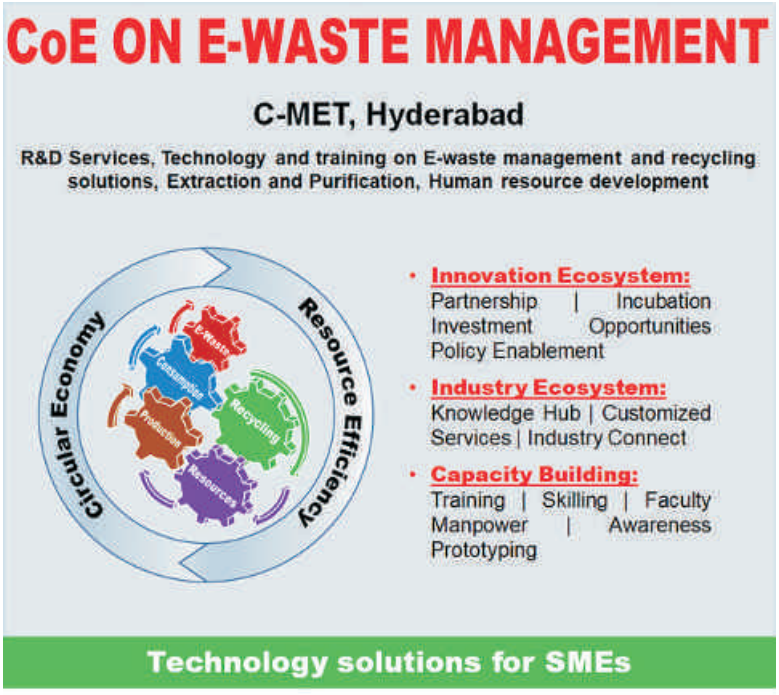

Figure 87: CoE in E-Waste Management

SiC Single Crystal Growth & Wafer Fabrication for Electronic Device Applications

Silicon carbide (SiC), an indirect wide bandgap (2.3–3.2 eV) IV-IV compound semiconductor, has very fascinating and extraordinary electronic properties for advanced applications - such as high temperature, high power, high frequency, high pressure and other strategic areas owing to its wide band gap, high thermal conductivity and high breakdown field. It also possesses high field strength (approximately 10 times more than that of Si), high saturation drift velocity (higher than GaAs) and its electrical characteristics indicate that SiC based devices can be more efficient and miniaturized when compared to silicon-based devices.

In recent years, the GaN/SiC professional community has grown rapidly in both academia and industry. C-MET has established an advanced SiC single crystal growth facility at Hyderabad for growing SiC Single Crystals (2″ diameter) to support DRDO program. C-MET has successfully grown 2″ diameter 6H polytype of SiC single crystal boules using physical vapour transport (PVT) technique, first time in the country.

Figure 88: SiC single crystal for Electronics Device Applications

Roadmap for Silicon Carbide (SiC) Single crystals for Electronics Device Applications

After SiC growth, boules should have to be converted into device grade wafer for subsequent use in advance electronics device fabrication. SiC wafer preparation starts with growth of single crystal ingots and then a series of steps are needed to turn an ingot into acceptable device grade wafers. In India, various groups / universities / IIT's are working on SiC based devices by growing SiC layer, however most important element of devices i.e., device grade substrate with sufficient size (4″ / 6″) is yet to be produced in India. SiC single crystal wafers with low defects and large diameters are strongly needed in the country for fabrication of large number of devices. By implementing this project, C-MET has the chance to fulfil country's some of requirement of SiC substrate for electronic devices. Once the targeted goals are achieved, it is expected to make tremendous impact and technology fallouts on device fabrication for next generation electronics.

Development of 12 N Germanium

Germanium is used as a semiconductor in transistors and various other electronic devices. Historically the first decade of semiconductor electronics was based entirely on germanium. Presently, germanium's major end uses are in infrared optics and in solar cell applications. Germanium compounds are also used for polymerization catalysts and have most recently found use in the production of nanowires. Zone refining techniques have led to the production of crystalline germanium for semiconductor applications.

The demand for ultrahigh purity metals is increasing rapidly because of more stringent specifications for materials used in high performance information devices. The principle of removing trace impurities from metals looks in general simple. Impurities in metal or semi-metals can be removed by lowering the chemical potentials of the impurity elements outside the metal. Since the chemical potential of an impurity approaches minus infinity as the concentration tends to zero, there are practical limits to ultra-purification. It is even more difficult to remove impurities which have a strong affinity for the metals. High purity reactivity metals such as Ge, Cd, Zn etc. contain often more gaseous elements than metallic impurities mainly because of contamination from atmosphere during processing. This process demands for stringent clean environment while processing. In general, purification techniques depend mostly on the differences in physico-chemical properties of the major metal and impurities. To reach the desired ultra-high purity, a sequence of complementary refining steps namely chemical, electro-chemical and physical methods are applied, usually in order.

Induction zone refining is the ultimate purification technique for purification of Ge (up to 12N) in limited quantities. Induction heating is the method of raising the temperature of an electrically conductive material by subjecting it to an alternating electromagnetic field.

During the VAIBHAV Summit, it was proposed to take up i) Germanium purification up to 12N with low dislocation density, ii) Ge alloys such as GeP, SiGe by induction zone refining and iii) Ge single crystal by Czochralski technique.

Figure 89: Induction Zone Refined 7N Germanium ingot

C-MET Thrissur

4. Centre of Excellence (CoE) in intelligent Internet of Things (IIoT) Sensors

The main objective of this project is to establish a Centre of Excellence (CoE) in Kochi, adjacent to Electronics incubator facilities of Maker Village by utilizing the complimentary sensor research, development and applications expertise at Centre for Materials for Electronics Technology (C-MET), Thrissur, and Indian Institute of Information Technology and Management Kerala (IIITM-K), Trivandrum. The application domains of the CoE will be developed with the support of industry partners, including start-ups at Maker Village, as well as that in the Kerala Startup Mission ecosystem.

1. To translate the research on sensors (temperature, humidity, pressure and acoustic) to commercially valuable products.
2. To create the state-of-the-art facilities for: (1) sensor manufacturing, (2) intelligent sensor system hardware and AI software development, and (3) comprehensive compliance testing.
3. To implement innovative products and solutions for the industry those are specifically tuned to cater the industry needs.
4. To provide a common facility to industries for prequalification of the electronic products for obtaining the certificate of conformity and compliance.
5. To provide business and mentorship support to Startup companies along with the facilities to realize an industry standard product solution with intelligent IoT sensors.
6. To promote innovation and entrepreneurship through design challenges, outreach programs and incubation grants.

CoE on Intelligent IoT Sensors

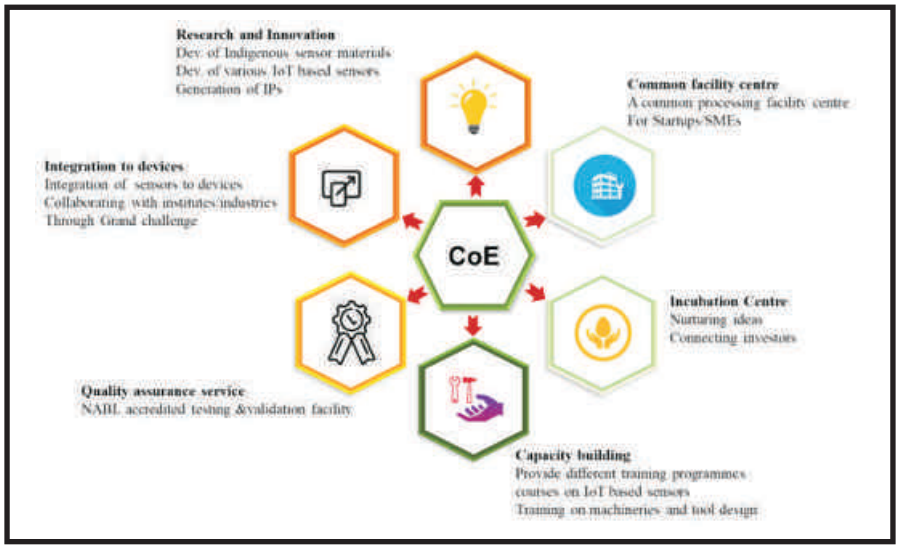

Figure 90: CoE on IoT sensors

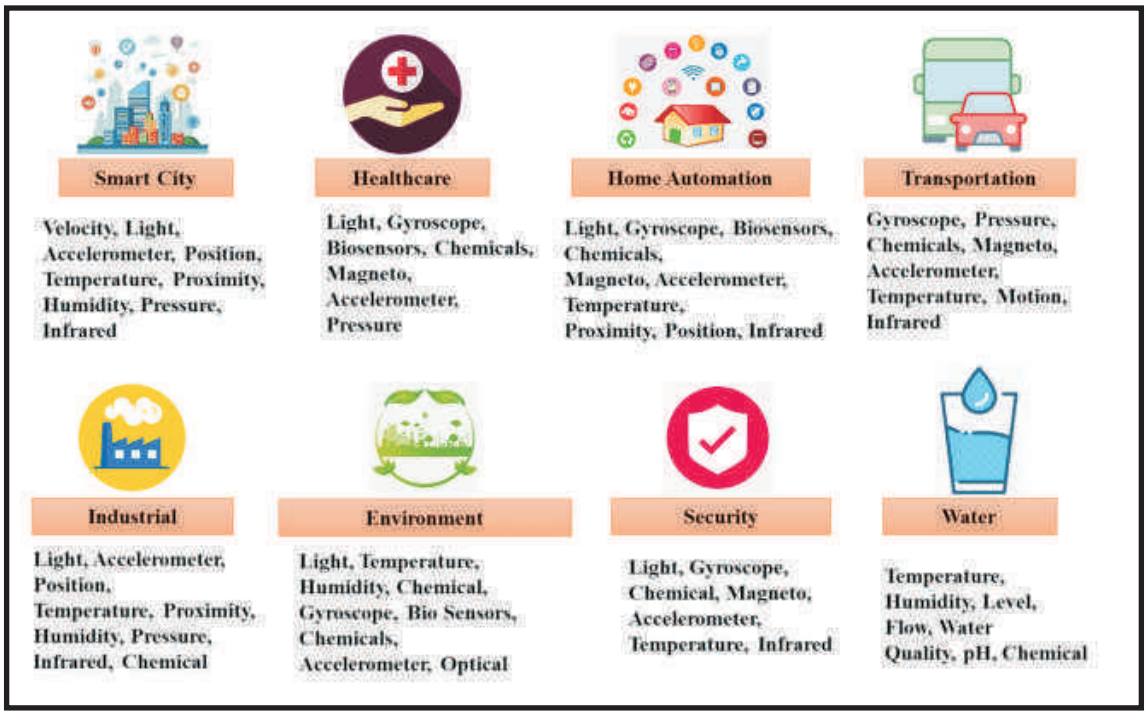

Figure 91: CoE IoT sensor applications

9. Others

9.1 Plans and prospects

C-MET implemented the projects in accordance with its approach and strategy. The key features of plans and prospects are:

1. To enhance the competency in advanced areas of science and technology in order to keep pace with the world scenario of electronic materials through in-house and grant-in-aid projects with inter and intra laboratory involvement.
2. To continue the interactions /working relations with strategic sector for development of critical materials and products through sponsored projects.
3. To continue the technical and materials characterization services to industries for enhanced scope for consultancy projects, chemical analysis and certification for the compliance.
4. To be a front runner in R&D of electronic materials and collaborate with esteemed international and national institutes/universities for creating common platform on knowledge sharing basis.
5. To develop impactful products and technologies through exploratory and requirement driven applied research.

9.2 RTI matters

Central Public Information Officer (CPIO)/ Appellate Authority (AA)/ Assistant Public Information Officer (APIOs) are identified in C-MET for receipt and disposal of applications/ appeals under RTI Act, 2005. C-MET has also hosted relevant inputs/ documents in website, as required under Section 4 of the RTI Act. The relevant contents are reviewed and updated periodically.

During the year 2020-21, 26 RTI applications (16 online and 10 physical) were received on the following subjects:

Sr. No.	RTI Subjects	No. of Application recd.
1.	Fellowship-Grants unpaid	01
2.	Leave Rules for CSIR- JRF	01
3.	Hierarchy level to Admin Staff	01
4.	Employment Pjt staff	01
5.	List of employees attended ICSEA Conference	01
6.	Skill development scheme in C-MET	01
7.	PRMRPY Scheme	01
8.	Working hours in C-MET	01
9.	Children & Education allowance reg.	01
10.	Compensate appointment	01
11.	Reservation (Disability)	01
12.	Skilled/unskilled workers in C-MET	01
13.	Peer Review information	01
14.	New Pension Scheme	01
15.	Outside information & lien on the post	01
16.	Contracts to various agencies	01
17.	Recruitment Rules for– Advt. 1/2020	01
18.	Personal Information of employees	01
19.	Not related to C-MET	08
	Total applications received:	26 Nos.

Appeal Subjects	No. of Appeal recd.
Children education allowance reg.	01
DPC/Promotion related	01

9.3 Public grievances

No public grievances were reported in C-MET during 2020-21.

9.4 Parliament matters

During the year 2020-21 the following Parliament Questions were replied: Lok Sabha 11 (3 Starred and 8 Unstarred), Rajya Sabha 19 (11 Starred and 8 Unstarred). The above questions related to SC/ST Scientist recruited in the last five years indicating the level of the different posts along with category, Cases pending before Tribunals, Inter-Ministerial Litigation, Internal Complaints Committee, Sexual Harassment of Women at Workplace, Assessment of Employment generation during the last 5 years, Vacancies under reservation in govt. Organizations, Employment recruited through Outsourcing, Vacant posts in Central Government, Foreign training of officials, High expenses on government litigation, Law Suits faced by Department, Funds used under Corporate social Responsibility, Promotion on Public rating, Employment Opportunities to youth, Prosecution of Government employees, Equal Pay for Equal Work, Representation of scientists from SCs & STs- seeking inputs, Women and Child Development, Appointment of Consultant etc.

9.5 Gender empowerment/Prevention of sexual harassment of women at work place

No cases of sexual harassment on women were reported in C-MET during 2020-21.

9.6 Activities undertaken for the benefit of differently abled persons

- Identifying and reserving the type of jobs which could be easily performed by PwD for Group 'B', 'C' & 'D' posts.
- Imparting post-recruitment & pre-promotion training.
- Providing aids / assistive devices.
- Providing barrier-free and accessible work-station to PwD.
- Redressing grievance through Liaison Officer to look after the reservation matters relating to PwD as well as issues relating to providing of amenities to them.
- Sanctioning 4 days' Special Casual Leave to PwD for specific requirements relating to their disabilities subject to exigencies of work. Also granting 10 days' Special Casual Leave in a calendar year to differently abled employees for participating in Conferences / Seminars / Training / Workshops related to disability and development.
- Exempting PwD from rotational transfer and posting as far as possible. Also considering choice posting in case of PwD subject to administrative constraints.

9.7 Details related to vigilance cases

At various intervals of time, Monthly Report, Quarterly Report and Annual Reports were sent to CVO, MeitY. More than (P+12+15) cases of vigilance clearance certificates were issued to staff in c/w promotion, passport, outside applications, and visit of abroad etc. Vigilance Awareness Week had observed during 28th Oct to 02nd Nov, 2019 and taken pledge by each one of the staff. Banners were prepared and put them on various places in this office. During the period under report, no vigilance case is pending or contemplated against any of the employees.

At various intervals of time, Monthly Report, Quarterly Report and Annual Reports were sent to CVO, MeitY. Vigilance clearance certificates were issued to staff in c/w promotion, passport, outside applications, and visit abroad etc. Vigilance Awareness Week had observed during 27th Oct to 02nd Nov, 2020 and taken pledge by each one of the staff. A Lecture has been arranged by the Commissioner of Police, Rachakonda Commissionerate on 2nd November 2020. Banners were prepared and put them on various places inside the campus. During the period under report, no vigilance cases are pending or contemplated against any of the employees.

ANNUAL REPORT 2020-21

C-MET

AUDITOR REPORT AND

ANNUAL ACCOUNTS

FOR THE YEAR 2020-21

M/S. VDA Associates, Chartered Accountants
10, Satsnag Society, Near Vaikuntha, Opp. L B Shashtri Road,
977, Navi Peth, Pune - 411030.

INDEPENDENT AUDITORS' REPORT TO THE CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY (C-MET)

Report on the Financial Statements

We have audited the accompanying financial statements of Centre for Materials for **Electronics Technology, C-MET,** which comprise the Balance Sheet as at 31st March, 2021, and Income & Expenditure Account for the year then ended, and a summary of the significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

The Management of Centre for Materials for Electronics Technology, is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance in accordance with the Accounting Standards applicable to non-corporate entities issued by Institute of Chartered Accountants of India in accordance with the accounting principles generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and the disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error.

In making those risk assessments, the auditor considers internal control relevant to the Society's preparation and presentation of the financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of the accounting estimates made by the Management as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements read with Annexure to Audit Report and Notes to Accounts (schedule 6) annexed herewith give a true and fair view in conformity with the accounting principles to the extent applicable to the Society:

a) in the case of the Balance Sheet, of the state of affairs of the Society as at 31st March, 2021; and

b) in the case of the Income & Expenditure Account, of the surplus of the Society for the year ended on that date;

For M/s VDA Associates
Chartered Accountants
Firm Registration No. 119179W

CA Pavan Sharma
Membership No. 170497
(Partner)

Place: Pune.
Date: 20.10.2021
UDIN:21170497AAAABI8888

ANNEXURE forming part of Audit Report of
Centre for Materials for Electronics Technology
for the Year ended 31st March 2020.

1) Fixed Assets pertaining to projects:

a) At present, the fixed assets pertaining to projects are shown in the books as project expenses. As suggested, project fixed assets are shown separately in the Balance Sheet. In respect of those assets, which relate to the projects that are completed and the fixed assets which are not likely to be returned to the sponsors, feasibility to dispose off such assets may be assessed.

b) There are few expenses incurred by C-MET Thrissur section for major repairs of Rs.6,06,673/- which was supposed to be capitalised. Whereas the same is books as revenue expenditure on the basis of management representation letter issued by them.

2) Statutory Dues:

a) Income Tax Refunds of previous years to be followed up and if not receivable then it should be written off in next financial year.

3) Capital Expenses booked as Revenue Expenses:

1. In respect of Thrissur Lab, we have found that Rs. 22,73,269. are booked under Repairs & maintenance account which are capital nature. The same are supposed to be capitalised whereas Thrissur Lab management has given us representation that they would like to consider it under revenue expenses only.

4) Bank Balance Reconciliation:

1. At Thrissur Lab, we have found material difference with the balance of Bank as per Books of accounts and that as per Bank Balance Confirmation. Action to reconcile the above amounts should be carried out by Thrissur Lab.

(Amount ₹)

Sr	Particulars	Bank Balance as per Tally	Balance as per Bank Certificate	Difference
1	PNB CORE Account	2,81,33,002.00	1,00,818.00	2,80,32,184.00
2	PNB SP Account	-21,13,919.00	36,11,530.00	-57,25,449.00
3	Sweep Account	2,99,10,000.00	-	2,99,10,000.00
4	FLCMargin Account	15,55,000.00	-	15,55,000.00
Sub - Total		**5,74,84,083.00**	**37,12,348.00**	**5,37,71,735.00**
1	Fixed Deposits	4,03,50,893.00	10,80,79,129.00	-6,77,28,236.00
TOTAL as per Tally		**9,78,34,976.00**	**11,17,91,477.00**	**1,39,56,501.00**
1	Interest on FD Income A/c	60,10,852.00	39,52,800.00	-20,58,052.00
	NET Difference			**1,18,98,449.00**

2.At Pune Lab, Canara Bank, Panchwati Branch, Pune has given following Bank Balance Confirmation of Auto-Sweep Accounts:

Sr	Particulars	Bank Balance as per Tally	Balance as per Bank Certificate	Difference
1	Canara Bank -TD Sweep in Account	6,70,06,061.56	6,75,49,585.10	5,43,523.54

The above reconciliation should also be carried out by Pune Lab.

5) Service Book Records:

At Hyderabad Lab, we have found that Service Book Records of few employees are not up dated from June 2020 to date of the audit, in the matter of EL, HPL and other entries. It is suggested to complete the same at the earliest.

For M/s VDA Associates
Chartered Accountants
Firm Registration No. 119179W

CA Pavan Sharma
Membership No. 170497
(Partner)

Place: Pune.
Date: 20.10.2021

Centre for Materials for Electronics Technology, Pune.

BALANCE SHEET AS AT 31st MARCH, 2021.

(Amount ₹)

CORPUS/ CAPITAL FUND AND LIABILITIES:	Schedule	As at 31.3.2021	As at 31.3.2020
CORPUS/ CAPITAL FUND	1	83,21,52,096	63,15,35,221
CURRENT LIABILITIES AND PROVISIONS (Including sponsored project)	2	55,21,20,820	43,91,55,293
TOTAL		**1,38,42,72,916**	**1,07,06,90,514**
ASSETS:			
FIXED ASSETS	3	14,37,75,938	14,03,51,874
CURRENT ASSETS, LOANS AND ADVANCES	4	1,24,04,96,978	93,03,38,640
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)		-	-
TOTAL		**1,38,42,72,916**	**1,07,06,90,514**
SIGNIFICANT ACCOUNTING POLICIES	5		
NOTES TO ACCOUNTS AND CONTINGENT LIABILITIES	6		

We hereby certify the above balance sheet to be true and correct to the best of our knowledge and belief, subject to notes to accounts and schedules attached hereto.

Dr.B.B. Kale
Director General
Officer

G.B. Rao
Sr. Finance

As per our report of even date attached.
For M/s VDA & Associates
Chartered Accountants
F.R.No. 119179W

CA Pavan Sharma
(M. No.: 170497)
PARTNER

PLACE: PUNE
DATE: 20.10.2021

Centre for Materials for Electronics Technology, Pune.

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2021.

(Amount ₹)

CORPUS/ CAPITAL FUND AND LIABILITIES:	**Schedule**	**As at 31.3.2021**	**As at 31.3.2020**
CORPUS/ CAPITAL FUND	1	83,21,52,096	63,15,35,221
CURRENT LIABILITIES AND PROVISIONS (Including sponsored project)	2	55,21,20,820	43,91,55,293
TOTAL		**1,38,42,72,916**	**1,07,06,90,514**
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CURRENT ASSETS, LOANS AND ADVANCES	4	1,24,04,96,978	93,03,38,640
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)		-	-
TOTAL		**1,38,42,72,916**	**1,07,06,90,514**
SIGNIFICANT ACCOUNTING POLICIES	5		
NOTES TO ACCOUNTS AND CONTINGENT LIABILITIES	6		

We hereby certify the above balance sheet to be true and correct to the best of our knowledge and belief, subject to notes to accounts and schedules attached hereto.

Dr.B.B. Kale
Director General
Officer

G.B. Rao
Sr. Finance

As per our report of even date attached.
For M/s VDA & Associates
Chartered Accountants
F.R.No. 119179W

CA Pavan Sharma
(M. No.: 170497)
PARTNER

PLACE: PUNE
DATE: 20.10.2021

Centre for Materials for Electronics Technology, Pune.

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2021.

(Amount ₹)

INCOME:	**Schedule**	**Current Year 2020-21**	**Previous Year 2019-20**
Revenue Grants	7	37,55,46,273	32,26,66,536
Income from Services	8	1,13,33,419	2,46,94,850
Interest Earned	9	3,19,83,783	3,92,30,797
Other Income	10	46,98,848	7,44,268
TOTAL (A)		**42,35,62,323**	**38,73,36,451**
EXPENDITURE:			
Establishment Expenses	11	17,51,99,121	19,45,10,340
Laboratory and Administrative Expenses etc.	12	5,11,70,391	4,67,52,156.00
Depreciation		2,07,25,662	2,06,84,750
TOTAL (B)		**24,70,95,174**	**26,19,47,246**
Surplus/ (Deficit) for the year (A – B)		**17,64,67,149**	**12,53,89,205**
Balance transferred to / from Corpus/Capital Fund		**17,64,67,149**	**12,53,89,205**

We hereby certify the above Income & Expenditure account to be true and correct to the best of our knowledge and belief, subject to notes to accounts and schedules attached hereto.

Dr.B.B. Kale
Director General
Officer

G.B. Rao
Sr. Finance

As per our report of even date attached.
For M/s VDA & Associates
Chartered Accountants
F.R.No. 119179W

CA Pavan Sharma
(M. No.: 170497)
PARTNER

PLACE: PUNE
DATE: 20.10.2021

Centre for Materials for Electronics Technology, Pune.

RECEIPT AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH 2021.

(Amount ₹)

RECEIPTS	CURRENT YEAR 2020-21	Previous Year 2019-20	PAYMENTS	CURRENT YEAR 2020-21	Previous Year 2019-20
I. Opening Balances			**I. Payments**		
a) Cash in Hand	-	-	Establishment Expenses	12,29,01,983	17,38,55,698
b) Bank Balances:	74,84,57,066	53,94,44,344	Administrative Expenses	9,94,11,457	7,05,42,349
			II. Project Payments		
II. Grants Received From MeitY (G.o.I):			Sponsored Projects	12,74,63,460	16,29,61,987
Capital Grants	74,06,675	98,33,464			
Revenue Grants	39,22,89,325	32,26,66,536	**III. Fixed Assets**		
			Purchase of Fixed Assets	2,41,49,727	98,33,464
III. Interest On deposits			Capital Work in progress	-	-
On Bank deposits	3,02,47,640	3,91,69,896			
			IV. Other Payments		
IV. Other Income			Loans & Advances to staff and others	18,50,33,074	12,97,11,095
Analysis Income	52,57,644	6,86,31,008			
Miscellaneous receipts	1,10,57,358	2,02,38,356	**V. Closing Balances**		
			a) Cash in Hand	-	-
			b) Bank Balances:	87,42,27,573	74,84,57,066
V. Other Receipts					
Sponsored Project receipts	23,49,15,234	28,02,44,812			
Loans & Advances from staff and others	35,56,332	1,51,33,243			
TOTAL	**1,43,31,87,274**	**1,29,53,61,659**	**TOTAL**	**1,43,31,87,274**	**1,29,53,61,659**

Centre for Materials for Electronics Technology, Pune.

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MARCH, 2021.

(Amount ₹)

SCHEDULE 1 - CORPUS / CAPITAL FUND:	As at 31.3.2021		As at 31.3.2020	
Balance as at the beginning of the year	**47,97,93,623**		46,99,60,159	
Add: Contributiontowards Corpus / Capital Fund	2,41,49,727		98,33,464	
	50,39,43,350		**47,97,93,623**	
Add / (Less): Balance of net income / Expenditure transferred from Income and Expenditure Account:				
As per last year	**15,17,41,598**		2,63,52,393	
Add: Surplus / (Deficit) for the year	17,64,67,148		12,53,89,205	
	32,82,08,746	83,21,52,096	**15,17,41,598**	63,15,35,221
BALANCE AT THE YEAR END		**83,21,52,096**		**63,15,35,221**

Centre for Materials for Electronics Technology, Pune.

SCHEDULE 2 - CURRENT LIABILITIES AND PROVISIONS:
(Schedules forming part of Balance Sheet as at 31st March, 2021)

(Amount ₹)

	As at 31.3.2021		As at 31.3.2020	
A. CURRENT LIABILITIES:				
1.Sundry Creditors:				
a) For goods	12,44,671		8,10,829	
b) For E.M.D and Deposits	31,43,494	43,88,165	1,35,51,995	1,43,62,824
2.Statutory Liabilities:				
TDS		13,77,445		13,67,840
GIS/Service Tax				
3.Other current Liabilities:				
Sponsored Projects	33,58,04,881		22,35,45,582	
Other Liabilities	6,30,87,253	39,88,92,134	5,66,72,175	28,02,17,757
TOTAL (A)		**40,46,57,744**		**29,59,48,421**
B. PROVISIONS:				
1.Gratuity Payable	8,28,28,878		7,86,50,735	
2.Leave Encashment payable	5,94,23,121		6,12,04,193	
3.Expenses Payable	52,11,077	14,74,63,076	33,51,944	14,32,06,872
TOTAL (B)		**14,74,63,076**		**14,32,06,872**
TOTAL (A + B)		**55,21,20,820**		**43,91,55,293**

Centre for Materials for Electronics Technology, Pune.

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MARCH, 2021.

(Amount ₹)

DESCRIPTION	GROSS BLOCK				DEPRECIATION				NET BLOCK	
	As at 1.4.2020	Additions during the year	Deletions/ Adj. during the year	**As at 31.03.2021**	As at the beginning of the year	For the year	Deletions/ Adj. during the year	**Total up to 31.03.2021**	**AS AT 31.03.2021**	As at 31.3.2020
A. FIXED ASSETS:										
1. BUILDINGS ON FREEHOLD LAND	13,14,62,501	75,03,198	-	**13,89,65,699**	7,93,42,894	57,84,007		**8,51,26,901**	**5,38,38,798**	5,21,19,607
2. LAB EQUIPMENT	31,84,60,373	1,06,72,892	-	**32,91,33,265**	23,97,55,617	1,26,66,843		**25,24,22,460**	**7,67,10,805**	7,87,04,756
3. FURNITURE, FIXTURES	1,37,80,210	3,77,401		**1,41,57,611**	1,03,63,811	3,62,360		**1,07,26,171**	**34,31,440**	34,16,399
4. OFFICE EQUIPMENT	1,79,80,600	30,46,939		**2,10,27,539**	1,43,17,769	8,92,590		**1,52,10,359**	**58,17,180**	36,62,831
5. COMPUTER/PERIPHERALS	1,35,45,633	19,89,101		**1,55,34,734**	1,25,71,287	8,06,145		**1,33,77,432**	**21,57,302**	9,74,346
6. ELECTRIC FITTINGS	17,65,724	10,315		**17,76,039**	9,53,740	81,714		**10,35,454**	**7,40,585**	8,11,984
7. ELECTRIC SUBSTATION	36,89,196		-	**36,89,196**	32,62,442	64,013		**33,26,455**	**3,62,741**	4,26,754
8. AIR CONDITIONERS	9,04,770	4,17,196	-	**13,21,966**	6,97,781	62,338		**7,60,119**	**5,61,847**	2,06,990
9.TUBEWELL	95,494	56,610	-	**1,52,104**	67,287	5,652		**72,939**	**79,165**	28,207
TOTAL OF CURRENT YEAR	**50,16,84,501**	**2,40,73,652**	**-**	**52,57,58,153**	**36,13,32,628**	**2,07,25,662**	**-**	**38,20,58,290**	**14,36,99,863**	14,03,51,874
B. CAPITAL WIP / E.U. I	-	76,075	-	**76,075**	-	-	-	**-**	**76,075**	-
TOTAL(A+B)	**50,16,84,501**	**2,41,49,727**	**-**	**52,58,34,228**	**36,13,32,628**	**2,07,25,662**	**-**	**38,20,58,290**	**14,37,75,938**	14,03,51,874

SCHEDULE 3 - FIXED ASSETS

Centre for Materials for Electronics Technology, Pune.
SCHEDULE 4 - CURRENT ASSETS, LOANS & ADVANCES:

(Schedules forming part of Balance Sheet as at 31st March, 2021)

(Amount ₹)

	As at 31.3.2021		As at 31.3.2020	
A. CURRENT ASSETS:				
1.Cash balance in hand		-		-
2.Bank Balances with Scheduled Banks:				
- On Deposit Accounts	38,86,47,049		36,26,83,586	
- On Savings Accounts	8,96,04,199		6,54,13,074	
- Project Deposit & Others	39,59,76,325	87,42,27,573	30,31,67,130	73,12,63,790
TOTAL (A)		**87,42,27,573**		**73,12,63,790**
B. LOANS, ADVANCES AND OTHER ASSETS				
Loans and Advances to Staff	2,28,924		2,54,760	
Loans and Advances to Others	20,30,06,042		6,41,87,283	
Amount Recoverable	31,58,028		46,64,495	
Advance to Suppliers	2,37,85,698		2,97,04,346	
Security and Other Deposits	12,69,13,759		9,64,05,322	
Prepaid Expenses	-		-	
Interest Accrued on FDRs	91,76,954	36,62,69,405	38,58,644	19,90,74,850
TOTAL (B)		**36,62,69,405**		**19,90,74,850**
TOTAL (A + B)		**1,24,04,96,978**		**93,03,38,640**

Centre for Materials for Electronics Technology (C-MET)
Schedules forming part of the accounts for the year ended 31st March 2021.

SCHEDULE: 5 SIGNIFICANT ACCOUNTING POLICIES

1. Accounting Conventions:

The Financial Statements are prepared on historical cost convention, going concern, and accrual basis and the same are followed consistently, except for Bonus, which is accounted for on cash basis.

2. Revenue Recognition:

- Income from operation includes, Income from analysis receipts, overhead receipts and Professional / consultancy services. Income from these activities is accounted for as and when services are rendered.
- Grants are recognized when there is a reasonable assurance that, the grants will be received.
- C-MET being research body, its entire expenditure relates to research activity.The expenditure incurred is debited to the appropriate accounts.
- All significant items of incomes and expenses are accounted on accrual basis unless otherwise stated.

3. Fixed Assets:

- Fixed Assets stated in the Balance Sheet are valued at their cost of acquisition inclusive of freight, octroi and other direct and indirect cost in respect thereof.
- Society has been directed to charge depreciation on its assets on the written down value basis vide instructions issued by Ministry of Electronics & Information Technology. Accordingly, depreciation has been charged as per rates prescribed under the Income Tax Act, 1961.
- Fixed Assets procured under the Sponsored projects, being the property of the respective Sponsoring agency, are not accounted under the head C-MET Fixed Assets.

4. Inventory:

As per the policy consistently followed by the Centre, expenditure incurred on consumable stores and spares is charged to revenue account.

5. Foreign Currency Transaction :

Transactions in foreign currency are recorded at the exchange rates prevailing on the date of transactions.

6. Prior period and Extraordinary Items:

Prior period income and expenses and extraordinary items, wherever material is disclosed separately. Prior period items include material items of Income or Expenses which arise in the current period as a result of error or omission in the preparation of financial statements of one or more prior periods. It does not include items, which are ascertained and determined during the year. Expenses amounting to Rs. Nil/- pertaining to previous year have been accounted for in the current year. The details are given in Certificate taken from Management.

7. Retirement Benefits:

C- MET has set up Contributory Provident Fund separately. Leave Encashment and Gratuity is accounted for as per the actuarial valuation, liability whereof is as below:

a) Gratuity - Rs.8,28,28,878 /- (Previous Year Rs. 786,50,735/-)
b) Leave Encashment - Rs.5,9423,121 /- (Previous Year Rs. 612,04,193/-)

8. Amount equal to capital expenditure is credited to capital fund. Grants for sponsored projects are shown separately. Unspent amount of the sponsored projects is shown as liability.

For CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY

Dr. B B Kale
Director General

G. B. Rao
Sr. Finance Officer

For VDA & Associates
Chartered Accountants
Firm Registration No. 119179W

CA Pavan Sharma
Membership No.: 170497
(Partner)

Place: Pune.
Date: 20.10.2021

CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY (C-MET)
Schedules forming part of the Accounts for the year ended 31st March 2021.

SCHEDULE: 6 NOTES ON ACCOUNTS

1. Current Assets, Loans & Advances: In the opinion of the management, the current assets, loans and advances have a value on realization in the ordinary course of business equal at least to the aggregate amount shown in the Balance Sheet.

2. Foreign Currency Transactions:
   a) Value of Imports (FOB basis):
   Capital Goods: Rs. 1,10,66,279/- (Previous Year Rs. 210,01,480/-)

   b) Expenditure in Foreign Currency: Rs. 21,44,103/- (Previous Year Rs. 129,27,025/-)

   As the information of CIF basis for import of capital goods is not available, values are taken on FOB basis.

3. The Society is an approved institution in terms of sub-section (21) of section 10 of the Income Tax Act, 1961 and is exempt from Income Tax.

4. Since most of the materials/equipments are of technical nature, their allocation between equipments, stores and projects are taken as certified by the management.

5. C-MET, being a scientific Society and not a commercial, industrial or a business entity, the Management is of the opinion that reporting requirements as per AS-17 “Segment Reporting” are not mandatory.

6. The Management of C-MET is of the opinion that being a Scientific Society under Ministry of Electronics and Information Technology, Govt. of India and Societies Registration Act, the disclosure requirements as per AS-18 “Related Party Disclosure” are not applicable.

7. In the opinion of the Management, Accounting Standard 22 for “Accounting for taxes on income” is not applicable to the Society as it is exempt from payment of income tax.

8. Debit and Credit Balances of Personal Accounts are subject to confirmation.

9. Previous year’s figures have been regrouped and rearranged wherever necessary.

10. Schedules 1 to 11 are annexed to and form an integral part of the Balance Sheet as at 31st March, 2021 and the Income & Expenditure Account for the year ended on that date.

11. The Financial Statements are prepared in accordance with the **Accounting Standard 21- Consolidated Financial Statement** of 3 operational units i.e., Pune, Hyderabad and Thrissur.

12. Contingent liability not provided in the books of account: -

    The TDS notices Unit wise are issued by the Income Tax Department and the dues are yet to be finalized and settled.

For CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY

Dr. B B Kale
Director General
Officer

G. B. Rao
Sr. Finance

For VDA & Associates,
Chartered Accountants
Firm Registration No. 119179W

CA Pavan Sharma
Membership No.: 170497
(Partner)

Place: Pune.
Date: 20.10.2021

Centre for Materials for Electronics Technology, Pune.

Schedules forming part of Income & Expenditure A/c for the year ended 31st March, 2021.

SCHEDULE 7 - REVENUE GRANTS:	Current Year 2020-21	Previous Year 2019-20
Grants for Revenue Expenditure.	37,55,46,273	32,26,66,536
TOTAL	**37,55,46,273**	**32,26,66,536**

SCHEDULE 8 - INCOME FROM SERVICES:	Current Year 2020-21	Previous Year 2019-20
Income from Services:		
Analysis receipts	1,36,018	43,986
Overhead /Consultancy services/Intellectual fee	1,03,69,047	2,04,96,864
TOT Fee	8,28,354	41,54,000
TOTAL	**1,13,33,419**	**2,46,94,850**

SCHEDULE 9 - INTEREST EARNED:	Current Year 2020-21	Previous Year 2019-20
On Savings account and Term Deposits:		
a) With Scheduled Banks	3,19,31,447	3,91,48,800
b) On Advances to Staff & others	52,336	81,997
TOTAL	**3,19,83,783**	**3,92,30,797**

SCHEDULE 10 - OTHER INCOME:	Current Year 2020-21	Previous Year 2019-20
Miscellaneous Income	46,98,848	7,44,268
TOTAL	**46,98,848**	**7,44,268**

Centre for Materials for Electronics Technology, Pune.

Schedules forming part of Income & Expenditure A/c for the year ended 31st March, 2021

(Amount ₹)

SCHEDULE 11 - ESTABLISHMENT EXPENSES:	Current Year 2020-21	Previous Year 2019-20
Salaries and Allowances	13,85,11,056	14,76,46,009
Leave Travel Concession	15,44,781	10,15,869
Medical Reimbursement	84,09,222	60,04,628
Leave Encashment	29,43,919	1,31,38,807
Gratuity	89,25,806	1,40,02,493
Employer Contribution to CPF	52,27,133	49,99,102
NPS Contribution	68,69,533	48,57,704
Honorarium	82,120	71,500
Canteen Reimbursement	8,11,120	9,16,800
Newspaper & Periodicals	1,79,151	1,78,904
CEA Reimbursement	12,21,800	14,07,414
Membership Fee	29,435	-
Recruitment Expenses	1,29,013	1,09,639
Transfer TA	1,86,720	57,975
Telephone Reimbursement to staff	1,28,312	1,03,496
TOTAL	**17,51,99,121**	**19,45,10,340**

Centre for Materials for Electronics Technology, Pune.

SCHEDULE 12 - LABORATORY AND ADMINISTRATIVE EXPENSES:
(Schedules forming part of Income & Expenditure A/c for the year ended 31st March, 2021)

Particulars	Current Year 2020-21	Previous Year 2019-20
Chemicals Consumables & Laboratory Gen. expenses	78,21,973	51,05,934
Electricity charges	1,07,82,047	1,06,57,733
Water charges	7,31,392	4,720
Repairs and maintenance:		
On Buildings	35,68,032	26,46,701
On Electricals	7,12,924	7,18,571
On Laboratory Equipments	17,12,055	12,63,215
On Office Equipments	11,86,423	6,00,130
On Furniture & Fittings	-	-
Rates and Taxes	16,46,975	18,15,056
Postage & Telegram Charges	48,008	65,038
Telephone, Telex & Fax charges	3,30,269	2,34,115
Printing and Stationery	7,09,337	5,25,606
Conveyance	19,238	4,477
Vehicle Hire	12,71,523	19,47,503
TA & DA	54,840	22,13,448
Security Expenses	70,55,880	69,81,326
Office & General Expenses	78,40,133	78,15,012
Diesel for Gensets	6,73,744	3,77,343
Auditor's Remuneration	1,64,520	1,58,635
Audit Expenses	88,331	1,31,098
Meeting Expenses	1,62,428	11,55,804
Difference in Thrissur Dev. expenditure	-	(2,36,350)
Gardening Expenses	11,69,962	4,92,864
Bank charges	1,46,758	42,388
Advertisement and Publicity	1,10,343	94,822
Professional & Consultancy Expenses	7,34,154	1,40,900
Prior period Expenses	20,00,000	-
Workshop/Symposia	2,26,059	13,97,863
University affiliation fees	2,530	-
Legal expenses	-	66,207
Internet charges	2,00,513	3,31,997
TOTAL	**5,11,70,391**	**4,67,52,156**

Centre for Materials for Electronics Technology, Pune.

Bifurcation of Grants for the year 2020-21. (Amount ₹)

Total Grants received during the year 2020-21. 39,96,96,000

Particulars	Date / Voucher	Total
PLAN Grants received for the year - 2020-21		
1. Sanction letter no.GG-11/2/2020-R&D-E-MeitY dtd 22.4.2020	28.4.20 / BRV-2	4,00,00,000
2. Sanction letter no.GG-11/2/2020-R&D-E-MeitY dtd 22.4.2020	29.5.20 / BRV-4	2,00,00,000
3. Sanction letter no.GG-11/2/2020-R&D-E-MeitY dtd 25.6.2020	30.6.20 / BRV-8	9,50,00,000
4. Sanction letter no.GG-11/2/2020-R&D-E-MeitY dtd 16.10.2020	27.10.20 / BRV-55	13,00,00,000
5. Sanction letter no.GG-11/2/2020-R&D-E-MeitY dtd 21.12.2020	1.1.21 / BRV-61	9,00,00,000
6. Sanction letter no.GG-11/2/2020-R&D-E-MeitY dtd 03.2.2021	12.2.21 / BRV-68	2,50,00,000
Sub-total		**40,00,00,000**
Less: Grant refunded back		**3,04,000**
Net Grants		**39,96,96,000**
Bifurcation for the year 2020-21		
Capital Expenditure.		2,41,49,727
Revenue Expenditure.		37,55,46,273
Total		**39,96,96,000**

DETAILS OF PROJECT BALANCES AS ON 31.3.2021

Sr. No		Name of the Project	Opening Balance as on 1.4.2020	Receipts during the year 2020-21				Closing Balance as on 31.3.2021
					Fixed Assets	Other Expenses	Total	
		1	2	3	4	5	6= (4+5)	7=(2+3-6)
	PUNE:							
1	SP41	UGC-JRF- JM Malli	63,629				-	63,629
2	SP46	CSIR-SRF-Ms. Bhirud	36,518				-	36,518
3	SP47	CSIR-JRF-Mr. Pandit	2,01,026				-	2,01,026
4	SP48	INSPIRE Faculty Award-Dr.Chauhan	4,486				-	4,486
5	SP55	Inspired Faculty Award-D R Patil	5,283				-	5,283
6	SP59	Proof of Patternable Thick film	1,35,529			1,35,529	1,35,529	-
7	SP60	Devp. Of Electrolyte systems	19,652			19,652	19,652	-
8	SP61	FAB of 2D Heterostructures	1,83,201				-	1,83,201
9	SP62	SERB Young Scientist Dr Khupse	3,13,396			3,13,396	3,13,396	-
10	SP63	Flexible Solidstate supercapacitor	73,370	3,54,346		2,55,104	2,55,104	1,72,612
11	SP64	Novel nanost hong perf anode mat	3,80,142	10,91,576		7,42,737	7,42,737	7,28,981
12	SP65	Synth of Nanosized ANI Ceramic	7,87,484			3,53,855	3,53,855	4,33,629
13	SP66	Dev. Of Nanostr Mng Ferrite	7,392			7,392	7,392	-
14	SP67	Integrated low-cost water sensors	29,539	60,000		79,360	79,360	10,179
15	SP68	3D Nano St. Lithium battery	33,53,607	2,56,30,000		40,50,300	40,50,300	2,49,33,307
16	SP69	WOS Nano St. Layered MOS 2	2,01,679	6,11,337		7,57,804	7,57,804	55,212
17	SP70	Engg. Of Q Dot based Solar Radiation	3,58,648	18,22,556		11,98,489	11,98,489	9,82,715
18	SP71	Inspire Faculty award Dr Nasani	4,75,618			9,576	9,576	4,66,042
19	SP72	Dev of Nano St. NMC Cathode Mt	1,16,434	1,97,000		3,35,888	3,35,888	(22,454)
20	SP73	Dev. Of Print Silver ink for RFID	3,06,655	23,94,000	1,82,175	19,40,225	21,22,400	5,78,255
21	SP74	Dev. Of Hybrid Battery	48,96,578	14,61,480		18,78,813	18,78,813	44,79,245
22	SP75	Centre of Excellence in Battery	2,66,80,434	6,07,120	90,15,046	46,11,734	1,36,26,780	1,36,60,774
23	SP76	WOS - A-Tin & Germanium Battery	7,38,835	8,68,158	1,76,610	8,00,115	9,76,725	6,30,268
24	SP77	Digitization & Quantification	15,06,987	1,63,933	24,916	4,39,129	4,64,045	12,06,875
25	SP78	Devp. Of Smart Parking Mgt System	6,88,651	1,32,298	3,84,229	3,56,273	7,40,502	80,447

26	SP79	Devp. Of U-SOFC in LTCC Technology	97,30,630		31,26,776	23,70,524	54,97,300	42,33,330
27	SP80	Design of newAnodes for Biogas	21,89,730			3,38,451	3,38,451	18,51,279
28	SP81	Studies in Annealing on Mgn	21,30,003			3,83,576	3,83,576	17,46,427
29	SP82	WOS - A-Multiferroic Magn Comp	15,37,200	13,207	1,41,750	8,56,486	9,98,236	5,52,171
30	SP83	Project for SC /ST Women	59,00,000		1,23,530	4,90,612	6,14,142	52,85,858
31	SP84	LTCC Base hot water		1,31,05,000		7,87,908	7,87,908	1,23,17,092
32	SP85A	CoE in Additive Manufacturing - Vertical A		3,69,65,000		5,43,762	5,43,762	3,64,21,238
33	SP85B	CoE in Additive Manufacturing - Vertical B		86,25,000		2,32,240	2,32,240	83,92,760
34	SP86	WOS Self Powered Breath		11,76,016		2,56,436	2,56,436	9,19,580
35	TS12	LTCC Based Circuits Fittings	(11,714)	27,00,000		6,69,000	6,69,000	20,19,286
36	TS13	LTCC Based Magnectic Sensors	14,74,484				-	14,74,484
37	TS15	Devp of Microcrystaliine	4,28,224			4,28,224	4,28,224	-
38	TS16	Sealing of Na Ion Battery cells	3,24,599			92,615	92,615	2,31,984
39	TS17	Dev. of Aluminium Based Reserved Batteries	-	8,12,000		2,37,170	2,37,170	5,74,830
40	TS18	Design & Dev of LTCC based EDDy Sensors		8,00,000		1,37,760	1,37,760	6,62,240
41	TS19	Dev. of Reserve Batteries		12,41,524		2,07,494	2,07,494	10,34,030
42	-	CSIR SRF D Kajale	86				-	86
43	-	CSIR SRF Y. Sethi	114				-	114
44	-	INSA Sr Sci. Dr. S Kulkarni	43,084	4,51,816		4,66,200	4,66,200	28,700
45	-	Workshop Q Dot Glass Nov 2019	8,759				-	8,759
46	-	DST Sub expert com. on Engg & Tech Dev.	2,360			2,360	2,360	-
		TOTAL (a)	**6,53,22,332**	**10,12,83,367**	**1,31,75,032**	**2,67,86,189**	**3,99,61,221**	**12,66,44,478**
	HYDERABAD:							
47	SP32	E-WASTE-PCBs-DeitY	59,35,040	3,02,000		5,748	5,748	62,31,292
48	SP33	DRDO/SSPL/CARS/ Cd & Te	(1,88,393)				-	(1,88,393)
49	SP35	SiC / DMRL	35,81,322	1,64,40,978		72,74,342	72,74,342	1,27,47,958
50	SP37	Recycling scrap Germanium DRDO SSPL	(19,799)			2,31,513	2,31,513	(2,51,312)
51	SP39	NaviC Meity	42,94,111	1,03,74,000	68,35,890	29,97,372	98,33,262	48,34,849
52	SP40	Design & Fab. MEMS Bionic Sensors	4,55,428	10,37,220		10,47,991	10,47,991	4,44,657

53	SP41	Estab. Of COE on E-Waste Management	8,73,11,307	3,00,00,000	44,31,439	79,46,367	1,23,77,806	10,49,33,501
54	SP42	Process Optimization & supply of CDC	16,68,965	-	2,02,650	1,71,058	3,73,708	12,95,257
55	SP43	Purification-Hf Metal - Indo-Bulgaria coll. Pjt	5,91,175	-		74,942	74,942	5,16,233
56	SP44	Skill Dev. training SC students on e-waste recycle tech & testing of RoHS	-	65,66,000		3,13,971	3,13,971	62,52,029
57	SP45	Feasibility study for dev. Of tech. to recover value materials from end-of-life silicon solar modules	-	45,42,000	22,467	9,06,665	9,29,132	36,12,868
58	SP46	Skill Dev. training SC students on e-waste recycle tech & testing of RoHS	-	17,25,000		6,61,024	6,61,024	10,63,976
59	SP47	Dev. Of Flaky Fe Si Al alloy powders suitable for appln. In tunable microwave abs.	-	26,51,000		1,94,995	1,94,995	24,56,005
60	TS-01	Supply of Hafnium sponge VSSC	(72,27,327)	1,41,91,200		69,63,873	69,63,873	-
61	TS-02	Replacement & augmentation of process equipment of Hafnium sponge Prodn facility	-	30,52,000		13,500	13,500	30,38,500
62	TS-03	Dev. & Supply of Hafnium sponge	-	79,47,072		44,56,529	44,56,529	34,90,543
		TOTAL (b)	**9,64,01,829**	**9,88,28,470**	**1,14,92,446**	**3,32,59,890**	**4,47,52,336**	**15,04,77,963**
	THRISSUR:							
63	SP45	DST (NR)	(1,80,693)				-	(1,80,693)
64	SP58	MEITY (KPM)	(3,80,767)	8,89,519	13,500	4,95,252	5,08,752	-
65	SP59	BRNS (SNP)	61,148	5,738		56,758	56,758	10,128
66	SP60	DST (SNP)	1,47,015	3,70,040		5,16,740	5,16,740	315
67	SP61	DST (AS)	5,68,172	6,40,446		8,63,513	8,63,513	3,45,105
68	SP62	ARMREB (AS)	45,779	12,68,020		9,73,154	9,73,154	3,40,645
69	SP63	MEITY (AS)	9,57,346	28,265	35,110	9,50,501	9,85,611	-
70	SP64	DST (SNP)	5,07,758	10,08,785	3,61,111	10,90,945	14,52,056	64,487
71	SP65	DIT (NCP)	2,55,05,104	97,00,253	51,64,250	64,41,274	1,16,05,524	2,35,99,833
72	SP66	CPRI (SEEMA)	(1,07,974)	13,15,000		12,07,026	12,07,026	-
73	SP67	SERB (T Karthik)	15,20,251	4,39,041	4,42,239	12,72,941	17,15,180	2,44,112
74	SP68	MEITY (Rama)	1,32,24,805	84,99,565	6,33,370	15,61,536	21,94,906	1,95,29,464
75	SP69	DST (Stanly)	51,06,566	10,59,215	33,43,934	11,05,707	44,49,641	17,16,140
76	SP70	MEITY (Seema)	65,43,637	46,32,000	31,97,572	48,11,891	80,09,463	31,66,174
77	SP71	MEITY (AS)	54,61,264	49,30,298	13,74,035	36,42,436	50,16,471	53,75,091
78	SP72	SERB (VK)	15,90,279	750	32,294	14,36,800	14,69,094	1,21,935
79	SP73	BRNS (Dr Ram)	-	42,38,825	18,000	2,96,409	3,14,409	39,24,416
80	TS-31	DEBEL - TR	6,95,115	9,47,756		16,42,871	16,42,871	-
81	TS-33	(MURATA) AS	-	2,61,960		2,61,960	2,61,960	-
82	DISHA	Ferroelectric Ceramic-Polymer Composite	39,790	250		39,790	39,790	250
83	JRF/PDF	JRF Grant (Ms Divya	29,342				-	29,342
84		JRF Grant (Ms. Merin)	-	35,000			-	35,000
85		JRF Grant (Ms.Soumya)	-	38,333			-	38,333
86		JRF Grant (Mr.Suresh)	223			223	223	-
87		JRF Grant (Manoj)	10,855			10,855	10,855	-
88		JRF Grant (Ms.Liya Tony)	3,14,640	4,30,781		5,84,824	5,84,824	1,60,597
89	-	ICSEA 2019	1,61,766				-	1,61,766
		TOTAL (c)	**6,18,21,421**	**4,07,39,840**	**1,46,15,415**	**2,92,63,406**	**4,38,78,821**	**5,86,82,440**
		GRAND TOTAL (a+b+c)	**22,35,45,582**	**24,08,51,677**	**3,92,82,893**	**8,93,09,485**	**12,85,92,378**	**33,58,04,881**

Statement showing comments of Statutory Auditors on the accounts of C-MET for the year 2020-21 and C-MET's replies thereto.

<table>
<tr><th>Sr. No</th><th>Brief Subject</th><th>Auditor's Comments</th><th>C-MET Reply</th></tr>
<tr><td>1.</td><td>Fixed Assets pertaining to projects:</td><td>At present, the fixed assets pertaining to projects are shown in the books as project expenses. As sugg ested project fixed assets are shown separately in the Balance Sheet.

In respect of those assets, which relate to the projects that are completed and the fixed assets which are not likely to be returned to the sponsors, feasibility to dispose off such assets may be assessed.</td><td>Actual amount of Fixed Assets procured out of the projects is separately accounted for & indicated in the schedule. Also, individual head - wise expenditure is separately maintained and sent to Sponsoring Agency. In addition, project Fi xed Assets register is also maintained.

Ownership and title of project fixed assets rests with the project sponsoring agency.
Fixed Assets pertaining to completed projects are disposed off as soon as sponsoring agency consents their disposal.</td></tr>
<tr><td>2.</td><td>Statutory Dues:</td><td>Income Tax Refunds of previous years to be followed up and if not receivable then it should be written off in next financial year.</td><td>The matter is being followed up by our internal auditors and accordingly non - recoverable amounts would be written off.</td></tr>
<tr><td>3.</td><td>Capital expenses booked as Revenue expenses.</td><td>In respect of Thrissur Lab, we have found that Rs.22,73,269. are booked under Repairs & maintenance account which are of capital nature. The same are supposed to be capitalised whereas Thrissur Lab ma nagement has given us representation that they would like to consider it under revenue expenses only.</td><td>Noted for information.</td></tr>
<tr><td>4.</td><td>Bank balance Reconciliation:

Sr</td><td>1.Thrissur Lab, we have found material differences with the balance of Bank as per Books of accou nts and that as per Bank Balance Confirmation. Action to reconcile the above accounts should be carried out by Thrissur Lab.

<table>
<tr><th></th><th>Particulars</th><th>Bank Balance as per Tally</th><th>Balance as per Bank Certificate</th><th>Difference</th></tr>
<tr><td>1</td><td>PNB CORE Account</td><td>2,81,33,002.00</td><td>1,00,818.00</td><td>2,80,32,184.00</td></tr>
<tr><td>2</td><td>PNB SP Account</td><td>-21,13,919.00</td><td>36,11,530.00</td><td>-57,25,449.00</td></tr>
<tr><td>3</td><td>Sweep Account</td><td>2,99,10,000.00</td><td>-</td><td>2,99,10,000.00</td></tr>
<tr><td>4</td><td>FLC Margin Account</td><td>15,55,000.00</td><td>-</td><td>15,55,000.00</td></tr>
<tr><td colspan="2">Sub - Total</td><td>5,74,84,083.00</td><td>37,12,348.00</td><td>5,37,71,735.00</td></tr>
<tr><td>1</td><td>Fixed Deposits</td><td>4,03,50,893.00</td><td>10,80,79,129.00</td><td>-6,77,28,236.00</td></tr>
<tr><td colspan="2">TOTAL as per Tally</td><td>9,78,34,976.00</td><td>11,17,91,477.00</td><td>1,39,56,501.00</td></tr>
<tr><td>1</td><td>[illegible]</td><td>60,10,852.00</td><td>39,52,800.00</td><td>-20,58,052.00</td></tr>
<tr><td></td><td colspan="3">NET Difference</td><td>1,18,98,449.00</td></tr>
</table>
2. At Pune Lab , Canara Bank, Panchawati Branch, Pune has given following Bank Balance Confirmation of Auto-Sweep Accounts.

<table>
<tr><th>Sr</th><th>Particulars</th><th>Bank Balance as per Tally</th><th>Balance as per Bank Certificate</th><th>Difference</th></tr>
<tr><td>1</td><td>Canara Bank -TD Sweep in Account</td><td>6,70,06,061.56</td><td>6,75,49,585.10</td><td>5,43,523.54</td></tr>
</table></td><td>Thrissur Lab. is advised to reconcile the balances and pass necessary entries.

Pune Lab. is advised to reconcile the balances and pass necessary entries.</td></tr>
<tr><td>5.</td><td>Service Book Records:</td><td>At Hyderabad Lab, we have f ound that Service Book Records of few employees are not updated from June 2020 to date of the audit, in the matter of EL, HPL and other entries. It is suggested to complete the same at the earliest.</td><td>Hyderabad Lab . is advised to update the Service Book of all employees as a matter of routine.</td></tr>
</table>

Acknowledgment

C-MET is grateful to the Ministry of Electronics & Information Technology (MeitY), Govt. of India for its whole-hearted support and guidance during the entire year. It is my pleasure to acknowledge the support to C-MET in the form of specific sponsored projects for the technology/product development from the government and private organizations such as MeitY, ISRO, DST, DRDO, DAE, IUSSTF, CPRI, SPEL, Pune, H2e Power Systems, Pune, J-Group Robotics, Mumbai, and MOIL, India Ltd., Nagpur, and Royal Society, UK.

The guidance and proactive support of the honourable Chairman, Deputy Chairman, Executive vice-Chairman and members of the Governing Council of C-MET have been invaluable for effective functioning. The advice of the Steering and Executive Committee of C-MET in carrying out the programmes effectively and efficiently requires special mention. I sincerely thank all of them. I place on record very special thanks to all the officers and staff members of Electronic Materials and Components Development (EMCD) division, finance division, Autonomous Bodies Coordination Division (ABCD) and the other divisions of MeitY, for their extraordinary support and prompt co-operation in implementing C-MET´s programs. I am also obliged to our bankers, Punjab National Bank, Canara Bank, State Bank of India, Indian Overseas Bank, Andhra Bank and Bank of India at Pune, Hyderabad and Thrissur for rendering timely services.

I earnestly owe all the staff members and project staff working in various projects of C-MET for their dedicated professional efforts in the R&D activities, administrative services and financial support in achieving the overall progress of C-MET during the year.

Dr. B. B. Kale
Director General (A)
On behalf of C-MET staff

Steering and Executive Committee of C-MET (2020-2021)

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