



CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY (C-MET)

Scientific Society under
Department of Electronics and Information Technology (DeitY),
Ministry of Communications and Information Technology (MCIT),
Government of India

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TECHNOLOGY (C-MET)**

(Scientific Society under Department of Electronics and Information
Technology (DeitY)
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ANNUAL REPORT

2014-2015

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Prof. N. S. Gajbhiye Former Vice-Chancellor, Dr. H.S. Gour Central University, Sagar- 470 003, M.P.	Member	Dr. Debashis Dutta Executive Director Centre for Materials for Electronics Technology Panchwati, Off Pashan Road Pune-411 008 (From 1 st December 2014)	Member-Secretary

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: PREFACE :



I am indeed extremely pleased to present the Annual Report of C-MET for the year 2014-2015. I took over the command as an Executive Director of C-MET on 1st December 2014 after the successful superannuation of Dr. D. P. Amalnerkar. This report comprises condensed information on the activities, achievements, output and, thereby, overall scientific advancement of C-MET during this period. Over the past 25 glorious years, the research and development activities at C-MET encompass a wide range of areas which are pertinent to materials in electronics, energy and allied strategic domains and are aligned well with the defined vision and mission of C-MET. Keeping in tune with the demands of the modern times, C-MET has been consciously taking rapid strides on the development and realization of *bulk-to-nano* advanced materials and technologies in different spheres of contemporary electronics.

This year, 8 sponsored projects were completed and 10 new externally funded projects have been initiated, while 20 projects are in progress. I am proud to affirm that our budgetary resources from extramural agencies have reached to the tune of Rs. 1934.00 lakhs during this year. I would like to summarize some of the notable accomplishments analogous to this year. It is my pleasure to announce that we have not only been able to clinch important projects in our *niche* areas of

expertise, but could also secure projects in the area of water purification using nanocatalysts which is directly beneficial to the society as a whole. Additionally, we obtained a project on setting-up of pilot scale production of Aerogel Super capacitor for electronic applications which is significant as we are moving forward from lab-scale to pilot-scale production.

Research performance indicators of C-MET for the present period continued to be impressive in terms of 66 publications in peer reviewed international journals, 67 contributory papers at various national/international conferences, 12 indian and one US patents, 68 Invited Talks/Plenary Lectures/Lectures at various National/International level scientific events. This year scientists and students from C-MET have bagged nine Best Paper Presentation awards in the conferences/symposia. On top of that, for the second year consecutively, a Scientist from C-MET has been awarded the prestigious **Medal Award for year 2015** by Materials Research Society of India (MRSI). Dr V Kumar received the medal this year. All these awards and honours exhibited research excellence of C-MET research fraternity.

The practice of amalgamation of the Annual Foundation Day of C-MET with a major scientific event has been conserved this year too. C-MET organized International Symposium on Physics and

Technology of Sensors during 7-11 March, 2015 at Pune to commemorate its 25th Annual Foundation Day. This symposium was structured to bring together researches, students and industry on a single platform from across the globe and exchange ideas and share thoughts with regard to the use of sensors in a variety of applications. Dr V K Aatre, former Scientific Advisor to Raksha Mantri, presided over the inaugural function. Dr. R. Chidambaram, Principal Scientific Advisor to Govt. of India delivered an inspiring lecture, entitled "Technologies for Knowledge Economy". C-MET intends to follow this trend of organizing a conference along with its Foundation Day next year.

On the whole, C-MET's remarkable march ahead of blending materials development efforts with strategic sector and service rendering initiatives directed to address societal challenges continues. Nevertheless, we still need to realign and refocus some of our R&D activities towards commercial translation and we have taken steps in that direction.

It is worth accentuating that the presentations in this Annual Report echo the gleaming ambience induced by motivated co-workers and stimulating projects.

I earnestly anticipate that you will appreciate the achievements of C-MET and will find our reading material of interest, both in this report and on the website. Your suggestions and feedback are always welcome!

On the concluding note, I would like to quote from Sir Issac Newton speech that "To me there has never been a higher source of earthly honor or distinction than that connected with advances in science". We, at C-MET, cherish the same dream.

Dr. Debashis Dutta
Executive Director

INTRODUCTION

Centre for Materials for Electronics Technology (C-MET) has been set up as a Registered Scientific Society in March 1990 under Department of Electronics and Information Technology (DeitY) (formerly Department of Electronics) as a unique concept for development of viable technologies in the area of materials mainly for electronics. C-MET is operating with 3 laboratories located at Pune, Hyderabad and Thrissur with specialized research mandate at each place.

OBJECTIVES

The objectives of C-MET are:

- To establish the technology up to pilot-plant scale for a range of electronic materials and transfer the same to industry for commercialization.
- To establish relevant characterization facilities.
- To undertake applied research activities in the area of its operation.
- To establish national data base on Electronics Materials.

C-MET has set up its vision, mission and strategy to achieve its objectives.

THE VISION

C-MET will become a premier R&D organization known all over the world for its knowledge base, innovations and expertise in Electronic Materials.

THE MISSION

To develop knowledge base in electronic materials and their processing technology for Indian industries and to become a source of critical electronic materials, know-how and technical services for the industry and other sectors of economy.

IMPORTANCE OF R&D IN ELECTRONIC MATERIALS & SIGNIFICANCE OF C-MET

Electronic materials form an important segment of Advanced Materials. The materials technology is highly guarded by the major players considering their critical nature. Today, Information Technology (IT) is one of the premier global technologies. IT comprises data (or information) generation, categorization, transmission, retrieval, processing, and propagation to the benefit of society. Microelectronics is the keystone of information technology. A strong IT network needs supporting systems and sub-systems, which have the roots in the advanced electronic materials. Although electronic materials are primarily associated with computers, the internet and mobile technologies; they are used in many applications which help to improve overall quality of life and arrest climate change. Electronic materials form an extremely complex subject area. The progress made in traditional scientific fields often depends upon new developments in electronic materials. Advanced electronic materials (viz. nano-scale electronic materials for miniaturized subsystems and systems and nano-spintronics by considering, in particular, nano-architecture and scalability issues) have been identified as one of the critical technology areas by both developed and developing nations. Electronic materials are crucial to the total development of a nation irrespective of the preference be

given to defence, agriculture, education, medicine, space or any other field. New heterostructure device concepts will be the basis for further improvements in micro and optoelectronics. High-K (permittivity materials) play an important role in down-scaling metal oxide semiconductor field effect transistors and dynamic random access memories. Non-volatile memories currently represent large proportion of the semiconductor market and are one of the most important technologies for mobile applications, the main end product being the flash memory. If the present trend is an indication, advancement in electronic materials technology may become the base of the total technology strength of a nation in future.

Research and development activities in the electronic materials domain have been pursued in various institutions in the country. **However, a clear focus to undertake client relevant R&D activities lies only with C-MET. This uniqueness of C-MET can be judged through its objectives laid down during its establishment.** All the developmental programs undertaken and carried out during previous plans and current 12th Plan are in accordance with these objectives. Various process and product technologies were developed in the area of electronic materials through all these years but a major stumbling block was the after effects of globalization and open market scenario immediately after the formation of C-MET. Understanding this scenario, new knowledge based methodologies have been evolved to increase the partnership of end users like industries and strategic sectors in C-MET's technical program.

OUR APPROACH

- Majority of Indian electronic materials related industries do not have well defined in-house R&D facilities and are not in a position to set up new production line for new technologies through scale-up. At the same time, after the globalization, it has become imperative for them to improve their production with respect to quality, quantity and delivery time to compete with the foreign counterparts. To achieve this, they have to depend on either foreign collaborators or identify a suitable Indian partner, which is capable of delivering the results. Industry had faced problems with absorption and up-gradation of imported technologies, to keep up with the latest trends in product quality and hence, it has become essential for them to improve it with the help of agency like C-MET, which is having a strong knowledge base. C-MET has identified this, as a right opportunity to shake hand with the industry. A shift from the technology transfer to providing services to industry is required in the changed scenario.
- Strategic sectors have been routinely facing uphill task to procure the requisite materials or components for their operation from western countries. Indian industries are lacking in the cutting edge technologies. Identification of a right agency in both these cases is very important and C-MET has a major role to play in terms of bridging the gaps. C-MET's expertise, infrastructure and years long experience suit to take up this challenging responsibility. Hence, the total system has been mobilized and geared up to utilize the present situation in favour of C-MET. **Accordingly, C-MET has signed major MoUs with DRDO, ISRO and DAE institutes.**

CURRENT STRATEGY

In order to accomplish the set objectives, we have adopted the following strategy for project execution at C-MET.

- To implement projects with outputs which are required by industry in immediate future (say up to 5 to 7 years).
To carry out these activities, basic infrastructure, other facilities and necessary scientific expertise needs to be fully developed especially at pilot plant scale.
- To implement projects which are expected to generate technologies/results which would be commercialized in the period of 5 to 15 years and the products/processes which are required for critical areas covering space, atomic energy, defense etc that are essentially small volume high value products.
In some cases, it may be necessary for C-MET to operate pilot plants or 'Technology Demonstration cum Market Sensitization (TDMS)' units for these products to meet small demand of critical sectors.
- To develop strong knowledge base
The technology development activities and pilot plant activities can not be sustained for longer period unless these are backed by internal scientific capability and expertise of required standard. This could be generated by various means e.g. by undertaking basic research in the concerned areas within the country and/or abroad, undertaking training and research by C-MET scientists as also, providing facilities to outside scientists in C-MET. This, in turn, will help in sustaining future activities of C-MET, as also, to achieve the objective of becoming the 'Centre of Excellence' Moreover, development of strong knowledge base in specialized arena of electronic materials (Gen-next thick film paste for cell phones, materials for renewable energy, E-waste, RoHS etc) is also essential from the standpoint of Knowledge Process Outsourcing as a global phenomenon. Such activities are also necessary for providing job satisfaction and motivation to scientists.

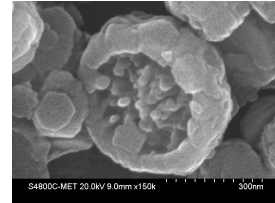
C-MET'S LABORATORIES AND CORE COMPETENCE

C-MET's R & D activities have been implemented in three laboratories at Pune, Hyderabad and Thrissur. The laboratory at Pune functions as headquarters and extends central coordination support. Each of these laboratories has its own area of specialization with requisite infrastructure and expertise. This approach has proven to be successful in creating core competence at each laboratory.

- **Pune Laboratory**

Materials for Electronic Packaging,
Materials for Renewable Energy,
Nano-materials /composites

Nano Structured Materials



- **Hyderabad Laboratory**

Ultra High Pure (UHP) Materials,
Compound Semiconductors,
Refractory Metals, Alloys,
RoHS and E-Waste

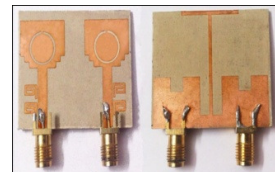
Developed Hf Sponge from Pilot Plant Facility



- **Thrissur Laboratory**

Microwave Dielectrics, Multilayer
Ceramics, Actuators and Sensors,
Nanomaterials , Thin Films and
Aerogels

Multiple Input Multiple Output (MIMO) antenna fabricated using Indigeneous microwave substrate



C-MET ORGANIZATION STRUCTURE

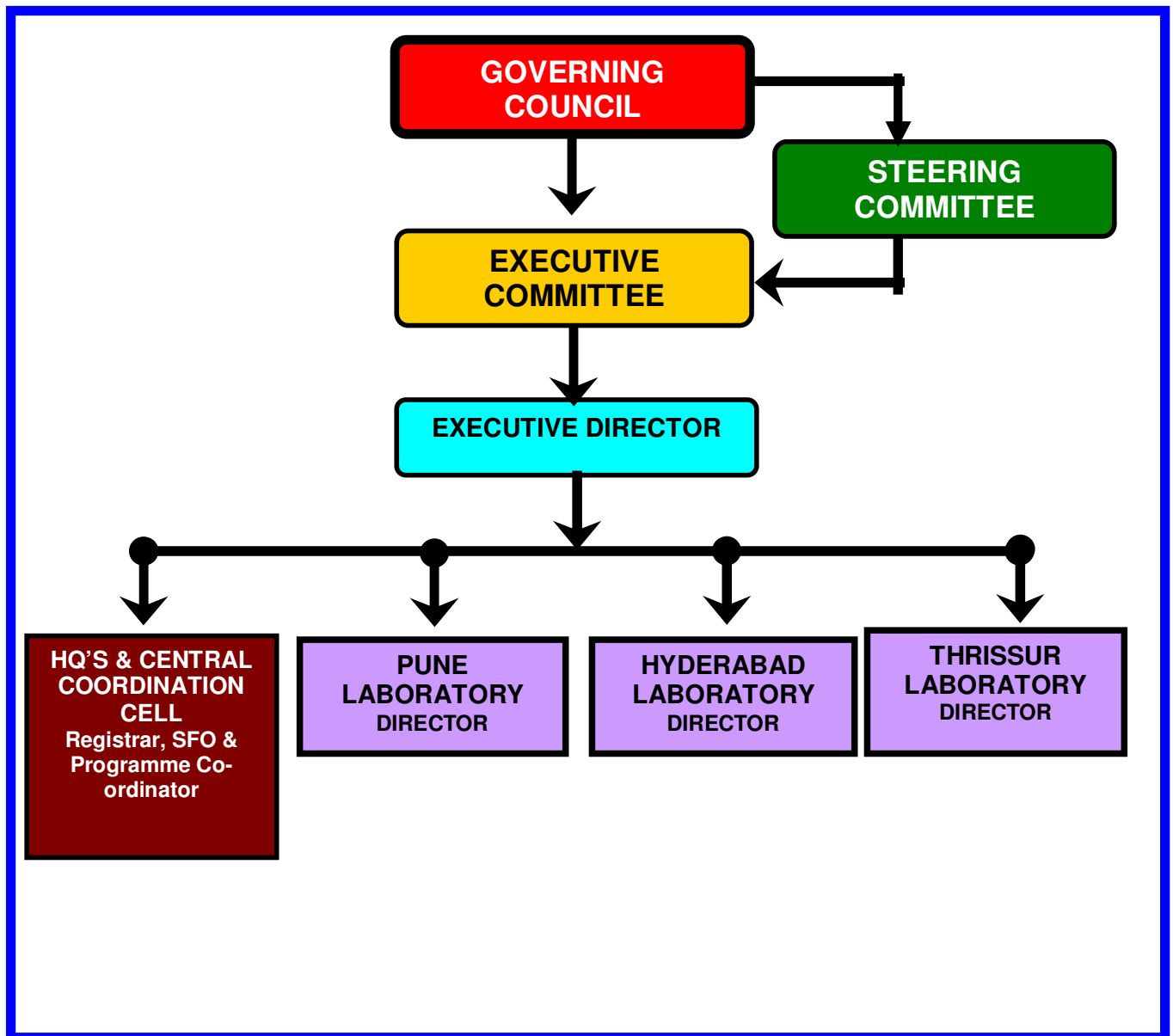
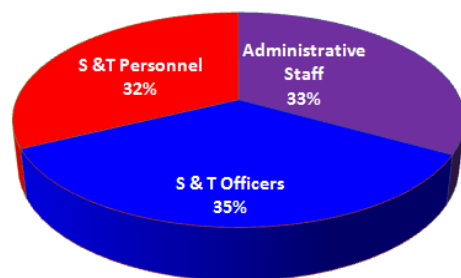


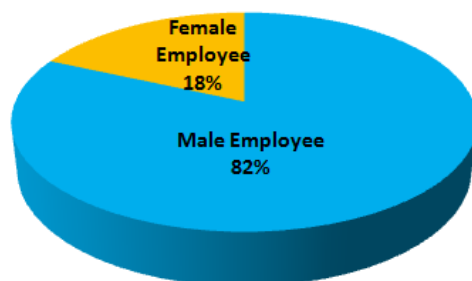
Figure 1 : Organization Chart of C-MET

HUMAN RESOURCE INDICATORS

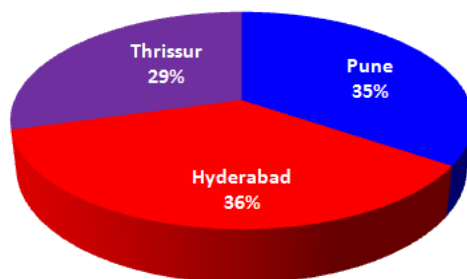
C-MET team consists of 40 S&T officers, 37 S&T personnel and 38 administrative staff. Among S & T staff 38 personnel are having Ph. D. degree. Additionally, there are more than 116 Project staff/Ph.D. students working at three laboratories of C-MET.



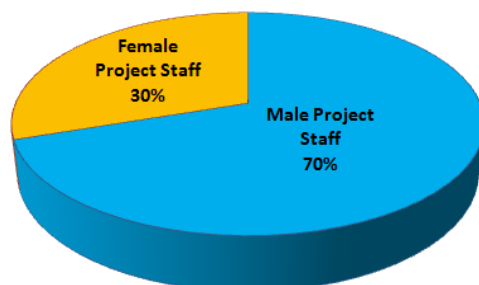
Total Staff



Gender Ratio of Employees



Project Staff / Ph.D Students



Gender Ratio of Project Staff

Figure 2 : Human Resource Indicators of C-MET

TECHNICAL ACTIVITIES & PROGRESS DURING 2014-15

During the year 2014-2015, the main technical activities of C-MET covered the following:

- Implementation of supplementary grant-in-aid projects from DeitY as well as various government funding agencies like DST, ISRO, BARC, BRNS, DRDO, DAE etc.
- Technical services
- Materials characterization services

Core Program:

It was proposed to have a more coordinated and focused approach to the R & D area where C-MET can deliver by exploiting its long experience in the development of traditional and advanced electronic materials and expertise gained hitherto and through inter-laboratory research integration.

In this context, five major core programs as enlisted in the following table have been selected for implementation.

Sr. No.	Core Program	Selection Criteria	Broad Objectives
1	Integrated Electronics Packaging	<ul style="list-style-type: none">• Strategic requirement• Potential hub for electronics packaging solutions	<ul style="list-style-type: none">• Development of LTCC materials for integrated passive components and allied applications• Development of high density interconnects
2	Nanomaterials and Devices	<ul style="list-style-type: none">• Entrance in cutting-edge technology• Potential for Knowledge Process Outsourcing• Advanced Applications	<ul style="list-style-type: none">• Large-scale generation of nanopowders in a transferred/non-transferred arc plasma reactor• Development of quantum dots of semiconductors and metals in glass, polymer matrices for optoelectronics and electronics• Development of polymer nanocomposites• Development of nanomaterials for photonics and electronics• Nanoelectronics : Training and certification.
3	Ultra High Purity Materials & compound Semiconductors	<ul style="list-style-type: none">• Materials for strategic sector• New process/products	<ul style="list-style-type: none">• Development of process technology for refractory metals.• Pilot plant scale production of UHP materials @ 2 Kg per batch for opto-electronic applications• Development of process technology for single crystals• Development of other compound semiconductor materials for MBE• Technology transfer of refractory metals production to strategic sector

4	Materials for Renewable Energy	<ul style="list-style-type: none"> • Energy storage/ conversion oriented applications • Potential for Knowledge Process Outsourcing 	<ul style="list-style-type: none"> • Development of glass/polymer nanocomposites for optoelectronics and energy applications • Development of transparent conducting oxides for electronics and optoelectronics • Development of nanoporous materials (aerogels) for strategic and industrial applications • Development of conducting aerogels for electronic applications • Development of nanocomposites for solar cell applications • Development of Li cell and fuel cells
5	Piezo -sensors and Actuators	<ul style="list-style-type: none"> • For strategic and allied applications 	<ul style="list-style-type: none"> • Development of nanomaterial based thick film sensors • Development of nanoceramics for microactuator, varistors and varactors.
6	Electronic Waste and RoHS	<ul style="list-style-type: none"> • Recycling of Hazardous waste • Extraction of precious metals • Accreditation of E-waste through analysis and certification • Development of Standard Operating Procedure (SOP) for the analysis of Hazardous substances for RoHS compliance 	<ul style="list-style-type: none"> • Indigenous development of procedure for extraction of precious metals such as Ag, Au, Cu, Pt etc . • Development of procedure for recycling of hazardous waste • Development of standard procedure for analysis

All these programs are supplemented / complimented by *Grant-In-Aid* sponsored projects.

Externally Funded Projects

In addition to ongoing sponsored projects continued from the last year, C-MET has initiated 16 new grant-in-aid projects and technical services projects during the year. C-MET earned an external funding (IEBR) to the tune of Rs. 1934.00 lakhs during the year 2014-15. The unit wise sponsored project funding pattern is depicted in Figure 3.

SPONSORED PROJECTS 2014-2015

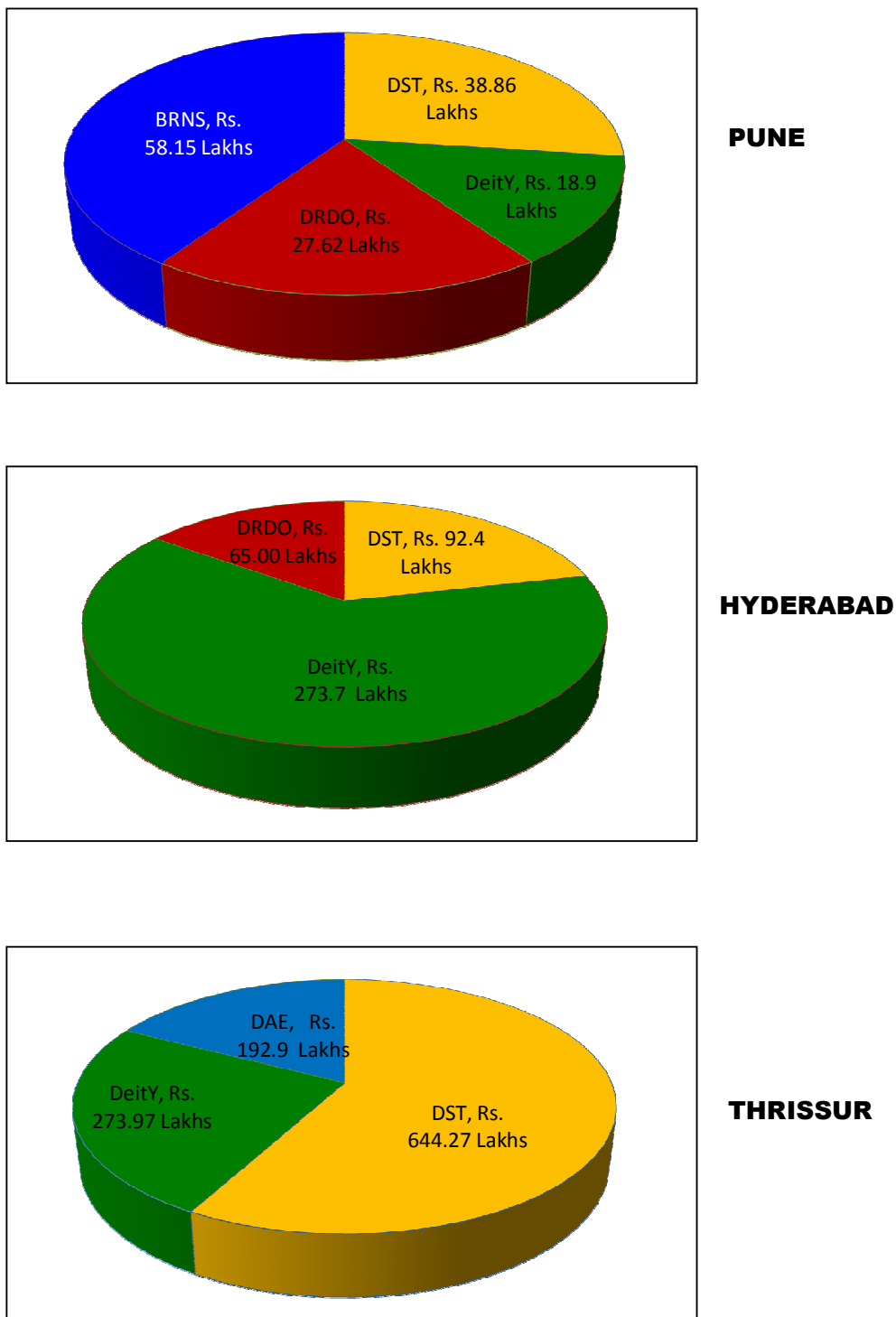


Figure 3 : Sponsored Projects at C-MET Pune, Hyderabad and Thrissur

The growth in IEBR is graphically shown in Figure 4

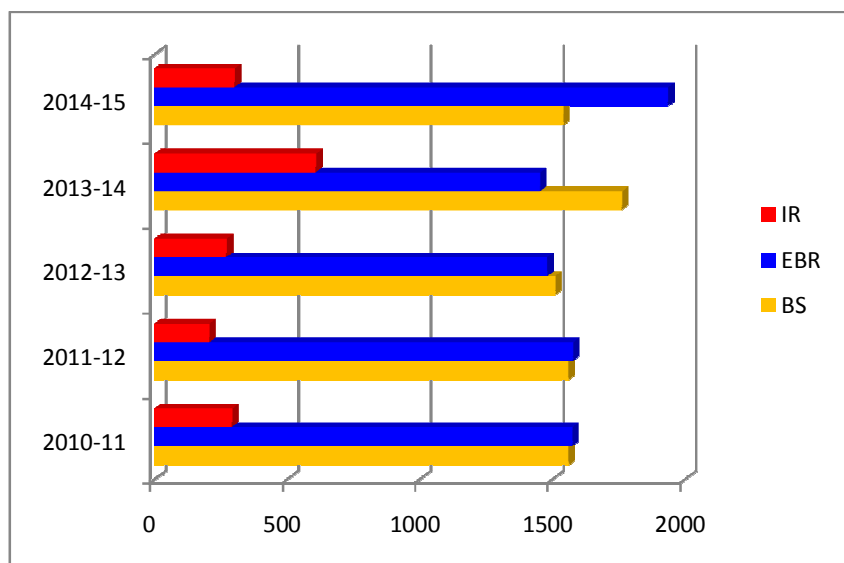


Figure 4 : External Funding (IEBR) of C-MET since 2010-2011

C-MET has also been enhancing its intellectual output in terms of publications, conference papers, Indian and foreign patents and invited talks as seen in Figure 5 and Figure 6. The trend clearly evidences better scientific recognition of the R&D capability of C-MET scientists.

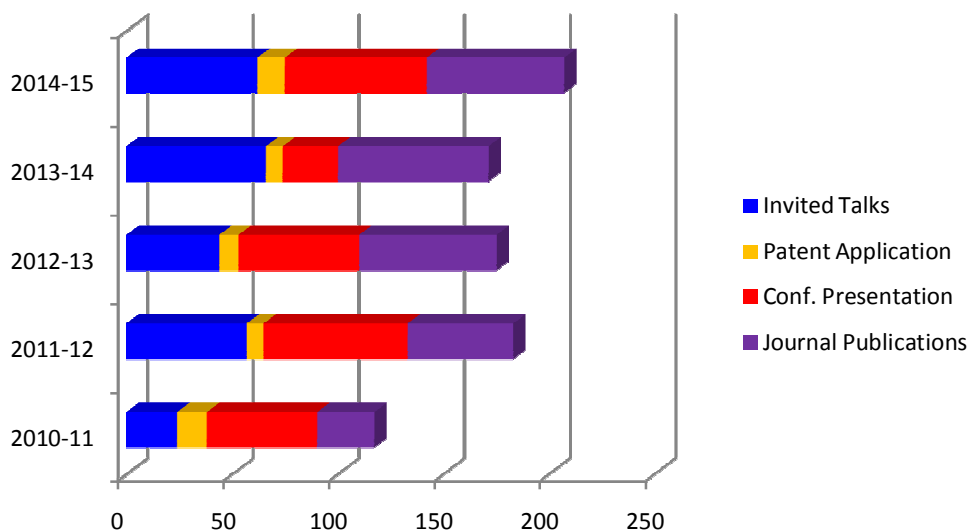


Figure 5 : Intellectual Output of C-MET since 2010-2011

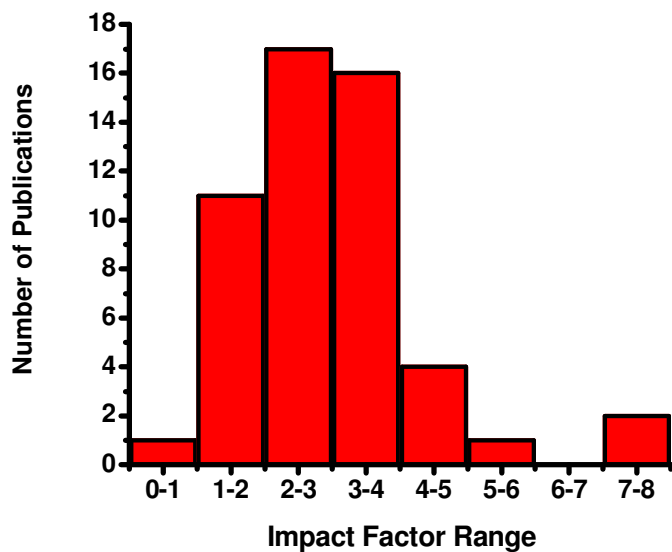


Figure 6 : Publications in Peer-reviewed Journals with Impact

Materials Characterization Services

The expertise and infrastructure developed at C-MET during the previous years, were effectively utilized by providing materials characterization services to outside organizations which included private industries, R&D institutes, strategic sectors and others. C-MET generated internal revenue of Rs. 18.22 lakhs from materials characterization services and rendering RoHS & allied services.

LABORATORYWISE TECHNICAL PROGRESS DURING 2014-15

A) Core projects

No.	Title of the Project	Funding Agency	Total Outlay (Rs in Lakhs)	Achievements for 2014-15
C-MET, Pune				
1	Development of CNT based lead-free solder composite for bumping applications	DeitY	62.00	<ul style="list-style-type: none"> Dispersant for CNT being identified Modification and activation of CNT in progress Co-deposition bath for CNT-Lead-free Sn-Ag-Cu solder developed. Optimization in progress Characterization of electrodeposited film showed CNT dispersed in solder matrix
2	WS ₂ -glass nanocomposite for gamma ray shielding	DeitY	60.00	<ul style="list-style-type: none"> Procurement of raw materials and equipments initiated
3	Synthesis of transition metal doped hollow glass microspheres for hydrogen storage applications	DeitY	53.00	<ul style="list-style-type: none"> Procurement of raw materials and equipments initiated
4	Development of aluminum (Al), alumina (Al ₂ O ₃) and copper (Cu) mono-dispersed nanopowders by using transferred arc thermal plasma reactor (TAPR) with plasma emission spectroscopy	DeitY	62.00	<ul style="list-style-type: none"> Procurement for the assembling of various components for plasma emission spectroscopy initiated
C-MET, Hyderabad				
5	Studies on the recovery of cobalt from spent Lithium ion batteries	DeitY	145.28	<ul style="list-style-type: none"> Spent Li-ion batteries collected and dismantled safely and characterized.
6	Establishment of silicon carbide (SiC) single crystals wafer process technology for electronic	DeitY	638.65	<ul style="list-style-type: none"> Specifications finalized for cutting facilities.

	devices applications.			
7	Process development for the extraction of rare earth (Yttrium, Europium & Terbium) oxides from the spent phosphors of fluorescent lamps.	DeitY	59.17	<ul style="list-style-type: none"> The phosphors powder has been collected by chemical process and analyzed.
8	Design and fabrication of induction zone refiner	DeitY	94.49	<ul style="list-style-type: none"> Specifications finalized for inductive zone refining system.
C-MET, Thrissur				
9	Development of thin film waveguides for optical amplification applications	DeitY	167.42	<ul style="list-style-type: none"> Thin films based on barium titanate have been prepared on glass substrates with good refractive index contrast.
10	Development of transparent conducting oxide based plasmonic materials and devices	DeitY	109.24	<ul style="list-style-type: none"> Highly stable precursor solutions for developing aluminium zinc oxide (AZO) thin films have been prepared. Fabricated AZO films with (002) orientation by spin/dip coating techniques (thickness in the range 100-200 nm). The films were transparent to visible light (>90% in the visible range); the band gap was ~3.32eV.
11	Development of NTC thermistors for radiosonde & meteorological balloon applications	DeitY	64.62	<ul style="list-style-type: none"> Developed NTC thermister compositions having low room temperature resistivity. The compositions were characterized by making disc thermistors
12	Magneto-dielectric substrates for miniaturized antenna applications	DeitY	91.31	<ul style="list-style-type: none"> Procurement of capital equipments has been done upto PO stage Optimized multiple calcinations steps to

				<p>obtain phase pure magneto-dielectric (MD) filler YIG ($\text{Y}_3\text{Fe}_5\text{O}_{12}$).</p> <ul style="list-style-type: none"> Fabrication of MD substrate by finely dispersing MD filler in PP & Epoxy matrices is in progress.
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B) Sponsored Projects

i) Completed Grant-in-Aid Projects:


During this year, following grant-in aid projects have been completed

No.	Title of the Project	Funding Agency	Total Outlay (Rs in Lakhs)	Achievements for 2014-15
C-MET, Pune				
1.	Development of optical isolators using quantum dots based photonic glasses	DeitY	156.08	<ul style="list-style-type: none"> The samples have been optimized on newly installed Magneto-optical Faraday Rotation equipment. The repeatability of glass samples has been tested. Project was completed successfully and the closure report has been submitted to DeitY, New Delhi.
2.	Development of prototypes aprons, glass sheets and curtains from lead free x-ray absorbing materials	DeitY	112.58	<ul style="list-style-type: none"> The accumulation of the samples have been done. Two types of aprons have been fabricated and tested in BARC. The glass of 3" diameter were prepared and tested in BARC. The project has been successfully completed and the completion report has been submitted to DeitY, New Delhi.
3.	Development of green low temperature firable thick film piezoresistive composite pastes for strain gauge applications	DRDO	48.35	<ul style="list-style-type: none"> Optimized different paste compositions with respect to paste properties such as screen printability and film properties such as sheet resistance, piezoresistive properties etc. using planar resistor pattern. Reproducibility of the RuO_2 and $\text{Bi}_2\text{Ru}_2\text{O}_7$ based thick film piezoresistors was confirmed by measuring the piezoresistive properties of the paste formulated last year. The developed piezoresistors showed good reproducibility, repeatability



				with the gauge factor (GF_L and GF_T) respectively in the range of 7-15 and 2-4.
4.	Hydrogen production using nanostructured Fe: TiO ₂ and N: TiO ₂ thin films and powders.	DST (Indo – Slovenia Collaborative Project)	9.41	<ul style="list-style-type: none"> The nanostructured Fe: TiO₂ and N: TiO₂ samples were optimized and sent to Slovenia for water splitting. The results were found satisfactory. Project has been successfully completed and project completion report has been submitted to DST, New Delhi
5	Development of microwave substrates in LTCC	NPMAS	32.26	<ul style="list-style-type: none"> Three different microwave design viz dipole antenna, filter circuits and monopulse comparator were given by the users. All the three circuits were developed and submitted to the sponsoring agency
C-MET, Thrissur				
6.	Development & pilot scale production of high permittivity & low loss ceramic filled PTFE substrates for MW applications	DST	234.58	<ul style="list-style-type: none"> Fabricated Cu-cladded microwave substrates having an effective dielectric constant of 6.15 ± 0.15 and loss tangent of 0.0018 at 10 GHz System level evaluation of patch antennas, RF MEMs switches, band pass filters etc were fabricated at LEOS, Bangalore, Data Patten, Chennai and CUSAT, Kochi and successfully tested. The products developed under this project have been advertised for Technology Transfer, identified interested industries and obtained approval of GC. ToT will be done shortly to the identified industry
7.	Development cum production & supply of MW substrates for 750W solid state amplifiers	BRNS	196.00	<ul style="list-style-type: none"> Phase pure low dielectric and high quality factor microwave ceramic filler materials were prepared in the CaO-RE₂O₃-SiO₂ phase diagram Process parameters optimized to obtain ceramic filled PTFE composites having effective dielectric constant, $\epsilon_r = 3.5 \pm 0.03$ and $\tan \delta = 0.0018$ at 10 GHz Dielectric anisotropy of the samples are judiciously measured using waveguide cavity perturbation technique
8.	ML actuators for MEMS based micro valve	DeitY (EMCD)	118.00	<ul style="list-style-type: none"> ML actuators were developed, evaluated their properties and delivered

ii) On-going Grant-in-Aid Projects:

During this year, following grant-in-aid projects are being implemented. The consolidated progress in respect of these grant-in-aid projects is furnished below:

No.	Title of the Project	Funding Agency	Total Outlay (Rs in Lakhs)	Achievements for 2014-15
	C-MET, Pune			
1.	Development of specific thin film substrates in LTCC	BARC	50.00	<ul style="list-style-type: none"> Samples submitted to funding agency. Testing is in progress
2.	Prototype development of packages for specific thin film applications	BARC	198.70	<ul style="list-style-type: none"> Fabrication of final samples is in progress
3.	Development of general purpose LTCC tapes and pastes	DST & CMET	580.93	<ul style="list-style-type: none"> Ag paste development is completed. Ag-Pd paste for screen printing and via fill development in progress. Via fill paste using Ag is being developed. LTCC tape development at CMET Thrissur is almost completed.
4.	"In-house" development of microphotoconductor devices using semiconductor nanostructures by novel photopatternable thick film technology for advanced optoelectronic applications	DeitY	90.00	<ul style="list-style-type: none"> 12 no. of devices have been tested in details and performed repeatability study three times for each device The photoluminescence data of synthesized powder incorporated in the completion report and spectral response of fabricated device matches with photoluminescence Sensors are fabricated for advanced optoelectronic application such as auto car dimmer  <p>Fabricated micro-photosensor</p>

5.	Development of active materials (cathode and anode) for high energy density lithium-ion cell/ battery with fabrication of prototype cell	DeitY	498.05	<ul style="list-style-type: none"> • Trial experiments were conducted for the synthesis of active materials (cathode and anode) for 100 gm batch scale. Completed its physico-chemical characterization using XRD, FT-Raman and FE-SEM analysis. • The characterization data were compared with commercially available active materials. • Prototype button Cells were fabricated using the developed active materials with the help of facility at Chonnam National University, Korea and CGCRI , Kolkata
6.	Novel solar light driven bismuth sulphide quantum dot-glass nanocomposite photocatalyst for hydrogen generation	DST	25.76	<ul style="list-style-type: none"> • The synthesis of glass nanocomposite using melt and quench method and sol-gel glass with different dopant concentrations is completed. • The characterization of glass nanocomposite is completed using HRTEM, UV, XRD and PL techniques. • Hydrogen evolution experiments using glass nanocomposite as a catalyst is in progress. • Synthesis of low melting temperature glass with varying dopant concentration by using melt and quench method is in progress. • The designing of flow bead reactor is in progress.
7.	Development of the prototype photo -reactor for the hydrogen production from hydrogen sulphide under natural sunlight	MNRE	22.40	<ul style="list-style-type: none"> • Synthesised of 25 gm CdIn_2S_4 and ZnIn_2S_4 catalyst by solid state methods using optimized parameters. • Hydrogen generated using Optimized conditions. • Repeated trials for H_2 generation under natural

				<p>solar light using industrial waste H_2S were done.</p>  <p>Hydrogen generation setup (H_2S splitting)</p>
8.	Development of visible light active titanium oxynitrid and tantalum oxynitrid photo catalysts for H_2O splitting	DRDO	44.03	<ul style="list-style-type: none"> • Trial runs for the synthesis of titanium oxynitride are conducted. • Optimized process parameters for the synthesis of titanium oxynitride at 2 gm/batch level.
C-MET, Hyderabad				
9.	Establishment of extended pilot plant facility for preparation of 320 Kg per annum hafnium sponge at C-MET, Hyderabad	VSSC	2311.36	<ul style="list-style-type: none"> • Process & Safety documents for Hafnium (Hf) sponge have been prepared and submitted to the sponsoring agency, viz., VSSC. • 99% pure Hf with respect to Zr was prepared by Solvent Extraction process. 212 Kg of HfO_2 was produced. • Briquetting & chlorination process completed for 100 Kg of HfO_2 and 56 Kg of $HfCl_4$ prepared. • Around 30 Kg of Hf reduced mass was obtained by Kroll Reduction process. • Around 18 Kg of Hafnium sponge prepared by Vacuum distillation process. • Production Processes successfully demonstrated to VSSC QC team. 

10.	Development of CdS/CdTe thin film solar cells by electrochemical technique using indigenously produced starting materials	DST	68.20	<ul style="list-style-type: none"> • A viable method for preparation of cadmium chloride and cadmium sulphate has been optimized. • Zone refined cadmium and their respective salts have been characterized by XRD and their impurity elements by ICP are being regulated. The XRD pattern of both CdCl₂ and CdSO₄ indicated the existence of orthorhombic phase. • Around 6 Kg of high pure Te & Cd have been prepared for conversion into their respective salts.
11.	Ultra high purification and preparation of ultra pure crystalline germanium for detectors and optoelectronic applications.	BRNS	23.90	<ul style="list-style-type: none"> • Purified germanium sample shown overall 6N purity excluding C, O, N, Cl impurities.
12.	Sustainability and up gradation of government owned restriction of hazardous substances (RoHS) test laboratory.	DeitY	299.72	<ul style="list-style-type: none"> • 234 number of RoHS and 358 number of Non-RoHS samples have been tested for hazardous substances and trace impurities received from around 60 industries. • The 5th Industry meet on RoHS was conducted in collaboration with ELCINA, New Delhi on September 04, 2014, where 65 delegates have participated. • NABL audit was completed successfully and validity extended up to June 26, 2016. • ILC program with NCCCM, BARC was completed successfully. • Successfully completed the technical audit conducted by BIS, Chennai for the Laboratory Recognition Scheme (LRS) for testing mercury (Hg) in CFLs on March 23, 2015. • A modified IEC62554 and IS

				<p>15906 methods have been established for testing mercury in Compact Fluorescent Lamps (CFLs).</p> <ul style="list-style-type: none"> Total revenue generated for the financial year 2014-2015 is Rs. 15.96 lakhs by serving 22 RoHS and 23 non-RoHS industries. <p>Sustainability of RoHS Project</p>
C-MET Thrissur				
13.	Development of nanostructured titania photoanode material for DSSC applications	DST	10.79	<ul style="list-style-type: none"> Developed titania nanotube of 10 nm diameters and length of 50-300 nm and the photo- efficiency 1.5% were obtained for the solar cell
14.	Development of LTCC Materials for General Purpose applications (In collaboration with C-MET, Pune)	DST	36.63	<ul style="list-style-type: none"> Several batches of 7"x7" tapes were supplied to C-MET, Pune. Compatibility of developed tapes with Ag and Ag-Pd is under process. Trained C-MET, Pune staff on tape casting process.
15.	Development of titania aerogel photoanode for DSSC applications	DST (Nano Mission)	44.50	<ul style="list-style-type: none"> Developed high surface area (150-250 m²/g) nanocrystalline (10-20nm) mesoporous titania aerogel synthesized through super critical drying process. Prepared titania aerogel slurry systems with different additives Photo-anodes having the active layer of thickness 5-12 μm, suitable for DSSC fabricated Assembling and characterization of DSSC test cell initiated
16.	Development of graphene based transparent electrodes for thin film acoustic actuators and	BRNS	20.15	<ul style="list-style-type: none"> Graphene electrodes on PVDF substrates were prepared by dip coating and

	sensors			<p>inkjet printing of the graphene oxide solution on PVDF substrates followed by reduction.</p> <ul style="list-style-type: none"> Graphene electrodes were characterized by UV-visible spectroscopy, AFM, SEM, etc analysis. PVDF –graphene acoustic transducer was developed.
17.	Development of low loss & medium permittivity composite dielectrics for radial power combiners	BRNS	36.67	<ul style="list-style-type: none"> Successfully prepared phase pure low dielectric and low loss microwave ceramic filler materials and augmented the same to 1 Kg level batch Ceramic filled PTFE cylinders having 110 mm diameter and 90 mm height were fabricated through compression molding technique and machined as per requirement of the user agency and delivered for system level evaluation Simulation studies were performed to develop dual band (325 and 650 MHz) radial powder combiners by incorporating dielectric resonators for dual band operations
18.	Development of thin film solar cell with earth-abundant kesterite absorber	DST	45.83	<ul style="list-style-type: none"> Cu₂ZnSnS₄ films with thickness in the range 1-1.5 μm were fabricated by low cost spin coating techniques on glass/Mo coated substrate. Optical absorption coefficient of films was found to be $\sim 10^5 \text{ cm}^{-1}$ in visible region. Optical band gap estimated was as 1.47eV.
19.	Development of graphene super capacitors for power electronics	DeitY	72.83	<ul style="list-style-type: none"> Graphene electrodes were prepared by calendaring process Graphene electrodes were characterized for its sheet resistance and tensile strength

				<ul style="list-style-type: none"> • Graphene supercapacitors were fabricated using these electrodes • Optimization of process conditions are in finalization stages • Two patents were filed on graphene supercapacitors
20.	Development of thermal sensor based monitoring system for early detection & screening of breast cancer	DeitY	342.06	<ul style="list-style-type: none"> • Prepared chip thermistors by tape casting route and evaluated their properties. Reliability tests were also carried out. • Developed chip thermal sensor probes from these chip thermistors and optimized the process conditions in order to obtain probes with good thermal time constant • Evaluated the material constant resistivity, thermal time constant, dissipation constant and temperature coefficient of resistance. Also carried out reliability tests of thermal probes. • Initiated the development of data acquisition system in collaboration with C-DAC

iii) Newly Initiated Grant-In-Aid Projects During 2014-15

No.	Title of the Project	Funding Agency	Total Outlay (Rs in Lakhs)
C-MET, Pune			
1	Development of magnetic sensors in LTCC	BARC	127.00
2	Efficient waste water treatment using novel catalyst under the INDO-UKIERI program to C-MET & NCL	DST	4.91
3	Development of nanostructured pdte powder for thermoelectric application	BRNS	19.00
4	Prototype development of fuel cell using nano functional materials	DeitY	31.68
5	Nanotechnology: synthesis and sensing application.	DST	8.50
C-MET, Hyderabad			
6	Design and development of crystal growth system for preparation of high pure GaN for LEDs and other related optoelectronic applications.	DST	67.88
7	Environmentally sound methods for recovery of metals from printed circuit boards : Phase-II	DeitY	1126.80
C-MET, Thrissur			
8	Development of transition metal doped TiO ₂ nanomaterials for photo-catalytic H ₂ generation by water splitting	BRNS	23.90
9	Development & setting-up of pilot scale production of aerogel super capacitor for electronic applications	DeitY & DST	2120.77
10	Aluminum internal electrode based ultra low temperature co-fired ceramics (μ -LTCC) for MW electronic applns.	BRNS	29.89

IMPORTANT EVENTS

Seminar on RoHS Compliance, Testing & Certification

C-MET, Hyderabad organized one day Symposium on “Restriction of hazardous Substances – RoHS, Compliance, Testing & Certification under E-waste Rules” was Conducted in collaboration with ELCINA, New Delhi on 4th September 2014 at India International Centre, New Delhi, wherein 65 delegates from various industries participated. The Keynote Address was delivered by Dr. Debashis Dutta, Group Coordinator (R & D), DeitY, Government of India. Dr. N. R. Munirathnam delivered the lecture on “The analytical challenges for e-waste rule/RoHS compliance”. Mr. B. Vinod Babu, Sr. Environmental Engineer & In-charge, Hazardous Waste Management delivered a lecture on “Managing Hazardous Waste from Electronics”, Dr. Shruti Rai Bharadwaj, Dy. Director, MoEF&CC, delivered a lecture on “MoEF’s perspective on E-waste & RoHS”. Mr. Priti Mahesh, Toxics Link delivered a lecture on “Challenges in implementation and the current need”. Dr. Rachna Arora, Senior Technical Advisor, Internationale Zusammenarbeit (GIZ), GmbH, delivered a lecture on “International experiences on RoHS compliance and challenges in India”. The symposium was concluded by offering the vote of thanks.



Figure 7 : Inauguration of seminar on RoHS Compliance, Testing & Certification

INDIA-JAPAN Workshop on Nanotechnology: Synthesis and Sensing Applications

The Department of Science and Technology (DST), Ministry of Science & Technology, Government of India, New Delhi and the Japan Society for the Promotion of Science (JSPS), Japan conduct the India-Japan Cooperative Science Programme (IJCSP) to promote bilateral scientific collaboration between Indian and Japanese scientists. In this series, an international workshop entitled “INDIA-JAPAN Workshop on Nanotechnology: Synthesis and Sensing Applications” was organized on 16th October 2014 at C-MET, Pune. Prof. R. P. Singh, Former VC of Lucknow University inaugurated the Workshop. Prof. Toshihiro Moriga, Prof. Mikito Yasuzawa, Prof. Pankaj Koinkar, Prof. Masao Nagase and Prof. Daisuke Yonekura delivered the lectures on this occasion from Japanese side. Prof. Mahendra, Prof. Mahendra A. More, Dr. Milind Kulkarni, Dr. Ranjit Hawaldar, Dr. Govind Umarji and Dr. Manish Shinde delivered the lectures in the workshop from the Indian side. 25 participants attended the one day workshop.



Figure 8 : Inauguration ceremony of INDIA-JAPAN Workshop

Inauguration of 200 kV FETEM facility

Dr. Srikumar Banerjee, former Chairman, Atomic Energy Commission inaugurated the 200 kV Field Emission Transmission Electron Microscopy (FETEM) Facility at C-MET, Pune on 12th November 2014



Figure 9 : Inauguration of 200 kV FETEM facility by Dr. Srikumar Banerjee, former Chairman, Atomic Energy Commission

National Science Day Celebration

National Science Day is celebrated all over India on 28th of February every year to commemorate the invention of the Raman Effect by the Indian Physicist, Sir Chandrasekhara Venkata Raman on the same day in the year 1928.

C-MET, Thrissur organized a full day function on 26th February 2015 to celebrate the National Science Day 2015 which included two important Science Day Lectures. Prof. C. Sudarsanakumar, Director, School of Pure & Applied Physics, Mahatma Gandhi University, Kottayam talked about the 'X-ray Diffraction over a period of 100 years'. Prof. Sudarsanakumar highlighted the significance of structure analysis of biomolecules in unraveling the molecular interactions in biological systems. The National Science Day Sir C V Raman Lecture was delivered by Dr. P. Asoka-Kumar, Physicist (Retired), Lawrence Livermore National Laboratory, USA on the topic "Materials Science using Positrons" and discussed about the subject at length, highlighting the importance of using positrons in understanding the defect structure of materials. Dr. Debashish Dutta, Executive Director, C-MET, Dr. V. Kumar, Director, C-MET, Thrissur and Scientists Dr. S. N. Potty and Dr. A Seema also presented their views on the occasion. C-MET Thrissur Laboratory was open to visit by the general public and students on the same day. Many people from various walks of life visited the C-MET, Thrissur laboratory and they were explained about the technologies/products developed at C-MET.



Figure 10 : Prof. C. Sudarsanakumar delivering the National Science Day Inaugural Lecture



Figure 11 : Dr. P. Asoka-Kumar delivering the National Science Day Sir C V Raman Lecture.

Annual Foundation Day, 2015 and the 2nd International Symposium on Physics and Technology of Sensors

Keeping in line with the continued practice, C-MET, Pune organized the second edition of international symposium coinciding with the Annual Foundation Day on 8th March 2015. The 'Pre-Symposium Indo-Japanese Workshop on Sensing mechanisms, Materials and Applications' was arranged on 7th March 2015. While, the International Symposium, ISPTS-2, was organized between 8th to 10th March 2015. Dr. Ashok Joshi, President, Ceramtech, USA inaugurated the 'Pre-Symposium Indo-Japanese Workshop. The list of the speakers included Prof Michael Pecht, USA and Prof. Kenji Uchino, USA, Dr. Toshihiro Moriga, Dr. Bharat Kale, Dr. Mikito Yasuzawa, Dr. Milind Kulkarni, Prof. Mahendra More and Dr. Pankaj Koinkar. More than 150 delegates attended the workshop.

The joint events of C-MET's Foundation Day and the inaugural function of ISPTS-2 were held at YASHADA Auditorium, Pune on 8th March 2015. Prof. (Ms) S. A. Gangal, Co-Chairperson of ISPTS-2 offered warm welcome to all the guests and participants. Dr. Debashis Dutta, Executive Director, C-MET and Chairperson of ISPTS-2, together with the Directors of three C-MET Centers, gave a brief account of the C-MET activities, its accomplishments at the centers situated at Hyderabad, Thrissur and Pune. Dr. V. K. Aatre, former Scientific Advisor to Raksha Mantri, honoured all by being present C-MET foundation day Function and at the inaugural function of ISPTS-2 as the Guest of Honour. He also delivered the 'C-MET Foundation Day Lecture' entitled "Materials and Sensors for Micro Systems - Indian Initiatives". In his lecture, Dr. Aatre provided details of the Research and Development undertaken under the National Programmes in the subject. Dr. Girish Phatak, Convener, ISPTS-2 proposed vote of thanks.

The ISPTS-2 event was jointly organized by Centre for Materials for Electronics Technology, (C-MET), Pune, Centre for Sensor Studies (CSS), Department of Electronic Science, Savitribai Phule Pune University, Centre for Advanced Life Cycle Engineering (CALCE) USA, and, Defence Institute of Advanced Technology (DIAT), Pune. The event was technically sponsored by the IEEE Reliability Society. Organizers were privileged to have sponsorship from DST and UGC, apart from generous Industry support. The Industries participated in through exhibition and advertisements in the abstract book.

ISPTS-2 organized a Public Symposium Lecture on 9th March 2015 which was inspiring delivered by Dr R. Chidambaram, Principal Scientific Advisor to Govt. of India. In his lecture entitled "Technologies for Knowledge Economy", he presented details of developments within India in various fields of sensors and actuators. The technical Sessions on the three days of the symposium involved Plenary Talks, Invited Talks, Oral and Poster presentations. This time, two important sessions were added, namely, a plenary session dedicated to Late Dr. Ravindra N. Karekar and a session for presentations by Ph.D students.

In all, one C-MET Foundation Day Lecture, 4 Plenary Talks and 16 Invited Talks were arranged during ISPTS-2. A total of 224 participants attended the symposium from about 67 Research Laboratories, 21 Educational Institutes, 86 Universities, 12 IIT & IISc, 29 Engineering Colleges and 3 industries from all over the country. The numbers of papers presented in different domains are - Bio Sensors (9), Gas Sensors (38), Humidity Sensors (17), Sensor Instrumentation (61), Sensor Materials (55), Mechanical Sensors (04), MEMS (25), Optical Sensors (05) and Physical Sensors (25). On 10th March 2015, various prizes for presentation, poster, PhD thesis, etc were awarded during the valedictory function. The ISPTS-2 deliberations ended with the vote of thanks.

“Pre-symposium Indo-Japan workshop on Sensing Mechanism, Materials and Applications”



Figure 12: Inaugural speech by Dr. Ashok Joshi, Pressident, Ceramtech, USA

Annual Foundation Day, 2015 and ISPTS -2



Figure 13: Opening Ceremony of Annual Foundation Day and ISPTS- 2

Annual Foundation Day, 2015 and ISPTS-2



Figure 14: C-MET “Foundation Day Lecture” by Dr V. K. Aatre, former Scientific Advisor to Raksha Mantri



Figure 15: “Public Symposium Lecture” by Dr R. Chidambaram, Principal Scientific Advisor to Govt. of India

DISTINGUISHED VISITORS

- Mr. Minamide, Managing Director, M/s. Murata Electronics, Singapore and Dr. Karun Malhotra, Technical Director, M/s. Murata Electronics, HQ, Japan visited C-MET Pune on 27th July 2014.
- Prof. Ajit Kelkar, Joint School of Nanoscience and Nanoengineering, and Prof. Barry Burks (Vice-Chancellor), Research and Economy Development both from North Carolina AT&T State University, USA visited C-MET, Pune on 13th October 2014.



Figure 18 : Visit of delegates from North Carolina AT&T state University, USA to C-MET, Pune

- Honorable Union Secretary, Department of Electronics & IT (DeitY), Government of India, New Delhi, Shri Ram Sewak Sharma and Dr. Susumu Kagwa, President, The University of Tokushima, Japan visited C-MET, Pune on 14th October 2014.

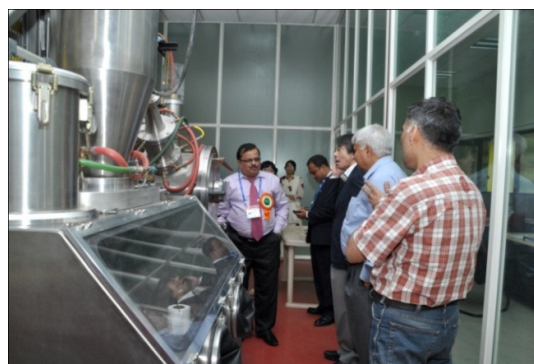


Figure 19: Visit of Dr. R.S. Sharma, Secretary, DeitY, New Delhi and Dr. Susumu Kagwa, Japan to C-MET,

- Prof. Toshihiro Moriga, Prof. Mikito Yasuzawa, Prof. Pankaj Koinkar, Prof. Masao Nagase and Prof. Daisuke Yonekura visited C-MET, Pune and delivered the lectures in INDIA-JAPAN Workshop on Nanotechnology: Synthesis and Sensing Applications” was organized on 16th October 2014 at C-MET, Pune.
- Dr. Luiza Cintra Campos, University College London ‘UK’ visited C-MET, Pune on 11th November 2014 and delivered a lecture on “Nanomaterials Application in Water and Air Treatment”.



- Honorable Union Secretary, Department of Electronics & IT (DeitY), Government of India, New Delhi, Shri Ram Sewak Sharma visited C-MET, Hyderabad laboratory on 10th February 2015.



Figure 21: Visit of Honorable Union Secretary, DeitY, Shri R. S. Sharma's to C-MET, Hyderabad

- Dr. P Asoka-Kumar, Physicist (Retired), of Lawrence Livermore National Laboratory, USA visited C-MET Thrissur Laboratory on 26th February 2015 and he also delivered a talk on “Materials Science using positrons”.
- Dr. R Chidambaram Principal Scientific Advisor to Govt. of India, visited C-MET, Pune on 9th March 2015.



Figure 22: Visit of Dr. R Chidambaram Principal Scientific Advisor to Govt. of India, to C-MET, Pune

- Many distinguished researchers from India and abroad who attended ISPTS-2 and Pre-symposium Indo-Japan workshop visited C-MET, Pune during 7th-10th March 2015.
- Prof. Kenji Uchino of Penn State University, USA visited C-MET, Thrissur and delivered a talk entitled “Loss Mechanism in Smart Materials” on 13th March 2015.



Figure 23: Prof. Kenji Uchino of Penn State University, USA delivering a talk at C-MET, Thrissur

- Dr. Artur Braun of Empa-Swiss Federal Laboratory for Materials Science & Technology, Switzerland visited C-MET, Thrissur on 13th March 2015 and delivered a talk on “Solar Hydrogen Generation via Photo-electrochemical Water-Splitting”.

SIGNING OF MEMORANDUM OF UNDERSTANDING

Memorandum of Understanding (MoU) on E-waste recycling was signed between Centre for Materials for Electronics Technology (C-MET), Hyderabad and Karnataka Biotechnology and Information Technology Services (KBITS), Government of Karnataka on 13th November 2014 in the presence of Shri S. R. Patil, Hon’ble Minister of Information Technology, Biotechnology and Science & Technology, Government of Karnataka.



Figure 24: Signing of Mou on E-waste recycling between C-MET, Hyderabad and KBITS, Government of Karnataka

Memorandum of Understanding on E-waste recycling was signed between Centre for Materials for Electronics Technology (C-MET), Hyderabad and E-Parisaraa, Bengaluru on 16th February 2015 at Dobaspet Recycling Facility of E-Parisaraa.



Figure 25: Signing of MoU on E-waste recycling between C-MET, Hyderabad E-Parisaraa, Bengaluru

FELLOWSHIPS/VISITS ABROAD

Dr. B. B. Kale has been awarded Brain Pool Fellowship by the Government of South Korea. Subsequently, he joined Department of Materials Science and Engineering, Chonnam National University, Gwangju, South Korea for one year duration from 18th August, 2014.

PUBLICATIONS

i) IN-PEER REVIEWED JOURNALS

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10. Controlled synthesis of zinc oxide nanoflowers by succinate-assisted hydrothermal route and their morphology-dependent photocatalytic performance, P. V. Adhyapak, S. P. Meshram, I. S. Mulla, S. K. Pardeshi, D. P. Amalnerkar, **Materials Science in Semiconductor Processing**, 27 (2014) 197-206.
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13. A facile green synthesis of silver nanoparticles using *Psoralea Corylifolia* L. seed extract and their In-Vitro antimicrobial activities, S. D. Danai-Tambhale, P. V. Adhyapak, **International Journal of Pharma and Bio Sciences**, 5 (2014) 457.
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49. Evaluation of hazardous substances in electrical wires of various colours and gauges available at local market as per RoHS regulation – A case study, U. Rambabu, S. Harish, B. Kishore Babu, R. Govindaiah, U. Rambabu, M.R.P Reddy and N. R. Munirathnam; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
50. Solvent Extraction Process for the Production of 99% pure hafnium Oxide for NIOBAT-101 Alloy for Space Applications, R. C. Reddy, T. P. Kumar, V. P. A. Ali, B. Suresh, M. K. Chawan, K. Mahesh, D. Saidulu, B. G. Biswas, A. Choudhary, A. Kumar, N. R. Munirathnam; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
51. E-Waste Recycling Methods – A technological Perspective, K. S. Gowri, B. Shiva, K. S. Vadayar, S. D. Rani, M. R. P. Reddy, R. C. Reddy, N. R. Munirathnam; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
52. Method development of sample preparation for Tin-Lead alloy solder wire for RoHS analysis, N. D. Naina Thakur, L. Sravanti, S. Harish, K. Babu, B. Divya, R. Govindaiah, U. Rambabu, M.R.P Reddy, N. R. Munirathnam; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
53. Determination of fluoride content in different green tea bags using ion chromatography, L. Sravanthi, B. Mahender, K. Ramaswamy, N. D. Naina Takur, U. Rambabu, R. Govindaiah, M. R. P. Reddy, N. R. Munirathnam; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
54. Determination of hexavalent chromium in magnetic recording tapes using UV-Visible spectrophotometer, B. Mahender, R. Govindaiah, U. Rambabu, M.R.P. Reddy, N. R. Munirathnam; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
55. Silicon carbide (SiC) single crystal growth by physical vapor transport and challenges, S. Mahajan, M. V. Rokade, S. T. Ali, N. R. Munirathnam, S. Deb, D. V. S. Rao, L. Durai, B. Bhanuprasad, A. K. Garg; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
56. Determination of effective distribution co-efficient of impurities during zone refining of cadmium, D. S. Prasad, K. Nagaraju, K. N. S. Sai, A. Chandrashekar, N. R. Munirathnam; **26th AGM-MRSI conference** held at University of Rajasthan, Jaipur during 9th-11th February 2015.
57. Ag-ZnO one dimensional nanostructures as ammonia gas sensors, Sapana Rane, Nitin Adhav, Sudhir Arbuj, Sunit Rane, Suresh Gosavi; **National Conference on Advances and**

Challenges in Green Technology, held at Sinhagad College of Arts, Science and Commerce, Pune, during 13th–14th February 2015.

58. Solvothermal synthesis of Ni doped SnO₂ nanostructures and its photocatalytic applications, N. Adhav, S. Rane, S. Arbuj, S. Gosavi, S. Rane; **National Conference on Advances and Challenges in Green Technology**, held at Sinhagad College of Arts, Science and Commerce, during Pune, 13th–14th February 2015.
59. Oxygen ion conducting glass ceramic composites for high temperature sensor applications, S. Kulkarni, S. Duttgupta, G. Phatak; **2nd International Symposium on Physics and Technology of Sensors (ISPTS-2)**, held at Pune, during 8th-10th March 2015.
60. CNT- lead free Solder composite electrodeposition for obtaining high speed interconnect for MEMS application, J. G. Rao, V. D. Giramkar, S. Joseph, G. Phatak; **2nd International Symposium on Physics and Technology of Sensors (ISPTS-2)**, held at Pune, during 8th-10th March 2015.
61. Fabrication and characterization of in-house developed resistor paste as buried micro heaters in LTCC for sensor applications, M. Kolpe, V. Giramkar, V. Chaware, S. Joseph, G. Phatak; **2nd International Symposium on Physics and Technology of Sensors (ISPTS-2)**, held at Pune, during 8th-10th March 2015.
62. Non-return microvalve using low temperature co-fired ceramic (LTCC), M. Devrukhakar, M. Dayaphule, V. Chaware, V. Giramkar, S. Joseph, G. Phatak; **2nd International Symposium on Physics and Technology of Sensors (ISPTS-2)**, held at Pune, during 8th-10th March 2015.
63. Al₂O₃ modified ZnO composite thick film for ethanol gas sensing, S. Rane, S. Awate, G. Umarji, S. Arbuj, S. Rane, S. Gosavi; **2nd International Symposium on Physics and Technology of Sensors (ISPTS-2)**, held at Pune, during 8th-10th March 2015.
64. Structure and microwave dielectric properties of CaV₂O₆, A. N. Unnimaya, R. Ratheesh; **2nd International Symposium on Physics and Technology of Sensors (ISPTS-2)**, held at Pune, during 8th-10th March 2015.
65. Hydrogen generation via photo-catalytic water splitting, T. Radhika; **International Conference on Photonics and Solar Water-Splitting (PSWS-2015)**, held at Dept. of Physics, St. Teresas College (Autonomus), Ernakulam, during 12th-13th March 2015.
66. Silicon carbide (SiC), a WBG semiconductor for electronic applications, single crystals bulk growth and characterization, S. T. Ali, S. Mahajan, M. V. Rokade, N. R. Munirathnam, S. Deb, D. V. S. Rao, L. Durai, V. V. Bhanuprasad, A. K. Garg; **19th National Seminar on Crystal Growth** held at VIT University, Vellore during 12th -14th March 2015.
67. Material to technology – with piezo ceramic as an example, N Raghu; **National Conference on Innovative Engineering (NCIE'15)**, held at Holy Grace Academy of Engineering, Mala, Thrissur on 19th March 2015.

III) PATENTS APPLIED

1. X-Ray shielding materials and method of preparation thereof, invented by Bharat Kale, Milind Kulkarni, Rajendra Panmand, Ujjwala Kawade, Sanjay Apte, Sonali Naik, Jalindar Ambekar, Ravindra Sonawane, R. Marimutthu, Dinesh Amlanerkar, **US Patent Application No. WO/2014/097316.**
2. Glass composite and method of preparation thereof, invented by Bharat Kale, Milind Kulkarni, Ravindra Sonawane, Sanjay Apte, Sonali Naik, Jalindar Ambekar, Suresh Gosavi, **Indian Patent Application No. 1504/MUM/2014.**
3. Novel glass ceramic electrolyte for low temperature solid oxide fuel cell, invented by Shrikant Kulkarni, Vijaya Giramkar, Siddharth Duttagupta, Girish Phatak, **Indian Patent Application No. 57/MUM/2015.**
4. Novel subtractive process for easy patterning of printed thick films in LTCC, invented by Girish Phatak, Shrikant Kulkarni, Vijaya Giramkar, Shany Joseph, **Indian Patent Application No. 130/MUM/2015.**
5. A low temperature co-fired ceramic substrate miniature fuel cell and manufacturing method thereof, invented by Shekhar Dimble, Shrikant Kulkarni, Tarkeshwar Patil, Ramesh Pushpagandhan, Girish Phatak, Siddhartha Duttagupta, **Indian Patent Application No. 495/DEL/2015.**
6. Carbon aerogel compositions, process of preparation and uses thereof, invented by Nimai Chand Pramanik, Poovakulathu Abraham Abraham, Rani Panicker Narayanapanicker and Kollannoor Jacob Stanly, **Indian Patent Application No. 117/DEL/2015.**
7. Carbon aerogel and process for preparation thereof, invented by Nimai Chand Pramanik, Poovakulathu Abraham Abraham, N Rani Panicker Narayana Panicker and Kollannoor Jacob Stanly, **Indian Patent Application No. 118/DEL/2015.**
8. An energy storage device and a system thereof, invented by Seema Ansari, Muralidharan Malamal Neelanchery, Suraj Subramanian, Mejo Akkaraparambil Johny, Dayas Kalaparamban Rappai, **Indian Patent Application No. 265/DEL/2015.**
9. Composition comprising reduced graphene oxide, supercapacitor and process of preparation thereof, invented by Seema Ansari, Muralidharan Malamal Neelanchery, Divya Maniyara, Manikandan Padinhare Meleppat, Dayas Kalaparamban Rapai and Sunny Erukulam Kochappan, **Indian Patent Application No. 293/CHE/2015.**
10. Carbon aerogel based electrode, Aerocapacitors, Process and applications thereof, invented by Nimai Chand Pramanik, Poovakulathu Abraham Abraham, Rani Panicker Narayanapanicker and Kollannoor Jacob Stanly, **Indian Patent Application No. 440/DEL/2015.**
11. Carbon aerogel, process of preparation and applications thereof, invented by Nimai Chand Pramanik, Poovakulathu Abraham Abraham, Rani Panicker Narayanapanicker and Kollannoor Jacob Stanly, **Indian Patent Application No. 439/DEL/2015.**

12. Piezoelectric composition methods and applications thereof, invented by Adukkadan Anil, Vattappilly Priyadarsini, Mani Iyer Sathynarayanan, Viswanathan Kumar, **Indian Patent Application No. 1372/DEL/2015.**
13. Nano-zinc oxide, process of preparation and applications thereof, invented by Nageri Manoj, Kizhakkekilkoodayil Vijayan Baiju, Viswanathan Kumar, **Indian Patent Application No. 2348/DEL/2015.**

IV) INVITED LECTURES BY C-MET SCIENTISTS

1. Dr. B. B. Kale delivered an Expert Talk on “Glass nanocomposites for advanced applications” in TEQID-II sponsored one week Faculty Development Programme (FDP) on Nanomaterials Characterization and Applications in Devices, Physics Department, College of Engineering (COEP) Pune, during 7th-11th April 2014.
2. Dr. M. V. Kulkarni delivered an Expert Talk on “Polymer composite: Synthesis and multifunctional applications” in TEQID-II sponsored one week Faculty Development Programme (FDP) on Nanomaterials Characterization and Applications in Devices, Physics Department, College of Engineering (COEP) Pune, during 7-11 April 2014.
3. Dr. N. C. Pramanik delivered lecture on “Energy storage in aerogel ultracapacitors for EV: achievements & plan for NMEM program” at Pune in Brain Storming Sessions, organized by Technology Information, Forecast & Assessment Council (TIFAC, Govt. of India) at C-MET, Pune on 21st April 2014.
4. Dr. A. Seema delivered an Invited Talk on “Development of graphene based supercapacitors for energy storage” at the National Mission for Electric Mobility (NMEM), Brain storming session on Rechargeable Energy storage systems for xEVs: Battery and Ultracapacitors, at C-MET, Pune, on 21st April 2014.
5. Dr. N. C. Pramanik delivered lecture on “Energy storage in nanostructured materials: challenges toward the national electric mobility mission” at PG Dept. of Chemistry (Panskura College), East Midnapore, on 25th April 2014.
6. Dr. K. V. Baiju delivered an Invited Talk on “Nanostructured material for environmental application” at Dept. of Chemistry, Sree Neelakanta Govt. Sanskrit College, Pattambi, at the Environmental Day Seminar, on 5th June 2014.
7. Dr. S. N. Potty delivered a lecture on ‘Nanotechnology’ at the Kendriya Vidyalayas, Palakkad in the Service Courses conducted for the lecturers from selected in India on 12th June 2014.
8. Dr. N. C. Pramanik delivered a lecture on “CAG Supercapacitor for applications in Power Electronics: Material challenges and achievements” at RCI (Hyderabad) in National Workshop on On-Board Power sources for Defense & Aerospace applications held at RCI Hyderabad, India during June on 12th June 2014.
9. Dr. K. V. Baiju delivered an Invited Talk on “Nanostructured materials for energy and environmental applications” at the National Seminar on Saturnia of crystallography, held at the Dept. of Chemistry, Little Flower College, Guruvayoor, on 24th July 2014.

10. Dr. D. S. Prasad given an Invited Talk entitled “High purity materials technologies ready to transfer at C-MET, Hyderabad”, in the 5th Strategic Electronics Summit (SES) organized by ELCINA, at Bangalore International Exhibition Centre (BIEC), Bengaluru during 30th-31st July 2014.
11. Dr. V. N. Mani delivered an Invited Talk on “Role of Semiconductors in Modern Electronic Gadgets Development” at International Conference on Emerging Trends in Engineering and Management, Coimbatore on 4th August 2014.
12. Dr. A. Seema delivered an Invited Talk on “Graphene: Marvelous material for electronics, photonics and beyond” at the National Seminar on Nanostructured Materials (NSM 2014), held at the NSS Hindu College Changanacherry, Kottayam, on 12th August 2014.
13. Dr. K. V. Baiju delivered an Invited Talk on “Titania based nanomaterials for solar cell and photocatalytic applications” at the National Seminar, held at the Dept. of Polymer Chemistry, Carmel College, Mala, Thrissur, on 13th August 2014.
14. Dr. R. Ratheesh delivered an Invited Lecture on “Microwave materials past, present and future’ in the refresher course for materials science at Kannur University on 14th August 2014.
15. Dr. S. N. Potty delivered a lecture on “Transparent conducting oxides” in the Refresher Course in Materials Science for the teachers from different colleges/universities at the Academic Staff College, Kannur University, Kannur, on 14th August 2014.
16. Dr. K. V. Baiju delivered an Invited Talk on “Catalysis of advanced materials” at the Academic staff College, Kannur in the Refresher Course for teachers conducted by Academic Staff College of Kannur University, Kannur, on 15th August 2014.
17. Dr. N. R. Munirathnam delivered an Invited Talk on “Advanced materials processing for bulk and nanoelectronics” in the National symposium on Advances in Nanoscience and Nanotechnology, organized by Geethanjali college of Engineering and Technology, Cheeryal (V), Keesara (M), Ranga Reddy District, on 27th August 2014.
18. Dr. N. C. Pramanik delivered a lecture on “Material architecture on energy storage for high power electronic applications” at UGC-Academic Staff College (Kannur) in ‘UGC Refreshers Course on Material Science for the Teachers’, Kannur University, Kerala, on 30th August 2014.
19. Dr. N. Raghu delivered an Invited Lectrue on “Materials science to Technology through piezo ceramics” at Kannur University, Kannur on 01st September 2014.
20. Dr. N. Raghu delivered an Invited Lectrue on “Electronic Packaging” at Kannur University, Kannur, Kerala, on 01 September 2014.
21. Dr V. N. Mani delivered an Invited Talk on “GaAs Semiconductors Role in Advanced Applications” at 2nd National Conference on Recent Advances in Materials (NCRAM 2014), B. S. Abdur Rahman University, Chennai, during 3rd-4th September 2014.

- 22.** Dr. N. R. Munirathnam delivered an Invited Talk on “Restriction of hazardous substances – RoHS compliance, testing & certification under E-waste rules” organized at India International Centre, New Delhi, organized by Elcina, New Delhi, on 4th September 2014.
- 23.** Dr. V. Kumar delivered an Invited Lecture on “Nanoferroelectric-glass for electronics applications”, at the Second refresher course in Nano-Science Organized by UGC-Academic Staff College, Calicut University, Calicut, on 17th September 2014.
- 24.** Dr. P. V. Adhyapak delivered an Invited Talk on “Nanoscale metal/ polymer hybrids for humidity sensing applications” at Third International Conference on Polymer Processing and Characterization, M. G. University, Kottayam, Kerala, during 11th-13th October 2014.
- 25.** Dr. V. Kumar delivered an Invited Lecture on “Piezoelectric thin films for MEMS applications” at Continuous Education Program on Recent Trends in Underwater Transducers, conducted by NPOL, Cochin, on 14th October 2014.
- 26.** Dr. B. B. Kale delivered Talk on “Nanocomposites for advanced applications” at Carbon Materials group, Chonnam National University, South Korea on 14th October 2014.
- 27.** Dr. M. V. Kulkarni delivered an Expert Talk on “Polymer nano composite: Synthesis and applications” in Indo-Japan Workshop on Nanotechnology: Synthesis and Sensing Applications at C-MET, Pune, on 16th October 2014.
- 28.** Dr. M. D. Shinde delivered an Invited Talk on “Plain and hierarchical CdS nanostructures: Synthesis, photosensor and field emission applications”, in Indo Japan Workshop on Nanotechnology: Synthesis and Sensing Applications, at C-MET, Pune, on 16th October 2014.
- 29.** Dr. G. G. Umarji delivered an Invited Talk on “CdS based photoconductor fabrication using advanced thick film technology” in Indo Japan Workshop on Nanotechnology: Synthesis and Sensing Applications, at C-MET, Pune, on 16th October 2014.
- 30.** Dr. R. Ratheesh delivered an Invited Lecture on “Indigenous development of Microwave Ceramic Dielectric Resonators and Composite Laminates” at Defense Electronics Research Laboratory (DLRL), Hyderabad, on 17th October 2014.
- 31.** Dr. N. Raghu delivered an Invited Lecture on “Materials technology – Backbone of electronics” at the National Conference on Advanced Materials (NCAM-2014), held at Sree Kerala Verma College, Thrissur, on 17th October 2014.
- 32.** Dr. B. B. Kale delivered Talk on “Nanostructured materials and applications” at Korea Research Institute of Chemical Technology, South Korea, on 18th November 2014.
- 33.** Dr. B. B. Kale delivered Talk on “Nanostructured materials for advanced applications” at Korea Research Institute of Chemical Technology, South Korea on 18th November 2014.
- 34.** Dr. R. Ratheesh delivered an Invited Lecture on “Flexible composite laminates for wireless communication applications” at the Department of Physics, Hyderabad Central University, Hyderabad, on 19th November 2014.

35. Dr. R. Ratheesh delivered an Invited Lecture on “Flexible composite laminates for microwave communication applications” in the National Seminar on Future of Electromagnetic Communications and Materials (SPECTRUM 2014), held at Government College, Chittor, Palakkad, on 29th November 2014.
36. Dr. R. Ratheesh delivered an Invited Lecture on “Flexible ceramic filled PTFE laminates for microwave circuit applications” at the 68th Annual Technical Meeting of the National Institute of Metals (NMD-ATM 2014), held at College of Engineering, Pune, on 12th November 2015.
37. Dr. S. N. Potty delivered an Invited Lecture on “Electronic materials” in inauguration of the Science Association at the Assabah Arts & Science College, Valayamkulam, Kottur, Malappuram, on 17th November 2014.
38. Dr. N. C. Pramanik delivered a lecture on “Energy storage materials and application potentials of Aerogel Supercapacitors” in National Workshop on *Energy Materials (EM-2014)*, held at Dept. of Physics, CUSAT, Cochin, on 4th December, 2014.
39. Dr. V. Kumar delivered an Invited Lecture on “Chemistry of materials” at UGC sponsored Seminar on Advances in Materials Chemistry organized by Department of Chemistry, Calicut University, Calicut, on 5th December 2014.
40. Dr. K. P. Murali delivered an Invited Lecture on “Microwave materials developed at C-MET” at the Dept. of Electronics, Cochin University of Science & Technology (CUSAT) in International Symposium on Antennas and Propagation (APSYM 2014), held at CUSAT, Cochin, on 17th December 2014.
41. Dr. N. C. Pramanik delivered a lecture on “Role of aerogels on energy storage scenario and the achievements of C-MET on Supercapacitor development” in Award of ‘Flame of Science’ from 4th Int’l Conference of World Science Congress 2014, held at Jadavpur University, Kolkata, on 16th December 2014.
42. Dr. S. S. Arbuji delivered an Invited Talk on “Heterogeneous photocatalysis: Novel approach for carbon-carbon bond forming reactions” at National Seminar on Emerging Trends in Organic Chemistry, at MJS Mahavidhyalaya, Shrigonda, Ahmednagar, on 26th December 2014.
43. Dr. K. V. Baiju delivered an Invited Lecture on “Nanomaterials for energy and environment” at the DBT sponsored Seminar on Recent Trends in Macromolecular Chemistry held at the Dept. of Chemistry and Research Centre, St Alberts College, Ernakulam, on 30th December 2014.
44. Dr. N. C. Pramanik delivered a lecture on “Instant energy storage: Supercapacitor principle, design & fabrication for applications” in Service courses for Post Graduate Teachers in Physics at Kendriya Vidyalaya, Palakkad, on 31st December 2014.
45. Dr. R. Ratheesh delivered a Keynote Address on “New Materials: Functional Materials” in the National Seminar on New Materials and Nano Technology held at Heera College of Engineering and Technology, Thiruvananthapuram, Kerala, on 16th January, 2015.

46. Dr. N.R. Munirathnam delivered Keynote Lecture entitled “Cellular phones waste in India, their environmental pollution and proposed remediation” at IC-LGO – 2015 International Conference organized by CSIR-NML, Jamshedpur during 20th-22nd January, 2015.
47. Dr. S. N. Potty delivered an Invited Lecture on “Electronic materials” in the inauguration of the Physics Association of the College, at MPMMSN Trust College, Shoranur, on 28th January 2015.
48. Dr. N. R. Munirathnam delivered an Invited Talk - namely John Bardeen Memorial Lecture on the subject “New Semiconductors and their applications” organized by Vignana Bharathi Institute of Technology (VBIT) Ghatkesar, Hyderabad, on 30th January 2015.
49. Dr. S. N. Potty delivered an Awareness Lecture on “ISO Certification” at Govt. Engineering College, Sreekrishnapuram, on 30th January 2015.
50. Dr. A. Seema delivered an Invited Lecture on “Applications of graphene in electronics & photonics” at the National Seminar on New Materials in Chemistry (NMC- 2015), held at University of Calicut, Calicut, on 30th January, 2015.
51. Dr. S. N. Potty delivered an Invited Lecture on “Electronic materials” in the inauguration of the Physics Association at MES College, Ponnani, on 2nd February 2015.
52. Dr. S. T. Ali delivered an Invited Talk on “Silicon Carbide (SiC) - a WBG semiconductor for electronic applications - single crystals bulk growth and challenges” at VIT University, Chennai, on 6th February, 2015.
53. Dr. R. Ratheesh delivered Plenary Lecture on “Novel microwave materials for wireless communication applications” in the Nation Conference (SCIENTIA-2015) at Sree Krishna College, Guruvayoor, on 06th February 2015.
54. Dr. K. P. Murali delivered an Invited Lecture on “C-MET Activities: At a glance” at the Sreepathi Institute of Management and Technology (SIMAT), Palakkad, on 06th February 2015.
55. Dr. K. V. Baiju delivered an Invited Talk on “Materials for dye and quantum dot solar cell applications” at the Science Expo-Scientia 2015, held at Dept. of Physics, Sree Krishna College, Guruvayoor, on 06th February 2015.
56. Dr. N. C. Pramanik delivered a lecture on “CAG - The advanced material for energy storage in supercapacitor: Energy storage mechanism, Material architecture for device fabrication & applications”, at Vimala College (Thrissur) in National Seminar on Advanced Materials for Energy & Environment (NSMEE 2015), on 09th February 2015.
57. Dr. N. C. Pramanik delivered a lecture on “Supercapacitor – materials & applications: Tuning of materials properties for SC electrodes”, in ‘Punnassery Memorial Talk Series’ at Sree Neelakanta Govt. Sanskrit College, Pattambi, on 18th February 2015.
58. Dr. S. N. Potty delivered a talk on “Different sources of energy” at State Institute of Correctional Administration (SICA), Thrissur, on 19th February 2015.

59. Dr. U. Rambabu delivered an Invited Talk entitled “Its time to search for alternative materials as per Restriction of Hazardous Substances (RoHS) Regulation” at UGC sponsored National Conference on Recent Trends in Materials Science (RTMS) – 2015 organized by S.V. Engineering College, Kadapa during 1st-2nd March 2015.
60. Dr. A. Seema delivered an Invited Talk on “Application of nanotechnology in plant biotechnology” at the National Seminar on New Frontiers in Agricultural Biotechnology, held at Kerala Agricultural University, during 3rd-4th March 2015.
61. Dr B. B. Kale delivered an Expert Talk on “Quantum dot based magneto-optical glassy materials for magnetic and current sensor applications” in Pre-symposium Indo-Japan Workshop on Sensing Mechanism, Materials & Applications held at Pune, on 7th March 2015.
62. Dr. Milind Kulkarni delivered an Expert Talk on “Development of nanosized conducting Polyalline & its nanocomposites for multifunctional sensor applications and demonstration of processable polyalline based electronic nose (e-nose)” in Pre-symposium Indo-Japan Workshop on Sensing Mechanism, Materials & Applications, Pune, on 7th March 2015.
63. Dr B. B. Kale delivered an Expert Talk on “Nanostructure Materials and applications” in International Conference on Functional Materials@Nanoscale concerns and challenges (ICFMNCC-2015) at K. B. P. M. College Pandharpur, during 9th-11th March 2015.
64. Dr. T. Radhika delivered an Invited Lecture on “Hydrogen generation via photo-catalytic water splitting” at Dept. of Physics, St. Teresas College, in the International Conference on Photonics and Solar Water-Splitting (PSWS-2015), held at St. Teresas College, Ernakulam, during 12th-13th March 2015.
65. Dr. N. R. Munirathnam delivered an Invited Talk on the occasion of Prof. Alladi Prabhakar 6th Memorial Lecture on “Environment Degradation due to Electronic Waste: Status & Remedies” at IETE, Osmania University, Hyderabad Centre on 16th March 2015.
66. Dr. N. R. Munirathnam delivered an Invited Talk on “Chemical, physical and metallurgical technologies in recycling of electronic waste for green environment in the National Seminar on Emerging trends in Chemical Sciences held at New Science College (Day), Hyderabad on 19th March 2015.
67. Dr. N. Raghu delivered an Invited Lecture on “Material to Technology – with Piezo ceramic as an example” at the National Conference on Innovative Engineering (NCIE '15), held at Holy Grace Academy of Engineering, Mala, Thrissur, on 19th March 2015.
68. Dr. R. Ratheesh delivered an Invited Lecture on “Novel flexible composite dielectrics for wireless communication applications” in the National Conference on Magnetic and Electronic materials, held at Department of Physics, Mahatma Gandhi University, Kottayam, on 30th March 2015.

V) AWARDS AND HONOURS

1. K. R. Chandrasekhar, S. S. Arbuj, J. D. Ambekar, S. B. Rane received **2nd Best Presentation Award** for the paper entitled “Synthesis of cobalt oxide (Co_3O_4) nanostructures and its antibacterial activity study” at National Conference on Green Techniques (NCGT-2014), at Mewar University, Rajasthan, during 11th-12th July 2014.
2. Dr. N C Pramanik received the ‘**Flame of Science**’ Award in December 2014 from ‘World Science Congress’ for ‘*Excellence Contribution in Noble Cause of Science*’. The award was conferred during the 4th International Conference of World Science Congress 2014, held at Jadavpur University, Kolkata during 16th-18th December 2014.
3. Dr. V. Kumar received the “**MRSI Medal**” for the year 2015 for his significant contribution in the field of Material Science and Engineering.
4. Mr. P. Prabeesh received the **Young Scientist Best Paper Award** for the paper entitled “Development of thin film solar cell with earth-abundant kesterite absorber” in the 27th Kerala Science Congress held at Alappuzha during 27th-30th January 2015.
5. S. T. Ali, Sandeep Mahajan, M. V. Rokade, N. R. Munirathnam, S. Deb, D. V. Sridhara Rao, L. Durai, V. V. Bhanuprasad and A. K. Garg received the **First Prize for the Best Poster Presentation** for the paper entitled “Silicon Carbide (SiC) Single Crystal growth by physical vapor transport and challenges” at 26th AGM-MRSI Conference held at University of Rajasthan, Jaipur, during 9th-11th February, 2015.
6. Sapana Rane, Nitin Adhav, Sudhir Arbuj, Sunit Rane, Suresh Gosavi received the **Best Oral Presentation Award** for the paper entitled “Ag-ZnO one dimensional nanostructures as ammonia gas sensors” at **National Conference on Advances and Challenges in Green Technology**, held at Sinhagad College of Arts, Science and Commerce, Pune, 13th-14th February 2015.
7. Shrikant Kulkarni bagged the **Best PhD Thesis award** at the 2nd International Symposium on Physics and Technology of Sensors (ISPTS-2), held at Pune, 8th-10th March 2015.
8. Mayur Devarukhakar bagged the **Dr. N.G. Patel Prize for Best Poster Presentation** (Second position) at the 2nd International Symposium on Physics and Technology of Sensors (ISPTS-2), held at Pune, 8th-10th March 2015.
9. M. V. Rokade, Sandeep Mahajan, S. T. Ali, N. R. Munirathnam, S. Deb, D. V. Sridhara Rao, L. Durai, V. V. Bhanuprasad and A. K. Garg received the **First Prize for the Best Poster Presentation** for the paper entitled “Silicon Carbide (SiC) a WBG semiconductor for electronic applications, single crystals bulk growth and characterization” at 19th National Seminar on Crystal Growth held at VIT University, Vellore, during 12th-14th March 2015.

Book Chapters

1. **Materials for Embedded Capacitors, Inductors, Nonreciprocal Devices, and Solid Oxide Fuel Cells in Low Temperature Co-fired Ceramic**, Vivek Rane, Varsha Chaware, Shrikant Kulkarni, Siddharth Duttagupta, Girish Phatak, in the Book 'Micro and Smart Devices and Systems', Ed: K. J. Vinoy, G. K. Ananthasuresh, Rudra Pratap and S. B. Krupanidhi, Springer, ISBN: 978-81-322-1912-5 (Print), 978-81-322-1913-2 (Online), (2014), 285-301.
2. **Thermal Sensors for Energy Converter Applications**, S. P. Duttagupta, P. Ramesh, S. Roy, R. A. Shukla, S. G. Kulkarni, G. J. Phatak in the Book 'Thermal Sensors: Principles and Applications for Semiconductor Industries', Ed: Chandra Mohan Jha, Springer, New York, ISBN: 978-1-4939-2580-3 (Hard cover), 978-1-4939-2581-0 (Online), (2015), 107-130.

PLANS AND PROSPECTS

During the year, 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. Continue the interactive/ working relation with strategic sector for development of critical materials through the sponsored projects.
3. Continue the technical services, materials characterization services to industries for creating more scope for consultancy projects and RoHS certification and allied services for improvement in cash earnings.
4. Be a front runner in R&D of Electronics Materials and collaborate with esteemed international and national institutes/universities for creating common platform on knowledge sharing basis.
5. Development of impactful products and technologies through exploratory and applied research.
6. Creation of fourth unit of C-MET with mission to conduct interdisciplinary R & D for meeting the electronic materials challenges pertaining to energy conversion/ transformation, generation, transmission, storage and end-usage of conventional and renewable energy sources.

ACKNOWLEDGMENT

Centre for Materials for Electronics Technology is grateful to the Department of Electronics & Information Technology, Ministry of Communications and Information Technology, Government 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 organizations such as DeitY, VSSC (ISRO), DST, DRDO, DAE (BRNS) etc.

The guidance and proactive support of the Honourable Chairman, Vice-Chairman and Members of the Governing Council of C-MET has 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 the Honourable Chairman, Vice-Chairman and Members of the Governing Council, Chairman and Members of the Steering Committee as well as Members of the Executive Committee.

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 and the other divisions of the Department of Electronics and Information Technology, for their precious support and prompt co-operation for implementing C-MET's programs. I am also obliged to our bankers, Punjab National Bank Canara Bank, and Bank of India at Pune as well as their branches at other places for rendering timely services. It is our pleasure to have been working with Statutory Auditors M/s Patki & Soman, Chartered Accountants and M/s Deekay & Co., Chartered Accountants & Internal Auditors and I acknowledge their meticulous work.

I earnestly owe all the staff members 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. Debashis Dutta
Executive Director
On behalf of C-MET Team

MAJOR CHARACTERISATION EQUIPMENTS AVAILABLE AT C-MET, PUNE

NAME OF THE EQUIPMENT	MODEL	NAME OF THE MANUFACTURER	APPLICATIONS
UV-VIS Spectrometer		Hitachi, Japan	Spectroscopic Chemical Analysis
Spectrofluorometer		Hitachi, Japan	Luminescence studies of organic, inorganic and polymeric compounds
Elemental Analyser	CE Instrument EA 1110	CE Instruments, Italy	Elemental Analysis of Organic/Polymeric Compounds
Potentiostat/ Galvanostat		Autolab, Netherlands	Electrochemical Synthesis and Characterization
TGA/SDTA/ DSC/DPA	Toledo 821, 851	Mettler, Switzerland	Thermal Characterization of Organic, Inorganic and polymeric samples
TMA/DMA	Perkin Elmer 7e	Perkin Elmer, USA,	Thermomechanical Analysis of Polymers
Fourier Transform Infrared Spectrometer (FTIR)	PE Spectrum 2000	Perkin Elmer, USA,	Spectroscopic Chemical Analysis
High Performance Liquid Chromatograph (HPLC)/Gel Permeation Chromatograph (GPC)	HPLC 515/996 & GPC 2410	Water, Austria	Chromatographic Analysis of Polymeric and Organic Compounds
Scanning Electron Microscope (SEM) with EDAX	Philips XL-30	Philips, Netherlands	Surface Morphology and related Microanalysis
Graphite furnace Atomic Absorption Spectrometer	Avanta – sigma	Nulab, USA	Trace Impurity Analysis
Hot Stage Microscope	FP-900, Lica DMLP	Mettler- Toledo, Switzerland	Characterisation of Liquid Crystalline Polymers
Scanning Probe Microscope		Agilent Technologies Inc., USA	Examination of Topological Features at Atomic Scale
Field Emission Scanning Electron Microscope	S-4800 II	Hitachi, Japan	Surface Morphology and related Microanalysis
Field Emission Transmission Electron Microscopy	JSM 2200FS	JEOL, Japan	Surface Morphology and related Microanalysis

MAJOR CHARACTERISATION EQUIPMENTS AVAILABLE AT C-MET, HYDERABAD

NAME OF THE EQUIPMENT	MODEL	NAME OF THE MANUFACTURER	APPLICATIONS
Inductively coupled Plasma Mass spectrometer (ICP-MS)	X-Series II	THERMO FISHER SCIENTIFIC, Germany	Elemental Analysis in liquid (ppb/ppt level)
Inductively Couples Plasma Optical Emission Spectrometer (ICP-OES)	iCAP 6500 series	THERMO FISHER SCIENTIFIC, Germany	Elemental analysis in liquid at ppm level at for Hafnium facility
X-Ray Diffractometer (XRD)	Xpert PRO	PANALYTICAL, Netherlands	Phase and impurities detection in materials
Inductively Couples Plasma Optical Emission Spectrometer (ICP-OES)	Agilent 725	AGILENT TECHNOLOGIES INDIA PVT. LTD., Bangalore	Elemental analysis in liquid at ppm level at RoHS facility
Gas Chromatograph Mass spectrometer (GC-MS)	DSQ II	THERMO FISHER SCIENTIFIC, USA	Analysis of Poly brominated compounds in electronic materials
Energy Dispersive X-ray Fluorescence (ED XRF)	ARL Quanta X	THERMO FISHER SCIENTIFIC, USA	Screening of elemental analysis down to ppm level
Ion Chromatography (IC)	850 IC Professional	METROHM, Switzerland	Estimation of Anions/ Cations
Graphite Furnace Atomic Absorption spectroscopy (GF AAS)	GF3000/932AA	GBC, Australia	Elemental analysis at ppm/ ppb level in liquids
Microwave Digestion System for RoHS facility	Multiwave-3000	ANTON PAAR, Vienna	Closed Digestion of samples by Microwave
Microwave Digestion System for hafnium facility	Star D	MILESTONE, Italy	Closed Digestion of samples by Microwave
Water purification System	Purelab Classic	ELGA, U.K.	18.2 MΩ water for analysis at RoHS facility
Metallurgical Microscope	LABORLUX 12 ME ST	LEICA, Germany	Morphological and Structural Analysis of Materials
Carbon Sulphur analyzer	EMIA-920V2	HORIBA, Japan	Estimation of Carbon, Sulphur in Metal Samples
Micro Hardness Tester	HMV	SHIMADZU, Japan	Measuring Brinell Rockwell, Diamond Hardness
ONH Analyser	ONH-836	LECO, USA	Estimation of Oxygen, Nitrogen and Hydrogen in materials
Water Purification system	SA 67120	Millipore, USA	18.2 MΩ water for analysis
UV Visible Spectrophotometer	UV 2450	SHIMADZU, Japan	Organic & Inorganic Analysis of Elements in liquids (micro level)
TGA/DTA	S-II 7300	S-II, Nano Technology, Japan	Thermal Characterization of Organic, Inorganic and polymeric samples ≤ 1400 °C

MAJOR CHARACTERISATION EQUIPMENTS AVAILABLE AT C-MET, THRISSUR

NAME OF THE EQUIPMENT	MODEL	NAME OF THE MANUFACTURER	APPLICATIONS
X-ray Fluorescence Spectrometer	PW2400	Philips, Netherlands	Elemental Analysis quantitative and qualitative estimation
DSC/TGA	SDTQ600	TA Instruments, USA	To study Physicochemical changes with respect to temperature upto 1500°C
Impedance Analyser	HP4192A	Hewlett-Packard, Japan	To measure inductance, capacitance, resistance, factor and variation of these properties with frequency from 5Hz to 13 MHz.
X-ray Diffractometer with variable temperature attachment	D5005	Bruker, Germany	Phase evaluation, crystal structural studies, phase formation with respect to temperature
Mercury Porosimeter		CE Instruments, Italy	Pore structure analysis with respect to pore volume, pore radius, pore size distribution in green and sintered bodies.
BET Surface area Analyser	Nova 1200,	Quantachrome, USA	Measurements of surface area of nano powders
Supercapacitor Test Systems	BT-2000	Arbin Instruments, USA	Measurement of capacitance, ESR, charge-discharge cycle
Gain Phase Analyser	Model 4294A	Agilent Technologies, USA	For impedance analysis of materials in the frequency range 40hz to 110MHz
Electrometer	6517A	Keithley, USA	Measurement of electrical resistivity (10Ω to 210TΩ) voltage/current, RH, etc.
Vector Network Analyzer	E8263 B	Agilent Technologies, USA	Microwave characterization of Dielectric Resonators, Composite substrates, ferrites, tunable dielectrics etc.
Piezo evaluation system	FE 2000	AixACCT, Germany	For piezoelectric property evaluation
Thermo Mechanical Analyzer	TMA/SS6100, SII	Japan	Measurement of thermal expansion coefficient of materials
UV-Visible spectrophotometer	Lambda 35	Perkin Elmer, USA	For measuring the absorbance in the UV-Visible region



C-MET, PUNE

AUDITED

FINANCIAL STATEMENTS

FOR THE YEAR 2014-2015

PATKI & SOMAN
Chartered Accountants
639, Sadashiv Peth, Kumathekar Road,
Opp. Sweet Home, Pune – 411 030.

AUDITORS' REPORT

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, 2015, 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, 2015; and
- b) in the case of the Income & Expenditure Account, of the deficit of the Society for the year ended on that date;

For Patki & Soman
Chartered Accountants
Firm Registration No.107830W

S. M. Patki
(Partner)
Membership No. 037315

Place : Pune.
Date : 11/08/2015

ANNEXURE Forming part of the Audit Report
of Centre for Materials for Electronics Technology
for the Year ended 31st March 2015.

1) Fixed Assets pertaining to projects:

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 sponsorers, feasibility to dispose off such assets may be assessed.

2) Valuation of Inventory:

Pursuant to the management policy with regard to valuation of lab-wares, chemicals and consumables, the purchases are charged to consumption irrespective of stock thereof at the end of the year. We are of the opinion that the stock at the end of the year may be valued and brought into account.

3) Capital Work –in – progress:

This accounts shows Rs. 3,69,13,374/- debit balance during the current year. (Previous Year Rs. 2,02,06,613/-).

4) Prior period income and expenditure:

Expenses amounting to Rs 11,64,749/- pertaining to previous year have been accounted for in the current year.

5) Report of C&AG:

As informed to us, there are certain irregularities noted by C&AG in respect of claim and disbursement of LTC to certain staff members and the matter is still in progress, outcome is uncertain.

6) Contingent liability :

Contingent liability not provided in the books of account:-

Particulars	Current Year (Rs.)	Previous Year (Rs.)
For Capital goods	Nil	Nil
For Others (In respect of pending court matter)	81,533/-	81,533/-

For Patki & Soman,

Chartered Accountants

Firm Registration No. 107830W

S.M. Patki

(Partner)

Membership No.: 037315

Place : Pune.

Date : 11/08/2015

Centre for Materials for Electronics Technology, Pune.
BALANCE SHEET AS AT 31st MARCH, 2015

(Amount in Rs.)

<u>CORPUS / CAPITAL FUND AND</u>		As at	As at
<u>LIABILITIES :</u>	Schedule	31.3.2015	31.3.2014
CORPUS/ CAPITAL FUND	1	46,95,92,259	45,36,32,209
CURRENT LIABILITIES AND PROVISIONS (Including sponsored project)	2	32,89,77,151	19,43,00,717
TOTAL		79,85,69,410	64,79,32,926
<u>ASSETS :</u>			
FIXED ASSETS	3	18,97,18,326	9,67,60,892
CURRENT ASSETS, LOANS AND ADVANCES	4	60,88,51,084	55,11,72,034
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)		-	-
TOTAL		79,85,69,410	64,79,32,926
SIGNIFICANT ACCOUNTING POLICIES	5		
NOTES TO ACCOUNTS AND CONTINGENT LIABILITIES	6		

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

Dr. Debashis Dutta
Executive Director

G. B. Rao
Sr. Finance Officer

As per our report of even date attached.

for Patki & Soman
Chartered Accountants

F.R. No. 107830W

S. M. Patki

(M.No.: 037315)

PARTNER

PLACE: PUNE

DATE :

Centre for Materials for Electronics Technology, Pune

SCHEDULE 2 - CURRENT LIABILITIES AND PROVISIONS :

(Schedules forming part of Balance Sheet as at 31st March, 2015)

(Amount in Rs.)

	As at 31.3.2015		As at 31.3.2014	
<u>A. CURRENT LIABILITIES :</u>				
1.Sundry Creditors :				
a) For goods & others	2,09,958		1,50,618	
b) For E.M.D and Deposits	33,95,365	36,05,323	9,50,482	11,01,100
2.Statutory Liabilities :				
Profession Tax / ITDS /				
Service Tax / GIS		1,61,012		1,86,066
3.Other current Liabilities :				
Sponsored Projects	23,18,33,143		11,72,54,306	
Other Liabilities	1,83,35,384	25,01,68,527	1,38,68,848	13,11,23,154
TOTAL (A)		25,39,34,862		13,24,10,320
<u>B. PROVISIONS :</u>				
1.Gratitude Payable	3,98,58,809		3,20,74,800	
2.Leave Encashment payable	3,12,74,765		2,64,28,108	
3.C-MET CPF Trust	11,19,651		1,47,867	
4.Expenses Payable	27,89,064	7,50,42,289	32,39,622	6,18,90,397
TOTAL (B)		7,50,42,289		6,18,90,397
TOTAL (A + B)		32,89,77,151		9,43,00,717

(Amount in
Rs.)

SCHEDULE 3 - FIXED ASSETS:

DESCRIPTION	GROSS BLOCK				DEPRECIATION				NET BLOCK	
	As at 1.4.2014	Additions during the year	Deletions / Adj. during the year	As at 31.03.2015	As at the beginning of the year	For the year	Deletions / Adj. during the year	Total upto 31.03.2015	AS AT 31.03.2015	As at 31.3.2014
A. FIXED ASSETS:										
1. BUILDINGS ON FREEHOLD LAND	7,73,86,013	47,84,830	-	8,21,70,843	4,80,23,575	31,75,486	-	5,11,99,061	3,09,71,782	2,93,62,438
2. LAB EQUIPMENT	20,12,20,813	8,88,24,481	-	29,00,45,294	16,63,58,945	1,18,91,117	-	17,82,50,062	11,17,95,232	3,48,61,868
3. FURNITURE, FIXTURES	1,23,10,072	1,41,810	-	1,24,51,882	80,69,783	4,38,211	-	85,07,994	39,43,888	42,40,289
4. OFFICE EQUIPMENT	1,40,45,186	4,12,756	2,472	1,44,55,470	1,10,09,365	4,93,915	-	1,15,03,280	29,52,190	30,35,821
5. COMPUTER/PERIPHERALS	1,04,84,586	3,16,140	-	1,08,00,726	73,68,696	20,42,719	-	94,11,415	13,89,311	31,15,890
6. ELECTRIC FITTINGS	10,79,926	-	-	10,79,926	4,57,571	62,235	-	5,19,806	5,60,120	6,22,355
7. ELECTRIC SUBSTATION	36,89,196	-	-	36,89,196	25,57,671	1,69,729	-	27,27,400	9,61,796	11,31,525
8. AIR CONDITIONERS	6,63,923	85,651	-	7,49,574	5,06,822	36,412	-	5,43,234	2,06,340	1,57,101
9. TUBEWELL	73,255	-	-	73,255	46,263	2,699	-	48,962	24,293	26,992
TOTAL	32,09,52,970	9,45,65,668	2,472	41,55,16,166	24,43,98,691	1,83,12,523	-	26,27,11,214	15,28,04,952	7,65,54,279
B. CAPITAL WORK-IN-PROGRESS	2,02,06,613	1,68,79,961	1,73,200	3,69,13,374	-	-	-	-	3,69,13,374	2,02,06,613
TOTAL OF CURRENT YEAR	34,11,59,583	11,14,45,629	1,75,672	45,24,29,540	24,43,98,691	1,83,12,523	-	26,27,11,214	18,97,18,326	9,67,60,892

Centre for Materials for Electronics Technology, Pune.

SCHEDULE 4 - CURRENT ASSETS, LOANS & ADVANCES :

(Schedules forming part of Balance Sheet as at 31st March, 2015)

(Amount in Rs.)

-	As at 31.3.2015		As at 31.3.2014	
<u>A.CURRENT ASSETS:</u>				
1.Cash balances in hand		10,627		3,873
2.Bank Balances with Scheduled Banks:				
- On Deposit Accounts	27,34,56,400		39,92,66,974	
- On Savings Accounts	7,96,27,645		1,59,14,431	
- Project Deposits (including FLC margin money)	20,43,64,448	55,74,48,493	9,29,28,783	50,81,10,188
TOTAL (A)		55,74,59,120		50,81,14,061
<u>B. LOANS, ADVANCES AND OTHER ASSETS</u>				
Loans and Advances to Staff	8,63,522		3,28,129	
Loans and Advances to Others	65,03,874		1,10,07,876	
Amount Recoverable	14,17,253		54,98,937	
Advance to Suppliers	26,96,082		20,54,267	
Security and Other Deposits	3,56,12,670		2,18,38,946	
Prepaid Expenses	16,288		7,995	
Interest Accrued on FDRs	42,82,275	5,13,91,964	23,21,823	4,30,57,973
TOTAL (B)		5,13,91,964		4,30,57,973
TOTAL (A + B)		60,88,51,084		55,11,72,034

CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY (C-MET)
Schedules forming part of the Accounts for the year ended 31st March 2015.

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 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.

Foreign Currency Assets / Liabilities are restated at the rates prevailing at the year end. Exchange Differences relating to fixed assets are adjusted to the cost of the assets.

Any other exchange difference is dealt with in the Income & Expenditure Account.

6. Prior period and Extraordinary Items:

Prior period income and expenses and extraordinary items, wherever material are 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.

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. 3,98,58,809/- (Previous year Rs. 3,20,74,800/-)
b) Leave Encashment - Rs. 3,12,74,765/- (Previous year Rs. 2,64,28,108/-)

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. Debashis Dutta
Executive Director

G. B. Rao
Sr. Finance Officer

For Patki & Soman,
Chartered Accountants
Firm Registration No. 107830W

S.M. Patki
(Partner)
Membership No.: 037315

Place : Pune.

Date : 11/08/2015

CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY (C-MET)

Schedules forming part of the Accounts for the year ended 31st March 2015.

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. 10,14,33,952/- (Previous Year Rs. 5,01,85,915/-)
 - b) Expenditure in Foreign Currency:Rs. 94,25,844/-(Previous Year Rs.95,78,482/-)

As the information of CIF basis for import of capital goods is not available, values are taken on FOB basis.
3. Estimated amount of contingent liability carried forward towards pending court judgement for medical reimbursement of Thrissur laboratory staff is Rs. 81,533/- (Previous Year Rs. 81,533/-)
4. 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 tax.
5. Since most of the materials/equipments are of technical nature, their allocation between equipments, stores and projects is taken as certified by the management.
6. 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.
7. The Management of C-MET is of the opinion that being a Scientific Society under Ministry of Communications and Information Technology, Govt. of India and Societies Registration Act, the disclosure requirement as per AS-18 “Related Party Disclosure” are not applicable.
8. 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.
9. Debit and Credit Balances of Personal Accounts are subject to confirmation.

10. There are certain irregularities observed by C&AG in respect of claim of LTC by certain staff members and the matter is yet to be concluded.
11. Previous year's figures have been regrouped and rearranged wherever necessary.
12. Schedules 1 to 12 are annexed to and form an integral part of the Balance Sheet as at 31st March, 2015 and the Income & Expenditure Account for the year ended on that date.

For CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY

Dr. Debashis Dutta
Executive Director

G. B. Rao
Sr. Finance Officer

For Patki & Soman,
Chartered Accountants
Firm Registration No. 107830W

S.M. Patki
(Partner)
Membership No.: 037315

Place : Pune.
Date : 11/08/2015

Centre for Materials for Electronics Technology, Pune.

Schedules forming part of Income & Expenditure A/c for the year ended 31st March, 2015

(Amount in Rs.)

SCHEDULE 7 - REVENUE GRANTS :	CURRENT YEAR 2014-15	Previous Year 2013-14
Grants for Revenue Expenditure	5,94,84,332	15,34,42,769
TOTAL	5,94,84,332	15,34,42,769

SCHEDULE 8 - INCOME FROM SERVICES :	CURRENT YEAR 2014-15	Previous Year 2013-14
Income from Services:		
Analysis receipts	18,45,385	15,30,130
Overhead receipts	64,93,952	91,98,079
TOTAL	83,39,337	1,07,28,209

SCHEDULE 9 - INTEREST EARNED :	CURRENT YEAR 2014-15	Previous Year 2013-14
On Savings account and Term Deposits :		
a) With Scheduled Banks	3,43,10,390	3,13,11,060
b) On Advance to Staff	56,254	45,638
TOTAL	3,43,66,644	3,13,56,698

SCHEDULE 10 - OTHER INCOME :	CURRENT YEAR 2014-15	Previous Year 2013-14
Miscellaneous Income	5,32,133	3,61,188
TOTAL	5,32,133	3,61,188

Centre for Materials for Electronics Technology, Pune.

Schedules forming part of Income & Expenditure A/c for the year ended 31st March, 2015

(Amount in Rs.)

SCHEDULE 11 - ESTABLISHMENT EXPENSES :	CURRENT YEAR 2014-15	Previous Year 2013-14
Salaries and Allowances	7,49,95,827	7,01,36,225
Bonus	2,23,528	1,95,308
Training	1,03,565	29,000
Leave Travel Concession	12,21,527	14,45,316
Medical Reimbursement	41,81,555	33,78,466
Leave Encashment	81,44,375	42,34,721
Gratuity	97,84,009	26,73,693
Employer Contribution to CPF & Interest	41,31,416	32,22,328
Honorarium	45,000	64,000
Canteen Reimbursement	9,49,180	8,95,970
Newspaper & Periodicals	98,059	86,333
CEA Reimbursement	13,77,842	12,05,797
Membership Fees	39,504	54,742
Recruitment Expenses	-	393
Transfer TA	27,781	54,795
TOTAL	10,53,23,168	8,76,77,087

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, 2015)

(Amount in Rs.)

Particulars	CURRENT YEAR 2014-15	Previous Year 2013-14
-		
-		
Chemicals	19,180	-
Laboratory Consumables	28,75,794	16,75,247
Laboratory General expenses	23,64,190	17,97,397
Electricity charges	1,12,34,162	99,42,132
Water charges	2,72,523	1,85,767
<i>Repairs and maintenance :</i>		
On Buildings	5,87,420	5,01,809
On Electricals	3,14,142	2,92,769
On Laboratory Equipments	2,10,211	2,03,989
On Office Equipments	3,83,173	5,27,513
On Furniture & Fittings	3,090	-
Rates and Taxes	13,53,809	11,88,738
Postage & Telegram Charges	1,16,846	1,20,757
Telephone , Telex & Fax charges	5,15,575	7,82,102
Printing and Stationery	4,86,362	10,51,513
Conveyance	12,621	5,359
Vehicle Hire	28,59,620	32,70,923
TA & DA	30,97,747	35,55,193
Security Expenses	33,40,394	29,17,851
Office & General Expenses	36,71,951	29,14,279
Internet charges	-	67,416
Diesel for Gensets	4,99,738	5,09,729
Auditor's Remuneration	1,03,854	97,416
Audit Expenses	1,06,072	72,396
Meeting Expenses	9,76,409	14,01,487
Foreign Tour Expenses	3,83,421	1,20,963
Gardening Expenses	11,78,848	17,40,037
Bank charges	8,110	9,066
Advertisement and Publicity	3,40,455	2,35,178
Professional & Consultancy charges	10,55,035	32,021
Prior period Expenses	11,64,749	1,86,091
Foundation Day Expenses	92,572	2,33,705
Workshop/Symposia	-	3,39,008
TOT Expenses	4,36,828	-
Contribution to Sponsored project	1,76,25,000	-
Assets written off	2,472	-
TOTAL	5,76,92,373	3,59,77,851

**Centre for Materials for Electronics
Technology, Pune.**

DETAILS OF PROJECT BALANCES AS ON 31.3.2015

(Amount in Rs.)

Sr. No.	Name of Project		Opening Balance as on 1.4.2014	Receipts during the year 2014-15	Payments during the year 2014-15			Closing Balance as on 31.3.2015
					Fixed Assets	Other Expenses	Total	
	1		2	3	4	5	6=(4+5)	7=(2+3-6)
	PUNE :							
1	SP22	TiO2 Phosphate Glass	(5,214)	10,428	-	-	-	5,214
2	SP24	X-ray Absorbing -DIT	2,02,371	-	-	-	-	2,02,371
3	SP25	Nano Structure Spinel Hydrogen	(55,966)	55,966	-	-	-	-
4	SP26	Micro-cantilever proj.	80	-	-	-	-	80
5	SP28	Solar light photocatalyst	(2,11,501)	-	-	-	-	(2,11,501)
6	SP29	Q-semiconductor Glass	5,34,610	-	-	13,36,389	13,36,389	(8,01,779)
7	SP30	LTCC Project-BARC	27	-	-	-	-	27
8	SP31	AMC and Spares for MEMS	(2,28,471)	2,28,471	-	-	-	-
9	SP32	Adv. Process capabilities in LTCC	(20,727)	8,40,000	-	2,25,757	2,25,757	5,93,516
10	SP33	Devp. Of LTCC Sys for Cryocooler Appl	46,142	90,310	-	1,25,386	1,25,386	11,066
11	SP35	Devp. Of Green Piezoresistive pastes	3,87,145	19,686	-	4,06,831	4,06,831	-
12	SP36	Solar Hydrogen production	(26,870)	-	-	-	-	(26,870)
13	SP37	CSIR-ES-Dr. Mulla			-		3,25,676	

			1,45,463	3,55,839		3,25,676		1,75,626
14	SP39	Devp. Of Optical Isolators	4,29,961	-	-	4,35,392	4,35,392	(5,431)
15	SP40	Devp of Prototype X-ray Apron	33,90,509	15,023	7,14,291	(1,70,088)	5,44,203	28,61,329
16	SP41	UGC-JRF- JM Mali	(10,938)	5,71,000	-	2,72,862	2,72,862	2,87,200
17	SP42	Bismuth Sulphide quantum Dot glass	1,04,557	7,04,160	-	2,99,918	2,99,918	5,08,799
18	SP43	In House Devp of Photoconducting Paste (DIT)	3,55,155	9,63,308	5,53,012	8,25,471	13,78,483	(60,020)
19	SP44	Devp of Photo-Reactor	8,02,942	-	-	6,60,672	6,60,672	1,42,270
20	SP45	Devp of LTCC Materials for GPA	2,56,84,759	1,96,93,741	89,98,041	70,07,039	1,60,05,080	2,93,73,420
21	SP46	CSIR-SRF-Ms. Bhirud	51,109	1,66,109	-	51,100	51,100	1,66,118
22	SP47	CSIR-JRF-Mr. Pandit	39,175	1,97,985	-	2,28,236	2,28,236	8,924
23	SP48	Inspire Faculty Award- Dr.(Ms) Chauhan	8,31,880	16,91,680	1,09,867	13,28,429	14,38,296	10,85,264
24	SP49	Devp. Of Active Material	3,13,39,208	10,47,186	43,04,753	8,51,854	51,56,607	2,72,29,787
25	SP50	CSIR-JRF-MS A F Shaikh	-	3,70,853	-	92,865	92,865	2,77,988
26	SP51	Devp. Of Visible Light	-	27,62,300	-	4,91,579	4,91,579	22,70,721
27	SP52	Fab. Of Microwave Components	-	30,13,606	35,098	27,98,312	28,33,410	1,80,196
28	SP53	INDO-UKIERI Programme with NCL	-	2,94,000	-	13,838	13,838	2,80,162
29	SP54	Prototype Devp of Fuel Cell	-	10,16,968	-	4,47,136	4,47,136	5,69,832
30	SP55	Inspired Faculty Award-D R Patil	-	19,00,000	-	9,21,641	9,21,641	9,78,359
31	SP56	UGC-JRF-Trupti Nirmale	-	2,91,480	-	2,14,055	2,14,055	77,425

32	SP57	Devp of Nanostructured PdTe	-	7,28,100	-	2,44,149	2,44,149	4,83,951
33	TS04	Scaleup of colour Glass	2,23,136	-	-	5,214	5,214	2,17,922
34	TS07	LTCC Package for MEMS-JCDA	98,085	-	-	3,19,697	3,19,697	(2,21,612)
35	TS09	LTCC Packages thin film devices	15,746	22,92,639	3,34,445	12,62,694	15,97,139	7,11,246
36	TS10	Devp. Of Microwave Compenents in LTCC	68,060	-	-	64,873	64,873	3,187
37	TS11	Study on Synthesis of nano	1,09,918	-	-	64,049	64,049	45,869
38	TS12	LTCC Based Circuits Fittings	1,05,411	-	-	1,07,197	1,07,197	(1,786)
39	TS13	LTCC Based Magnectic Sensors	-	46,79,104	-	-	-	46,79,104
	TOTAL (a)		6,44,05,762	4,39,99,942	1,50,49,507	2,12,58,223	3,63,07,730	7,20,97,974
40	HYDERABAD : SP21	Ultrahigh quality Silicon carbide...for adv. Electronics devices	(2,21,882)	64,99,978	45,89,947	13,64,797	59,54,744	3,23,352
41	SP22	Establishment of extended pilot plan...annum hafnium sponge	2,95,40,515	-	1,34,16,937	1,55,96,024	2,90,12,961	5,27,554
42	SP25	Gallium -DST	83,237	2,50,000	85,155	1,97,598	2,82,753	50,484
43	SP27	CdS/cdTe Thin film Solar Cells	(4,62,901)	18,46,804	-	6,43,550	6,43,550	7,40,353
44	SP28	Germanium -DAE	15,10,852	-	47,014	78,552	1,25,566	13,85,286
45	SP29	RoHS-TEST LAB-DIT	58,78,727	40,71,000	73,500	65,68,973	66,42,473	33,07,254
46	SP30	SERB-SP	-	12,70,000	-	4,29,771	4,29,771	8,40,229
47	SP31	GALLIUM-DST	-	-	-	-	1,23,540	-

48	SP32	E-WASTE-PCBs-DeitY	-	57,50,600	-	1,23,540	56,27,060
			-	2,33,00,000	-	11,54,678	2,21,45,322
		TOTAL (b)	3,63,28,548	4,29,88,382	1,82,12,553	2,61,57,483	3,49,46,894
	THRISSUR :						
49	SP38	Devp.of ML Actuator	1,17,550	-	-	1,17,550	-
50	SP39	Devp.of Light Polymer	(16,259)	-	-	-	(16,259)
51	SP40	Devp.of nano PZT	39,36,023	-	26,66,144	12,69,879	-
52	SP41	Devp. Piolet Pdn of MW appli-DST	16,77,308	1,525	-	16,78,833	-
53	SP42	Devp. Nano ZnO-DST	16,958	-	-	16,958	-
54	SP43	Devp. Of Graphene-CPRI	284	-	-	284	-
55	SP44	Devp. Of Nanostructured titania...applications	1,54,450	2,06,308	-	2,16,416	1,44,342
56	SP45	Devp. Of LTCC materialsapplications	11,51,709	10,470	-	-	8,35,748
57	SP46	Devp of Titania Aerogel...Solar cell appl.	2,75,502	5,34,550	29,000	3,67,041	3,96,041
58	SP47	BRNS(AS)	56,071	7,23,094	-	4,77,909	4,77,909
59	SP48	BRNS(RR)	20,69,485	10,31,680	-	24,66,948	24,66,948
60	SP49	DST(SNP)	32,81,794	68,813	28,46,893	2,00,085	30,46,978
61	SP50	DEITY(AS)	31,55,621	28,000	4,64,722	10,18,057	14,82,779
62	SP51	DEITY(AS)	1,20,500	78,44,144	29,43,454	26,32,805	55,76,259
63	SP52	BRNS(RT)	-	16,21,707	-	2,46,714	2,46,714
64	SP53	BRNS(RR)	-				

				1,56,92,607	24,99,981	6,48,158	31,48,139	1,25,44,468
65	SP54A	DIETY(NCP)	-	4,49,93,925	-	42,64,067	42,64,067	4,07,29,858
66	SP54B	DST(NCP)	-	6,41,50,351	-	10,09,687	10,09,687	6,31,40,664
67	SP55	BRNS(NR)	-	6,49,979	-	52,074	52,074	5,97,905
68	GIA-VI	JRF- Ms. LAXMI PRIYA	430	2,24,877	-	2,24,494	2,24,494	813
69	GIA-V	JRF- Ms. VIJYA K	19,204	2,67,996	-	2,56,796	2,56,796	30,404
70	GIA-III	JRF- Ms. VANI K	93,115	3,27,053	-	2,51,924	2,51,924	1,68,244
71	GIA-IV	JRF- Ms. DIVYA A S	1,83,320	85,867	-	2,67,813	2,67,813	1,374
72	GIA-IX	JRF- MIBY THOMAS	2,07,000	61,033	-	2,68,033	2,68,033	-
73	GIA-VIII	JRF- MR. MANOJ N	12,000	-	-	11,973	11,973	27
74	GIA-VII	JRF- SUCHITRA	4,150	2,27,090	-	2,31,240	2,31,240	-
75		KSCSTE FELLOWSHIP- MR. ANIL A	3,780	2,27,420	-	2,28,529	2,28,529	2,671
TOTAL (c)			1,65,19,995	13,89,78,489	1,14,50,194	1,84,24,267	3,07,10,209	12,47,88,275
GRAND TOTAL (a+b+c)			11,72,54,305	22,59,66,813	4,47,12,254	6,58,39,973	11,13,87,975	23,18,33,143

RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st MARCH, 2015

(Amount in Rs.)

RECEIPTS	CURRENT YEAR 2014-15	Previous Year 2013-14	PAYMENTS	CURRENT YEAR 2014-15	Previous Year 2013-14
<u>I. Opening Balances</u>			<u>I. Payments</u>		
a) Cash in Hand	3,873	31,698	Establishment Expenses	8,95,44,027	8,31,48,998
b) Bank Balances :			Administrative Expenses	5,52,15,371	3,57,41,932
i) In Savings accounts	1,59,14,431	1,50,05,453			
ii) In Fixed Deposits	39,92,66,974	32,34,57,550	<u>II. Project Payments</u>		
iii) In Project & other Deposits	9,29,28,783	10,48,17,260	Sponsored Projects	6,53,26,489	14,51,69,275
<u>II. Grants Received</u>					
From DeitY (G.o.I):					
Capital Grants	9,45,65,668	2,25,57,231	<u>III. Fixed Assets</u>		
Revenue Grants	5,94,84,332	15,34,42,769	Purchase of Fixed Assets	9,43,92,468	1,74,72,431
			Capital Work in progress	1,68,79,961	1,92,97,924
<u>III. Interest On deposits</u>					

On Bank deposits	3,43,43,990	3,13,11,060	<u>IV. Other Payments</u> Loans & Advances to staff & others		
				3,54,72,072	78,22,043
<u>IV. Other Income</u>					
Analysis Income	3,54,240	4,72,080	<u>V. Closing Balances</u>		
Miscellaneous receipts	2,82,37,242	4,20,38,766	a) Cash in Hand	10,627	3,873
			b) Bank Balances :		
			i) In Savings accounts	7,96,27,645	1,59,14,431
			ii) In Fixed Deposits	27,34,56,400	39,92,66,974
			iii) In Project & other Deposits	20,43,64,448	9,29,28,783
<u>V. Other Receipts</u>					
Sponsored Project receipts	18,12,59,337	11,84,77,043			
Loans & Advances from staff & others	79,30,638	51,55,754			
TOTAL	91,42,89,508	81,67,66,664	TOTAL	91,42,89,508	81,67,66,664

Statement Showing Comments of the Statutory Auditors on the Accounts of C-MET for the Year 2014-15 and C-MET's Replies Thereto

Sr. No	<u>Brief Subject</u>	Auditor's Comments	C-MET Reply
1.	Fixed Assets pertaining to projects:	<p>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.</p> <p>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 sponsorers, feasibility to dispose off such assets may be assessed.</p>	<p>Actual amount of Fixed Assets procured out of the projects is separately accounted for & indicated in the schedule. Also individual headwise expenditure is separately maintained and sent to Sponsoring Agency. In addition, project Fixed Assets register is also maintained.</p> <p>Ownership and title of project fixed assets rests with the project sponsoring agency.</p> <p>Fixed Assets pertaining to completed projects are disposed off as soon as sponsoring agency consents their disposal.</p>
2.	Valuation of Inventory :	<p>Pursuant to the management policy with regard to valuation of lab-wares, chemicals and consumables, the purchases are charged to consumption irrespective of stock thereof at the end of the year. We are of the opinion that the stock at the end of the year needs to be valued and brought into account.</p>	<p>Consumable materials like lab-ware, chemicals etc. are purchased according to actual & current needs and immediately sent to the respective laboratory for use. Hence there is no retaining store system. Therefore, valuation of consumable stores by the storekeeper is not feasible.</p>
3.	Capital Work-in-progress :	<p>This accounts shows Rs. 3,69,13,374/- debit balance during the current year. (Previous Year Rs. 2,02,06,613/-).</p>	<p>Amount is pertaining to Thrissur laboratory towards Civil construction work. The adjustment entry will be passed upon completion as soon as final statement is received.</p>

4.	Prior period income and expenditure:	Expenses for Rs 11,64,749/- of previous year have been accounted for in the current year.	For information only.									
5.	Report of C&AG:	As informed to us, there are certain irregularities noted by C&AG in respect of claim and disbursement of LTC to certain staff members and the matter is still in progress, outcome is uncertain.	Replies to audit paras under both Part-IIA & IIB. Effective measures will be initiated to avoid reoccurrence. Outcome of the same will be intimated in due course of time.									
6.	Contingent Liability :	<div>Contingent liability not provided in the books of account :-<table><tr><td>Particulars</td><td>Current Year (Rs.)</td><td>Previous Year (Rs.)</td></tr><tr><td>For Capital goods</td><td>Nil</td><td>Nil</td></tr><tr><td>For Others</td><td>81,533/-</td><td>81,533/-</td></tr></table></div>	Particulars	Current Year (Rs.)	Previous Year (Rs.)	For Capital goods	Nil	Nil	For Others	81,533/-	81,533/-	For information only.
Particulars	Current Year (Rs.)	Previous Year (Rs.)										
For Capital goods	Nil	Nil										
For Others	81,533/-	81,533/-										

Steering and Executive Committee of C-MET (2014-2015)			
STEERING COMMITTEE		EXECUTIVE COMMITTEE	
Prof. T. R. N. Kuttty Emeritus Professor, IISC No. 48, HMT Layout, 7 th Cross/ 7 th Main Rebindranath Tagore Nagar (PO) Bangalore- 560 012	Chairman	Dr. D. P. Amalnerkar Executive Director Centre for Materials for Electronics Technology Panchwati, Off Pashan Road Pune-411 008 (Upto 30 th November 2014)	Chairman
Prof. S. B. Krupanidhi Materials Research Centre Indian Institute of Science Bangalore- 560 012	Member	Dr. Debashis Dutta Executive Director Centre for Materials for Electronics Technology Panchwati, Off Pashan Road Pune-411 008 (From 1 st December 2014)	Chairman
Dr. J. Narayana Das Chief Controller (R&D) Naval Systems Materials & Human Resources, Room No. 201, DRDO Bhavan, Rajaji Marg, New Delhi- 110105	Member	Dr. (Mrs.) Niloufer Shroff, Scientist 'G' and Head M&C Division, Department of Electronics & Information Technology, Electronics Niketan, 6 CGO Complex, New Delhi - 110 003	Member
Dr. S. Arvamuthan, Dy. Director PPCM, VSSC, I. S. R. O. (P.O.) Thiruananthapuram – 695 014	Member	Smt. C. K. Bajaj DFA (Finance) Department of Electronics & Information Technology Electronics Niketan New Delhi-110 003	Member
Dr. Murali Sastry Director-Innovation Center, India DSM Innovation Center DSM India Private Limited 9 th Floor, Tower 'A' Infinity Towers, DLF Phase-II, Gurgaon – 122 002	Member	Shri R. P. Pradhan Dy. Secretary Department of Electronics & Information Technology Electronics Niketan New Delhi-110 003	Member
Prof. N. S. Gajbhiye Vice-Chancellor, Dr. H.S. Gour Central University, Sagar- 470 003, M.P.	Member	Dr. N. R. Munirathnam Director (A) Centre for Materials for Electronics Technology Hyderabad- 500 051	Member
Dr. D. P. Amalnerkar Executive Director Centre for Materials for Electronics Technology Panchwati, Off Pashan Road Pune-411 008 (Upto 30 th November 2014)	Member- Convenor	Dr. V Kumar Director (A) Centre for Materials for Electronics Technology Thrissur-680 771	Member
Dr. Debashis Dutta Executive Director Centre for Materials for Electronics Technology Panchwati, Off Pashan Road Pune-411 008 (From 1 st December 2014)	Member- Convenor	Dr. G J Phatak Director (A) Centre for Materials for Electronics Technology Panchwati, Off Pashan Road Pune-411 008	Member
		Shri G. B. Rao SFO, Centre For Materials For Electronics Technology Pune – 411 008	Member
		Lt. Col. P. P. Kulkarni (Retd.) Registrar (Acting) Centre for Materials for Electronics Technology Panchwati, Off Pashan Road Pune-411 008	Member Secretary



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CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY (C-MET)

Website: www.cmet.gov.in

Headquarters

Panchawati, Off Pashan Road, Pune – 411 008

Tel: +91(020) 25898141, 25899273

Fax: +91(020) 25898085, 25898180

Email: ed@cmet.gov.in



Pune Laboratory

Panchawati, Off Pashan Road, Pune – 411 008

Tel: +91(020) 25898390, 25899273

Fax: +91(020) 25898085, 25898180

Email: cmetp@cmet.gov.in



Hyderabad Laboratory

IDA Phase II, Cherlapally, HCL (PO), Hyderabad – 500 051

Tel: +91(040) 27265673, 27262437, 27260327

Fax: +91(040) 27261658

Email: cmeth@cmet.gov.in



Thrissur Laboratory

Mulangunnath Kavu, Athani (PO), Thrissur- 680 581

Tel: +91(0487) 2201156-59, 2201757

Fax: +91(0487) 2201347

Email: cmett@cmet.gov.in

