# CURRICULUM VITAE

**VAISHALI BAMBOLE**
**HAG PROFESSOR AND HEAD**
**DEPARTMENT OF PHYSICS**
Professor, Department of Physics
University of Mumbai, Maharashtra, India.

**INSTITUTE ADDRESS:**
Department of Physics
III[rd] Floor, Tilak Bhavan,
University of Mumbai
Vidyanagari, Kalina, Santacruz (E)
Mumbai - 400 098
Email:vaishali.bambole@physics.mu.ac.in , ai.expert@braingatesystem.com, vabphy@gmail.com

## ACADEMIC / RESEARCH EXPERIENCE:

| Designation | Nature of appointment | Name of Employer/Institute | Date of Joining | Date of Leaving | Salary with Grade | Reason of Leaving |
|---|---|---|---|---|---|---|
| ASSISTANT PROFESSOR | Temporary | INSTITUTE OF SCIENCE, NAGPUR | 1-9-1992 | 24-11-1993 | 2200-75-2800-100-4000 | To Join Ramdeobaba Engg. College Nagpur |
| ASSISTANT PROFESSOR | Temporary | RAMDEOBABA ENGG. COLLEGE NAGPUR | 25-11-1993 | 3-10-1994 | 2200-75-2800-100-4000 | To Join University of Department of Chemical Technology |
| ASSISTANT PROFESSOR | Regular | INSTITUTE OF CHEMICAL TECHNOLOGY (Former UDCT) | 4-10-1994 | 16-5-2005 | 2200-75-2800-100-4000 | Selected to senior scale |
| ASSISTANT PROFESSOR | Regular | INSTITUTE OF CHEMICAL TECHNOLOGY (Former UDCT) | 17-5-2005 | 31-3-2007 | 10000-325-15200 | Selected as Reader at ICT |
| READER | Regular | INSTITUTE OF CHEMICAL TECHNOLOGY (Former UDCT) | 1-4-2007 | 18-12-2008 | 12000-420-18300 | To Join as Full Professor Department of Physics University of Mumbai |
| PROFESSOR<br><br>PROFESSOR HIGHEST ACADEMIC | Regular<br><br>REGULAR | DEPARTMENT OF PHYSICS, UNIVERSITY OF MUMBAI | 19-12-2008<br><br>26-09-2021 | 25-09-2021 | 144200-218200<br><br>182200-224100 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| GRADE | | | | | | |

**EDUCATIONAL QUALIFICATION**

| Examination | Board / University | Course with specialization | Class/ Division |
|---|---|---|---|
| SSC or Equivalent | Mahatma Gandhi High School,Jaripatka,Nagpur Nagpur, Maharashtra | English, Hindi, Marathi, Soc. Science, Maths, Science | I Class |
| HSSC or equivalent | Hislop College, Nagpur, Maharashtra Nagpur | Physics, Maths, Chemistry, Biology, English | I Class |
| Bachelor's Degree | Institute of Science, Nagpur (RTMU, Nagpur University) | Physics, Maths, Electronics English | I Class |
| Master's Degree | RTMU, Nagpur University Campus. | Physics (Electronics) | I Class |
| Doctoral Degree | Institute of Chemical Technology (Former UDCT), University of Mumbai in Physics | Novel Conducting Polymers: Application to Electronic Devices | ------- |
| Post-doctoral / Any other | (i) B.Ed. (Ambedkar College, Nagpur ) (ii) PG Diploma in Comp. Sci.,Garware Institute Mumbai University | Psychology, Methodology, Micro Teaching Methods, Microteaching C,C++, BASIC | I Class I Class |

**TEACHING EXPERIENCE:** **TOTAL TWENTY NINE YEARS:** TWELVE YEARS AS FULL PROFESSOR, THREE YEARS AS HEAD OF THE DEPARTMENT

| | |
|---|---|
| **Under Graduate Classes** | **18 years** |
| **Post Graduate Classes** | **26 years** |
| **Research experience excluding years spent in M.Phil./Ph.D.** | **23 years** |
| **Period of Professional/Industrial Experience** | **30 years** |

**a) Teaching Interests**: I have already taught the following existing courses/ subjects.

| Sr. No. | Course / Subject | UG / PG Degree |
|---|---|---|
| 1 | Applied Physics, Optics , Colour Physics | UG |
| 2 | Instrumental Method of Analysis, M.Sc. (Physics by Research), Characterization techniques for nanomaterial | PG and Doctorate |
| 3 | **Applied Physics-I:** Thermal Physics, Optics, Data analysis and Networking, Ultrasonics, Optical Fibres, Lasers, Digital Electronics, Microwaves, Characterisation techniques- Instrumental Analysis for M. Pharm | UG & PG |
| 4 | **Applied Physics – II** Solid State Physics, Material Science,, Semiconductors, Rheology, Polymer Physics, Viscoelasticity. | UG & PG |

I am presently extending teaching of new courses / subjects on following

| Sr. No. | Course / Subject | UG / PG /PhD Degree |
|---|---|---|
| 1 | Bio nanophysics, Polymer Nano Composites, Molecular Electronics, Conducting Polymers, Polymer Physics, Sensors | PG and Ph.D |
| 2 | Nano Drug Delivery system, Functional Nanomaterial, Biosensors, Electron Beam for Material, Characterisation & studies, PECVD, Molecular Beam epitaxy and Actuators | PG and Ph.D |

| | | |
|---|---|---|
| 3 | Nanofabrication, Nanoelectronics, Lithography techniques, Nanofiber and films deposition Technique, MEMS, | PG and Ph.D |
| 4 | Organic Solar cells, Microfluidics Lab on Chip, Advance Electronics, Electrospinning techniques, Artificial Organs | PG and Ph.D |

**Particulars about research work directed – PG./M.Phil./Ph.D./P.D.F.**

**i. No. of degree Awarded** : **M. Phil.: 10** **Ph.D.: 4**

ii. **No. of Ongoing students** : **Ph.D**. : **5** **PDF**: **1** (Ongoing)

| Sr. No. | Name of student | Registered For | Date of Registration | Year of award of Degree | Title | Remark |
|---|---|---|---|---|---|---|
| 1. | Bhakti Vatsaraj | M.Sc. by Research | 2004 | 2007 | Preparation and characterization of Ionoconductor gels and films | Completed |
| 2. | Atish Bankhele | M.Sc. by Research | 2007 | 2010 | New materials for advanced technologies: use of conducting polymers for electronic devices | Completed |
| 3. | Yogesh Kamble | M.Sc. by Research | 2007 | 2010 | Preparation, characterization and application of Electroactive Polymers and Blends | Completed |
| 4. | Vinod Patil | M.Sc. by Research | 2007 | 2010 | Use of conducting polymers for electro-optical devices | Completed |
| 5. | Alka Pandey | M.Sc. by Research | 2012 | 2015 | Highly flexible & rechargeable batteries based on conducting polymers | Completed |
| 6. | Poonam D. Mahajan | M. Phil | 2016 | 2018 | Synthesis and characterization of nanocomposites and nanofibers of polymers | Completed |
| 7. | Hemangi Nikhare | M. Phil | 2016 | 2018 | Synthesis and characterization of nanocomposite of liquid crystal polymer | Completed |
| 8. | Anjali Jhamb | M. Phil | 2016 | 2018 | Hand held biosensors based on microfluidics as next generation diagnostic devices | Completed |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9. | Shimmy Shankar | M. Phil | 2016 | 2018 | Extending shelf life and safety of Ready-To-Eat | Completed |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | (RTE) food using high energy radiation. | |
| 10. | Reshma Kajrolkar | M. Phil | 2016 | 2018 | Early detection of Alzheimer / Parkinson: Fabrication of biosensor using conducting polymer | Completed |
| 11. | Preeti Narkhede | M. Phil | 2016 | 2018 | Soft Tissue Engineering for nerve regeneration using conducting polymer nanocomposites | Completed |
| 12. | Yashwantsingh Chauhan | M. Phil | 2016 | 2018 | Fast check strip dosimeters | Completed |
| 13. | Iliyas Shaikh | M. Phil | 2016 | 2018 | Removal of Heavy Elements by phytoremediation | |
| 14. | Jyothi Waghmare | M.Phil | 1992 | 1994 | Tetravalent impurities in $ZrO_2$ | Completed |
| 15. | Varsha Bhatkhande | M.Phil | 2013 | 2015 | Flexible Battery using Polyamine $TiO_2$ – Nanocomposites | Completed |

**Post-Doctoral Fellow PDF and Ph.D. Student List:**

| Sr. No. | Name of student | Registered For | Date of Registration | Year of award of Degree | Title | Remark |
|---|---|---|---|---|---|---|
| 1. | Bipin K Singh | PDF | 2019 | | Study of photophysical properties of hybrid organolead-halide perovskite materials and light harvesting structures. | Ongoing |
| 2. | Sangeeta Y. Thakare | Ph.D. | 11-01-12 | 2016 | Behavior of Electro-optical properties of liquid crystal doped with ferroelectric nanopowder | Completed |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. | Madhavi S. Pradhan | Ph.D. | 23-4-12 | 2016 | Effect of Electric Field on phase transition of liquid crystal mixture | Completed |
| 4. | Sunil P. Chavan | Ph.D. | 14-3-14 | 2020 | Electronic & Optical Properties of | Completed |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | Semiconductor Nanostructures | |
| 5. | Ravindra M. Kamble | Ph.D. | 23-10-2015 | 2021 | Magnetic and microwave absorption properties of conducting polymer nanocomposites | Completed |
| 6. | Nilam R. Navale | Ph.D. | 6-3-2018 | - | Timing and Spectral Studies of X-ray Binary Sources | Ongoing |
| 7. | Vidya Sawakhande | Ph.D. | 18-7-2018 | - | Studies on toxidation of venoms used for production of anti-snake venom serum | Ongoing |
| 8. | Bhageshree Bangalkar | Ph.D | 23/12/2020 | | Polymer nanocomposites based Biosensor for Biomedical Application | Ongoing |
| 9. | Yugandhara Waghode | Ph.D | 17/2/2021 | | Synthesis and Characterisation of Quantum dots and their applications | Ongoing |
| 10. | Syed Habibuddin Syed Abed Ali | Ph.d | 19/3/2021 | | Spinal Ferrite Polymer Nanocomposites for Energy Storage | Ongoing |

B. **Research Interest** (Broad areas and specific areas)

**1. Current:**

Molecular Electronics Devices, Conducting Polymers, Knowledge based Textiles, Smart Textiles with functionalised finish, High Energy Radiation with Speciality Polymers, Use of electron beam technology for increasing the shelf life of Ready to Eat food., Gas Sensors, Biosensors, Acutators, IoT based devices, Biomolecular detection, New project proposal inThin Films, Plasma Enhanced Chemical Vapour Deposition (PECVD), Polymer gels-Application to Artificial Muscles. Nanotechnology: Synthesis, Characterisation, Tissue Engineering, Application of Radiation for Restoration of Cultural Heritage, Applications of spinel ferrites as Radar Absorbing materials (RAM's).

## 2. The On-going Post Doctoral Research work:

**Post Doctoral Fellow: Dr. Bipin Singh**

Ph.D. (Physics), Photonic and Optoelectronics,
Indian Institute of Technology (Banaras Hindu University), Varanasi

Our earlier work on photonic band gap materials, study of structural and spectroscopic signatures of thin film, and dye-sensitized solar cells gave encouraging results. According to our results, the period and quasi-periodic Photonic crystals (PCs) with graded and dispersive materials can be used in the development of efficient filters, reflectors, sensors and other optical devices. This work further opened-up the idea of understanding the effect of graded and dispersive materials on photonic band gap properties that govern photon management, light transport and interference in the structures.

Presently, as post-doctoral research work we are working on : '**The study of photophysical properties of hybrid organolead-halide perovskite materials and light harvesting structures'**. Hybrid organolead-halide perovskite materials attract considerable attention for application in photovoltaic cells. These materials possess most of the properties required to be excellent absorbers; appropriate direct bandgap, high light absorption coefficient, excellent carrier transport, and tuneable band gap etc. These perovskite materials can be easily processed from solution into thin films in one- or two step procedures and afford very efficient solar cells. The research work focuses mainly on investigating and development of highly efficient and stable perovskite solar cell by introducing different structural and compositional techniques. A major part of this research work is devoted towards a better understanding of the photon management (using plasmonic and photonic crystals concepts) and stability, charge generation, transport and recombination processes in perovskite solar cells. Studies on the structural and spectroscopic signatures of perovskite materials for their display in form of Light emitting diodes (LEDs) and photo-detector applications are currently been undertaken.

**Publication out of the Post Doctoral Research work:**

(i) *Multi-channel photonic bandgap engineering in hyperbolic graded index materials embedded one-dimensional photonic crystals,* Bipin K. Singh Vaishali Bambole, Vipul Rastogi, Praveen C. Pandey; Optics and Laser Technology,129 (2020) 106293 (Impact factor:2.18)

(ii) *Photonic Band gap Consequences in One-dimensioal Exponential Graded Index Photonic Crystals,* Bipin K Singh,Vaishali Bambole, Shubhashish Tiwari, Kaushal Shukla, Praveen Pandey, Vipul Rastogi, Optik, International Journal for light and

Electron Optics,240,(2021),166854

**PATENTS**

| Sr No | Title and type of Patent (product/process) | Patentees | Patent Details | National / inter-national | Obtained/ Filed |
|---|---|---|---|---|---|
| 1 | Synthesis of Polyether Sulfone and mixture of $SiO_2$ and $Al_2O_3$ Nanocomposites | Prof. V.A. Bambole & Prof. P.A. Mahanwar | 2017MU00095 A 20150925 | National | Obtained |
| 2 | Nanotube Polymer Composition | Prof. V.A. Bambole & Prof. P.A. Mahanwar | 1110/MUM/2012 | National | Obtained |
| 3 | Synthesis of Polyether Ether Ketone Carbon Nano platelets Composition | Prof. V.A. Bambole & Prof. P.A. Mahanwar | 2014MU00096 A 20151106 | National | Obtained |
| 4 | Nanocomposites Carbon and Nano-Plated Chain with Polyetheretherketone | Prof. V.A. Bambole & Prof. P.A. Mahanwar | | National | Filed |
| 5 | Synthesis of Curcumin-Cu Nanocomposites by Simple Ultrasonication Method and its Evaluation of In-Vitro Anticancer, Binding With BSA | Prof. V.A. Bambole & Mr Amol Pansare | 201721003517 A 20180803 | National | Obtained |
| 6 | Ultrasonic Synthesis of Curcumin Co Nanocomposites for In-Vitro Anticancer Activity and Their Interaction with BSA | Prof. V.A. Bambole & Mr Amol Pansare | 201721003505 A 20180803 | National | Obtained |

| | | | | | |
|---|---|---|---|---|---|
| 7 | Ultrasonically synthesized Curcumin-La nanocomposites and its application for In-vitro anticancer activity on | Prof. V.A. Bambole & Mr Amol Pansare | 201721003515 A 20180803 | National | Obtained |

| Sr No | Title and type of Patent (product/process) | Patentees | Patent Details | National / inter-national | Obtained/ Filed |
|---|---|---|---|---|---|
| | Human Breast Cancer Cell Line MCF-7 and its binding interaction with BSA, | | | | |
| 8 | Curcumin- Nanotitanium Composites Synthesis by Ultrasonic Method and Their Binding Behavior with BSA as well as In-Vitro Anticancer Activity on MCF-7 Cancer Cell Line | Prof. V.A. Bambole & Mr Amol Pansare | **201721003511 A 20180803** | National | Obtained |
| 9 | Nanotitanium-Capecitabine Composites Synthesis by Ultrasonication Method and Their Binding behavior with BSA as well as In-Vitro Anticancer Activity on COLO-205 Cancer Cell Line. | Prof. V.A. Bambole & Mr Amol Pansare<br>Prof. V.A. Bambole & Mr Amol Pansare | Application **No.201821040 684.**<br>Application **No.201821040 684.** | National<br>National | Filed<br>Filed |
| 10 | Design and synthesis of Capecitabine-Iron nanocomposites using simple ultrasonication method and its binding behavior studies with BSA and In-vitro anticancer activity on Human Colon Cancer Cell Line COLO-205 | Prof. V.A. Bambole & Mr Amol Pansare | Application **No.201821040 672** | National | Filed |
| 11 | Ultrasonic controlled Synthesis and Invitro evaluation of Capecitabine-Lanthanum nanocomposite for binding interaction with BSA and enhanced | Prof. V.A. Bambole & Mr. Amol Pansare | Application No.201821040 680 | National | Filed |

| Sr No | Title and type of Patent (product/process) | Patentees | Patent Details | National / inter-national | Obtained/ Filed |
|---|---|---|---|---|---|
| | antiproliferation effect on cancer cells. | | | | |
| 12 | Ultrasonically altered synthesis of Capecitabine-Aluminium nanocomposites and its binding studies with BSA and in-vitro anticancer activity on Human Colon Cancer Cell Line COLO-205 | Prof. V.A. Bambole & Mr Amol Pansare | Application No.201821040681. | National | Filed |
| 13 | Ready-to-eat Idli by Electron Beam Irradiation | Prof. V. A. Bambole | Application **No.** 201921009028 | National | Filed |

**CHAPTERS PUBLISHED IN BOOK (INTERNATIONAL):**

| Sr No | Title of the Book | Author | ISBN No |
|---|---|---|---|
| 1. | Tissue Engineering: Use of Electrospinning Technique for Recreating Physiological Functions 387-455. Nanobiomaterials in Soft Tissue Engineering Applications of Nanobiomaterials, Elsevier Publication. | Vaishali Bambole & Jatinder Vir Yakhmi | I<br>SBN 2016 387-455. |
| **2.** | Molecular Spintronics Ferroics and Multiferroics, Trans Tech Publications | J. V. Yakhmi & V. A. Bambole | ISBN-13:978-3-03785-431-0 |

**MAJOR RESEARCH PROJECTS EXECUTED**

| Sr. no | Title | Agency | Year of completion | Grant/ Amount mobilized in Rs. | PI / Co-PI |
|---|---|---|---|---|---|
| 1. | New materials for the advanced technologies: Use of Conducting Polymers for electronic devices | AICTE | 2004 | 8.5 Lakh | PI |
| 2. | Development of Rheology Controlled Heat and UV curable powder Coatings | AICTE | 2004 | 15 Lakh | PI |
| 3. | Conducting Polymers for the development of Molecular Electronic Devices | UGC | 2004 | 6.86 Lakh | Co-PI<br>PI - Prof . N.V. Bhat |
| 4. | Application of radiations with Conducting Poly. composites | BRNS | 2004 | 8.92 Lakh | Co-PI<br>PI- Prof. M.D.Kurup |
| 5. | UV curable powder coating | AICTE | 2006 | 11 Lakh | PI |
| 6. | Electron beam technology for modification of polymers and their applications | BRNS DAE | 2008 | 14.56 Lakh | Co-PI<br>PI- Dr. S.K. Gupta |
| 7. | Interaction of gamma radiation with engineering plastics | UGC | 2008 | 15 Lakh | PI |
| 8. | Interaction of High Energy Radiation. with Specialty Polymers for Engg. Applns. | UGC | 2010 | 11.2 Lakh | PI |
| 9. | Electron Beam Curable Nano Coatings | BRNS DAE | 2010 | 14.07 Lakh | Co-PI<br>PI- P.A. Mahanwar |
| 10. | CVD assisted all dry fabrication technique for electronic devices using conducting polymers | DST | 2012 | 36.44 Lakh | PI |
| 11. | Electron beam curable nano-coatings | BRNS | 2012 | 14 Lakh | PI |
| 12. | Conducting polymer based highly flexible Paper/Fibre batteries | UGC | 2013 | 14.20 Lakh | PI |

| | | | | | |
|---|---|---|---|---|---|
| 13. | Ready to Eat Food products: Enhancing the safety and shelf life by Electron Beam Irradiation | BRNS | ongoing | 34.9 Lakh | PI |
| 14. | Electron beam cross-linked stress control heat shrinkable pipes for electronic Appln. | BRNS | ongoing | 18 Lakh | PI |
| 15. | Electron beam cross-linked conducting polymer blends for batteries | AICTE | ongoing | 9 Lakh | PI |
| 16. | Recent Advances in Microfluidics, Biochemical & SAW Sensors For Human Healthcare | GIAN-2016 | Completed | 10 Lakh | PI |

**PROJECT PROPOSALS SUBMITTED / IN-PIPE LINE**

| Sr. No. | Title of Project | Amount, Rs. | Possible Funding Agency |
|---|---|---|---|
| 1. | Research Proposal Submitted to RUSA | 162 Crores | RUSA |
| 2. | An Intelligent Life Companion – " Design and development of AI based Solution to assist in daily chores of autistic and spastic children" | 90 Lakhs | DST-TIDE |
| 3. | Heidelberg – India Graduate School Joint MSc/PhD program | 50 Crores | BARTI and University of Mumbai |
| 4. | Setting up of Advanced Animal House Facility at University of Mumbai | 10 Crores | DST/DBT |
| 5. | Nano Drug Delivery System | 10 Lakh | GIAN |
| 6. | Micromechanical Photonics for MEMS and NEMS | 10 Lakh | GIAN |
| 7. | Biomechanics and Electrical Locomotion study of C. Elegans | 10 Lakh | GIAN |
| 8. | Hydrogen Generation from Quantum-Dot | 10 Lakhs | GIAN |

| | | | |
|---|---|---|---|
| 9. | Knowledge based textiles: Functional finishes in textiles for smart apparel | 60 Lakhs | Ministry of Textiles |
| 10 | Impregnation of silver nanoparticles with the help of electron beam accelerator | 35 Lakhs | BRNS |
| 11. | Use of Electron Beam Radiation technology for cultural heritage | 1.5 Crores | Ministry of Culture |
| 12. | Use of Platinum based nanometals & Allby catalyst ((Pt.M, M= Co, NI, Fe, V,G) for fuel cell applications | 45 Lakhs | DST |
| 13. | Timing and Spectral Studies of X-ray Binary Sources | 50 Lakhs | ISRO |
| 14. | Fabrication Facility for Diagnostic Devices to be used during a Pandemic | 1.5 Crore | DBT |

**AWARDS AND HONOURS**

| Sr. No. | Year | Name of the Award | Awarding Organization |
|---|---|---|---|
| 1. | 2019 | Felicitated by His Excellency The Governor of Maharashtra | Maharashtra State Government |
| 2. | 2020 | Stree Shakti Samman | Life Insurance Corporation of India |
| 2 | 2019 | Adarsh Mahila Purskar | Dr. Ambedkar Bhavan Trust |
| 3 | 2019 | Innovation Award of the Year 2019 | Indo Global Chamber Of Commerce |
| 4 | 2019 | Certificate of Innovation | Ready 2 Innovate IEEE Bombay section |
| 5 | 2019 | Woman Innovator Award | Ministry of Micro, Small & Medium Enterprises (MSME) |
| 6 | 2013 | Certificate of Appreciation | Dept. of Science & Technology |
| 7 | 2011 | Young Achiever Award | Rashtriya Jan Kalyan Parishad, Mumbai |
| 8 | 2010 | Best Teacher Award | University of Mumbai |

**MEDIA COVERAGE AND NEWS LINKS ABOUT THE INNOVATION IN FOOD PRESERVATION**

1. https://abpmajha.abplive.in/videos/breakfast-news-9am-special-chat-with-dr-vaishali - bambole-11-01-2019-622448
2. https://youtu.be/jm8vz_azBeQ
3. https://youtu.be/1XL8tLB2shg
4. https://youtu.be/u7txKk8HwMg
5. https://twitter.com/Deepak_News24/status/1093481611599978499?s=19
6. https://twitter.com/news24tvchannel/status/1093467089954844673?s=19
7. https://www.indiatimes.com/news/india/this-mumbai-professor-just-discovered-a-way-to-keep-your-idli-fresh-even-after-three-years-361798.html
8. https://www.facebook.com/26781952138/posts/10157261937932139/
9. https://f87kg.app.goo.gl/7SbyumgiE2nEDtTm9
10. https://epaper.sakshi.com/m5/2007836/Maharashtra/02-02-2019#page/7/1
11. https://epaper.sakshi.com/m5/2007841/Hyderabad-Main/02-02-2019#page/19/1
12. https://youtu.be/R0szG922mXk
13. https://youtu.be/E0-3LUfM_
14. https://www.youtube.com/watch?v=PWgFcbe0c8o

**OTHER QUALIFICATION AND EXPERIENCE**

**TECHNICAL SKILLS**: Conversant with following characterization techniques:

| Techniques | Measuring techniques | Measured and tested quantities |
|---|---|---|
| X-ray analysis | XRD (X-ray Diffraction)<br>XRF (X-ray Fluorescence Spectroscopy<br>XPS/ESCA (X-ray Photoelectron Spectroscopy/Electron Spectroscopy for Chemical Analysis)<br>EDX (Energy Dispersive X-ray Spectroscopy) WDX (Wavelength Dispersive X-ray Spectroscopy) | Chemical composition, elemental analysis;<br>Particle properties: number, size, size distribution, shape, porosity, molecular weight;<br>Surface analysis: structure, atomic and molecular distribution, crystallinity. reaction kinetics |
| Electron microscopy | SEM (Scanning Electron Microscopy)<br>TEM (Transmission Electron Microscopy) | Topography; particle characterization; chemical analysis (in combination with X-ray techniques |
| Scanning probe microscopy | AFM (Atomic Force Microscopy | Topography; mechanical and electrical properties; tribology |
| Optical techniques | Fluorescence spectroscopy<br>DLS (Dynamic Light Scattering)<br>Ellipsometer | Particle characterisation: number, size, shape, quantum efficiency;<br>Surface characterisation: film thickness, topography |
| Mass spectrometry | Gel permeation Chromatography | Chemical analysis, thin film analysis, depth profiles, polymer analysis, molecular weight, monomer units, end group |
| Nano-powder and Nano-dispersion characterisation | Ultrasonic spectroscope<br>Particle charge detection<br>BET-Measurement<br>SMPS (Scanning Mobility Particle Sizer) | Mean particle diameter, zeta potential, particle charge, isoelectric point, specific surface, viscosity, dispersion behaviour, agglomeration behavior |
| Indentation testing | Nano-indentation | Mechanical properties, hardness, Young's modulus |

| | | |
|---|---|---|
| Particle counting | Particle size Analyser | Measured and tested quantities:<br>Size distribution, particle number, emission quantity |

## CONTRIBUTION OF EDUCATIONAL INNOVATION:

### 1) DESIGN OF NEW CURRICULUM AND COURSES

With the newly acquired autonomy to the Department of Physics, University of Mumbai, Semester pattern was set-in. Hence new curriculum courses were designed by me for subjects such as Instrumentation, Electronics, Polymer Physics, Material Science and Solid State Physics. Bio Nano Physics, Bio medical Instrumentation, Energy studies & Molecular Electronics.

### 2) SETTING UP OF NEW LABORATORIES FOR MASTERS AND DOCTORAL COURSE.

**a) Polymer Physics:**

A Master course in Polymer Physics was designed and executed by me for the first time in the Department of Physics along with practical based on Industrial Applications of Polymers.

**b) Molecular Electronics:**

A research area in the up-thrust area of Advance Physics was established, for high-end research at the doctoral level. The lab include high end instrumentation facility for fabrication of nanocomposites and nano fibres. The set of instrumentation include 3axis Electrospinning technique, Gas sensing facility, A PECVD system, Laser lithography machine, Potentiostat/ Galvanostat, LCR measurement system.

**c) Physical Quantity Measurement systems (PQMS) Lab:**

A state of art laboratory was established for material characterisation includes STM, AFM, VSM,VNA, UV Spectrometer, Laser Lithography gun.

**d) Bio Nano Physics:**

A highly sophisticated laboratory was established in the field of Bio Nano Physics. Laboratory in compliance with ISO 9001 standards for high end research in the field of food sciences, Nutrition and food safety using the principle of physical sciences. The

typical set of lab for the characterisation of Food items include : Stomacher, Laminar flow, Moisture analysis, Kjeldahl etc.

### 3) INNOVATION IN THE AREA OF FOOD SAFETY

An innovation in a technological process which can increase the shelf life of cooked food, vegetables, fruits and flowers (perishables) without using preservatives and without refrigeration for more than three years could be made possible.

READY - TO - EAT (RTE) TRADITIONAL INDIAN FOOD SUCH AS IDLI AND UPMA WITH INCREASED SHELF LIFE OF 1000 DAYS WITHOUT PRESERVATIVES (PATENT FILED)

RTE are food products that are offered or exposed for sale without additional cooking or preparation.

- More than 22 crore people sleep without food and about 10 crore die of hunger alone in India. This innovation in food safety can be an immediate solution to serve the cause
- Packaged food in India have grown at about 7% a year with RTE foods being the fastest growing, at a compound annual growth rate (CGAR) of 73%.

**MAJOR REASONS FOR THE GROWING DEMAND OF RTE FOODS:**

- It saves time.
- Can be preferred when travelling aboard.
- In space-station as food.
- Better suited for dual income families and changing lifestyles of young generation.
- Indian RTE foods are superior over MNC RTE foods (burger, pizza, etc.) In terms of the nutrition value.
- For immune compromised patients.
- During rescue operations by DRDO during natural calamity.

**SALIENT FEATURES OF THE INNOVATION**

- The shelf life of prepared food was extended by using combination processing (Hurdle technology) comprised of electron beam irradiation and thermal treatment.
- We examined the efficacy of combination processing in preventing microbial deterioration of food without introducing undesirable changes in sensory characteristics and physical attributes (texture and colour) of food.

**CHARACTERISATION**

- Microbiological analysis, colour analysis, texture analysis, sensory evaluation, nutritional value, economics.

## 4) INNOVATION IN INDUSTRIAL DESIGN:

### I. AN INNOVATION IN THE DESIGN OF AN INDEGINEOUSLY DEVELOPED PULSED PLASMA ENHANCED CHEMICAL VAPOUR DEPOSITION (PECVD) SYSTEM AT A MUCH LOWER PRICE

A CONTINUOUS WAVE (CW) AND PULSED PLASMA ENHANCED CHEMICAL VAPOUR DEPOSITION SYSTEM WAS INDEGENIOUSLY FABRICATED WHICH IS MANUALLY TUNABLE WITH MATCHING NETWORK

**SPECIFICATIONS:**

| | | |
|---|---|---|
| Output Frequency | : | 13.6 MHz |
| Maximum Power | : | 0-200 Watts |
| Operational mode: | : | Continuous wave (0 to maximum) |
| R.F POWER OUTPUT | : | PULSED (ON/OFF MODE) |

**SALIENT FEATURES:**

i) Ultra-thin films can be deposited on different substrates like plastics, paper, fabric, steel and glass of different geometries.

ii) It has following advantages compared with the conventional cvd method:

iii) Deposition of films is possible at low temperature.

iv) Properties of the thin films can be tailored.

v) The process parameters can be controlled accurately. These parameters may include adhesion, compressive and tensile stress, etch rate, selectivity in etching, step coverage, stoichiometry and cleanliness of the deposited layers.

vi) The films formed by PECVD have unique properties such as they are highly cross-linked, adhesive, pinhole free, with uniform thickness that can be varied over few A.U. to nm.

## II. CONDUCTIVITY SET-UP TO MEASURE CURRENT IN FABRIC AND ULTRA THIN FILM

A new set up was conceptualized and indigenously fabricated to measure conductivity of ultra-thin films, fabrics with varying temperature on a gold coated platform. The contacts are non-piercing and spring loaded to avoid short circuit.

III. **GAS SENSOR (ELECTRONIC NOSE) MIMICKING NOSE:** A novel set up for gas sensing was indigenously fabricated. The design of sensor head is unique and novel and accommodates up to 20 sensors. The sensor head set-up is integrated with a data acquisition system, computer based, and is sensitive to ppm level of gas as well as selective to a particular gas.

## IV. PLASMA ENHANCED CHEMICAL VAPOUR DEPOSITION SYSTEM (PECVD)

A new set up was indigenously fabricated which is Plasma Enhanced Chemical Vapor Deposition System. This is a low cost system with a unique facility of generating pulsating Plasma. Due to which ultra-thin (tailor made to thickness and size) of conducting polymers can be synthesis which can be used as electrodes for super capacitor. The most important

## AFFILIATION WITH PROFESSIONAL BODIES

| Sr No | FELLOWSHIPS | MEMBER |
|---|---|---|
| 1 | Elected Fellowships (e.g. INSA, IASc, NASI, MASc, etc.) | |
| | i. Indian Women Scientific Association (IWSA) | Life Member |
| | ii. UICT Alumni Association (UAA) | Life Member |
| | iii. Indian Polymer Science (IPA) | Life Member |
| | iv. Society for Polymer Science (SPS) | Life Member |
| | v. Color Society of India | Life Member |
| | vi. Society for Advancement of Electrochemical Science & Technology | Life Member |
| | vii. Material Research Society of India | Life Member |
| | viii. Atomic Energy Education School | Member |
| 2 | General Fellowships (elevation by application to a higher category from membership, typically based on experience as a member of that body) | |
| | i. Head, Department of Physics, University of Mumbai, | 2016- 2019 |
| | ii. Member, Academic Council of the University of Mumbai | 2016 – till date |
| | iii. Member, Academic Council of Karmaveer Bhaurao Patil Arts and Science Modern College, Vashi Mumbai | 2016 – till date |
| | iv. Member Board of Studies of Physics, RTMU, Nagpur University | 2018 till date |
| | v. Member Board of Studies of Physics, Shivaji University KolhapurUniversity | 2018 till date |
| | vi. Member Secretary, the Board of Governor of Physics, Department of Physics (Autonomous, University of Mumbai) | 2016- 2019 |
| | vii. Chairperson, Research and recognition committee, University of Mumbai | 2016- 2019<br>2016 -19 |
| | viii. Chairperson, Admission, Examination Committee & Advisory Board Department of Physics, Univ. of Mumbai. Finance board of the Dept. of Physics | 2011-2015<br>2017- till date |
| | ix. Chairperson, Board of Studies in Physics, University of Mumbai | 2018- till date |
| | x. Member on Board of Governors Atomic Energy Education Society, DAE | 2017-2020 |
| | xi. Member, BOS – Physics, Ruia College(Autonomous) | 2021 till date |
| | xii. Member, Editorial Board of "TISS Journal of Disability Studies and Research (TJDSR)" | |

| | | |
|---|---|---|
| **3** | Membership (Professional societies, Institutes, associations, alumni associations, all by applications and not by election by peers). | |

## LIST OF PROFESSIONAL TRAINING UNDERGONE

| Nature of Training | Organization where training was provided | Duration |
|---|---|---|
| Laser and their application Emerging Trends | RIS, IISc, Bangalore | 4-16th Dec.1995 |
| National seminar on 'Recent Advances in Physiochemical Aspects of Fibers and Polymers' | UGC, Physics Division, UDCT, Matunga, Mumbai | 28th-29th Feb.1996 |
| International Symposium on 'Polymers beyond AD 2000' | IIT, Delhi | 12th-15th Jan.1999 |
| 7th National seminar on 'Physics and Technology of Sensors' | Dept. of Electronics Science, University of Pune | 14th-16th Feb. 1999 |
| India-Japan Workshop on 'Advanced Materials in Molecular Electronics' | NPL, Delhi | 10th-11th Dec.2001 |
| Orientation Programme | Academic Staff College, University of Mumbai | Feb - March 2002 |
| Short term course at WRIC on 'Internet Training' | WRIC, Mumbai | July 2002 |
| Workshop on Polymers in Information & Communication Technology International Seminar | Dept. of Polymer Science, Univ. of Science & Technology, Cochin | 12th-14th Dec.2002 |
| JCBC – 2005 | School of Chemical Sciences, Kottayam, Kerala | 21st - 23rd March 2005 |
| Refresher Course in Physics | Academic Staff College, University of Mumbai | Dec.2005 |
| Symposium on Sensor for Biomedical Applications | SPCE, Andheri (W), Mumbai | 28th – 29th March 2006 |
| Theme Meeting on 'Self-assembly Routes for Nanotech Materials' (SARNAM – 06) | BARC, Mumbai | April 26th – 28th , 2006 |
| Refresher Course in Physics | Osmania University, Hyderabad | 1st – 31st November, 2006 |
| International Conference on Emerging, Functional Materials (PEFM2010) at Multipurpose Hall | BARC, Mumbai | 22nd – 24th Sept. 2010 |
| UGC-NRC-M Workshop | Dept. of Material Engg., Indian Institute of Science, Bangalore | July 16th – 21st , 2012 |

| | | |
|---|---|---|
| Two week training Programme on Intellectual Property procedures in India | Rajiv Gandhi National Institute of Intellectual Property Management (RGNIIPM),Central Government Institute under the Ministry of Commerce & Industry, Nagpur | 13th -24th Feb. 2017 |
| INUP Familiarization Workshop on Nanofabrication Technologies | Indian Institute of Technology, Bombay | 29 Nov to 01 Dec 2017 |
| NCPRE Familiarization workshop on Photovoltaics | Indian Institute of Technology, Bombay | 30 Nov 2018 |
| INUP Hands-on Training Workshop on Fabrication of Inter-Digitated Electrode Array | Indian Institute of Technology, Bombay | 19th Feb.-23rd , 2018 |

**SCIENTIFIC / TECHNICAL PROGRAMS ORGANIZED AS A CONVENOR:**

| Sr. No | TITLE | CONVENOR | DATE |
|---|---|---|---|
| **1** | MHRD Sponsored seven days' workshop on "Recent Advances In Embedded System Based Microfluidics & Biochemical Sensors For Human Healthcare" under the Scheme of 'GIAN' | Vaishali Bambole & H. Muthurajan | 19 – 25 October 2016 |
| **2.** | DST – PURSE sponsored two days' workshop on "Recent Advances in Nano Drug Delivery System | Vaishali Bambole & Pradip Sarawade, H. Muthurajan | 23 – 24 March 2017 |
| **3.** | Two Day National Workshop, Recent Trends in Surface Physics and Phenomena, | Prof. Vaishali Bambole | 21st - 22nd March, 2017 |

| | | | |
|---|---|---|---|
| **4.** | UGC purse sponsored Hands-On Workshop for Students, Solar PV Design and Installation | Vaishali Bambole & Dr. Nainesh Patel | 9th and 10th March 2017 |
| **5.** | Seminar on study of magnetostrictive properties in alloys of ferromagnetic and rare earth metals | Vaishali Bambole | 15th April 2017 |
| **6.** | Seminar on low dimensional systems | Vaishali Bambole | 17th Nov 2017 |
| **7.** | Workshop on 150 years of the periodic table | Vaishali Bambole | 3rd Nov 2018 |
| **8.** | One day workshop on mastering mind by mediation and breadth work | Vaishali Bambole | 29th January 2017 |
| **9.** | One day workshop on UGC purse sponsored Hands-On Workshop for Students, Solar PV Design and Installation | Vaishali Bambole and Nainesh Patel | 28th March 2019 |
| **10.** | 21 days Refresher Course for physics teachers in "Characterisation Techniques in Applied Physics" | Vaishali Bambole and Nainesh Patel. | 6th- 19th November 2019 |
| **11.** | National seminar on hazardous effect of Mobile radiation | Vaishali Bambole and Pradeep Sarawade | 22nd March 2019 |
| **12.** | National Seminar on Cyber Crime | Vaishali Bambole and Chetan Gurada | 30th March 2019 |

**ESTABLISHMENT OF RESEARCH LABORATORIES**

I have been actively involved in establishing following research laboratories.

1. Molecular Electronics Laboratory
2. Bionano Physics Laboratory
3. Biomedical Instrumentation Laboratory
4. Energy Studies Laboratory

**OFFICE BEARER OF CONFERENCES, SYMPOSIA ETC.**

1. Organising Committee Member, 62nd Symposium on Solid State Physics,

Department of Atomic Energy, DAE Convention Centre, Bhabha Atomic Research Centre, Mumbai

2. Chairperson for the session on 'Complex System', 62nd Symposium on Solid State Physics, Department of Atomic Energy, DAE Convention Centre, Bhabha Atomic Research Centre, Mumbai

3. Conference on "Advances in Polymers & Coatings, Rangotsav – 2013, Colour Society of India.
4. Conference on "Advances in Polymers & Coatings, Rangotsav – 2014, Colour Society of India.
5. Workshop on "Bridging the Technological gap between Industry and Academia" (MSME), Dharavi, 2013.
6. Convener for Refresher Course in Experimental Physics arranged by Academic Staff College, Mumbai
7. Member of Finance, Admission, Examination Committee & Advisory Board Department of Physics, Univ. of Mumbai.
8. Convenor, Special Seminar on Low Dimensional Systems, organised by Materials Research Society of India, Mumbai Chapter and Department of Physics, University of Mumba
9. Organising Committee member of International Light Cone Conference LC 2017 during September 18-22, 2017, Department of Physics, university of Mumbai
10. "International Conference on Advanced Nanomaterials and Nanotechnology (I $CAN_N$- 2019)" at Sonopant Dandekar College, Palghar on 26th to 28th November, 2019.
11. Organising Committee Member, International Symposiumon Biotechnology and Chemistry Innovations For societal Benefits,9th Jan. 2019, University of Mumbai Innovation and incubation Centre and ThinQ Research and Skill Development Society
12. Organising Committee member "Golden Jubilee International Conference on Nanomaterials & Nanotechnology (ICONN-2021)"during 25-27 March 2021 in on line mode, by Department of Physics, University of Mumbai.

**MEMBERSHIP OF IN-HOUSE COMMITTEES:**

1. Member Secretary, Board of Governance, Dept. of Physics (Autonomous), University of Mumbai
2. Chairperson, Academic Board, Dept. of Physics (Autonomous), University of Mumbai

3. Chairperson, Research and Review committee, Dept. of Physics,University of Mumbai
4. Chairperson, Board of Studies, University of Mumbai.

5. Chairperson, Admission and Examination Committee, Department of Physics, University of Mumbai
6. Member, Editorial Board of "TISS Journal of Disability Studies and Research (TJDSR)"
7. Member, NAAC Steering Committee
8. Member, Syllabus Framing Committee
9. Member, BOS – Physics, Ruia College (Autonomous)
10. Member, BOS – Physics, Shivaji University
11. Member, Scrutiny Committee to scrutinized the proposals received for Opening New Colleges (Revised) from the academic Year 2018-19.

**ADMINISTRATIVE EXPERIENCE**

**PARTICIPATION IN THE ACADEMIC, ADMINISTRATIVE COMMITTEES AND RESPONSIBILITIES**

**MEMBER OF VARIOUS BODIES OF THE UNIVERSITY:**

1. Head of the Department of Physics, University of Mumbai
2. Member, Academic Committee, University of Mumbai
3. Member Steering Committee, NAAC, RSC, Univ. of Mumbai
4. Nomination as State Representative, selection for the post of Professors, MPSC,
5. Member of UGC Expert Committee, New Delhi
6. Member, Selection Committee Meeting in the School of Law and School of Commerce and Management for the post of Faculty Selection, Central University, Gujarat.
7. Member, Selection Committee Meeting in the School of Mathematical and Physical Science for the post of Faculty Selection, Central University, Gujarat.
8. Member, Selection Committee Meeting in the School of Chemical Science and Technology for the post of Faculty Selection, LBSRSV, New Delhi.
9. Member, Selection Committee Meeting to interview the candidates for the post of

Principal and PGTGS, PGTs in AEES, Mumbai.

10. Member**,** Constitution Committee for Selection of Research Associate and JRF under DBT R&D Project at Dept. of Life Sciences, University of Mumbai
11. Member, Finance Board of Autonomous Department of Physics, Mumbai University.
12. Co-ordinator Refresher Course in Experimental Physics, Academic Staff College, University of Mumbai.

**EXPERT MEMBER FOR VARIOUS GOVT. COMMITTEES:**

1. **Member**, UGC – Mumbai University (Selection Committee for selection of Project Fellow)
2. **Member**, Selection Committee for Faculty position (Physics) PDPM IIITDM, Jabalpur)
3. **Member,** Selection Committee for Asst. Professor and Professor, Dept. of Tech. Education, Maharashtra State, Mumbai
4. **Member,** CSIR – SRT/RA Selection Committee Meeting at HRDG (CSIR), New Delhi
5. **Member**, Selection Committee Meeting for the post of Dy. Registrar at Dr. HGV,

**MEMBER OF VARIOUS BODIES OF THE UNIVERSITY**:

1. Expert committee member to visit the satellite centre at Wada, on 19th march 2021
2. Convenor, LIC committee, N.B Mehta Science College, Bordi, dated 20th March 2021
3. Selection Committee member for the post of Assit. Professor , University of Mumbai, Member, 16th July 2019
4. Scrutiny Committee, for opening of new colleges, (UG and PG ) for arts, Commerce, Science. Etc., dated 18 Dec. 2017
5. Member, Advisory Committee, Mumbai University
6. Member Steering Committee, NAAC, RSC, Univ. of Mumbai
7. Nomination as State Representative, selection for the post of Professors, MPSC,
8. Member of UGC Expert Committee, New Delhi
9. Member, Selection Committee Meeting in the School of Law and School of Commerce and Management for the post of Faculty Selection, Central University, Gujarat.

10. Member, Selection Committee Meeting in the School of Mathematical and Physical Science for the post of Faculty Selection, Central University, Gujarat.

11. Member, Selection Committee Meeting in the School of Chemical Science and Technology for the post of Faculty Selection, LBSRSV, New Delhi.
12. Member, Selection Committee Meeting to interview the candidates for the post of Principal and PGTGS, PGTs in AEES, Mumbai.
13. Member**,** Constitution Committee for Selection of Research Associate and JRF under DBT R&D Project at Dept. of Life Sciences, University of Mumbai
14. Member, Finance Board of Autonomous Department of Physics, Mumbai University.
15. Co-ordinator Refresher Course in Experimental Physics, Academic Staff College, University of Mumbai.

**EXPERT MEMBER FOR VARIOUS GOVT. COMMITTEES:**

1. Member, UGC – Mumbai University (Selection Committee for selection of Project
    a. Fellow)
2. Member, Selection Committee for Faculty position (Physics) PDPM IIITDM, Jabalpur)
3. Member, Selection Committee for Asst. Professor and Professor, Dept. of Tech. Education,
4. Maharashtra State, Mumbai
5. Member, CSIR – SRT/RA Selection Committee Meeting at HRDG (CSIR), New Delhi
6. Member, Selection Committee Mtg. for the post of Dy. Registrar at Dr. HGV, Sagar, M.P.
7. Member, Selection Committee Meeting for the post of Internal Audit Office at
8. Dr.Hari Gour VidyaSagar University, Sagar, M.P.
9. Member, Selection Committee Meeting for the post of Executive Engineer, Asst. Engineer and Jr. Engineer at Dr.Hari Gour VidyaSagar University, Sagar, M.P.
10. Member, Budget committee for Autonomous Dept. of Physics, Mumbai University
11. Member, Selection Committee Meeting for the post of Faculty at Central University, Sagar.
12. Member, Selection Committee for Asst. Professor and Professor, Dept. of Tech.
    a. Education, Maharashtra State, Mumbai
13. Member, Selection Committee for Asst.Professor and Professor, School of Environment
    a. & Sustainable Development of University, Central University of Gujarat.

## OTHER ADMINISTRATIVE EXPERIENCE:

a) Administrative experience of working as Warden of girl hostel, Ramdeobaba Engineering College, Nagpur
b) Framed syllabus of Master's degree in Physics / B.Chem.Engg and B.Tech
c) Actively involved in student counselling
d) Member in house committee, UICT, Mumbai

## IMPORTANCE OF RESEARCH WORK CARRIED OUT

### POST DOCTORAL RESEARCH WORK

**Post-Doctoral Fellow: Dr. Bipin Singh**
Ph.D. (Physics), Photonic and Optoelectronics,
Indian Institute of Technology (Banaras Hindu University), Varanasi

Our earlier work on photonic band gap materials, study of structural and spectroscopic signatures of thin film, and dye-sensitized solar cells gave encouraging results. According to our results, the period and quasi-periodic Photonic crystals (PCs) with graded and dispersive materials can be used in the development of efficient filters, reflectors, sensors and other optical devices. This work further opened-up the idea of understanding the effect of graded and dispersive materials on photonic band gap properties that govern photon management, light transport and interference in the structures.
Presently, as post-doctoral research work we are working on : 'The study of photophysical properties of hybrid organolead-halide perovskite materials and light harvesting structures'. Hybrid organolead-halide perovskite materials attract considerable attention for application in photovoltaic cells. These materials possess most of the properties required to be excellent absorbers; appropriate direct bandgap, high light absorption coefficient, excellent carrier transport, and tuneable band gap etc. These perovskite materials can be easily processed from solution into thin films in one- or two step procedures and afford very efficient solar cells. The research work focuses mainly on investigating and development of highly efficient and stable

perovskite solar cell by introducing different structural and compositional techniques. A major part of this research work is devoted towards a better understanding of the photon management (using plasmonic and photonic crystals concepts) and stability, charge generation, transport and recombination processes in perovskite solar cells. Studies on the structural and spectroscopic signatures of perovskite materials for their display in form of Light emitting diodes (LEDs) and photo-detector applications are currently been undertaken.

**Publication out of the Post-Doctoral Research work*:***

(i) Multi-channel photonic bandgap engineering in hyperbolic graded index materials embedded one-dimensional photonic crystals, Bipin K. Singh Vaishali Bambole, Vipul Rastogi, Praveen C. Pandey; Optics and Laser Technology,129 (2020) 106293 (Impact factor:2.18)

(ii) Photonic Band gap Consequences in One-dimensioal Exponential Graded Index Photonic Crystals, Bipin K Singh,Vaishali Bambole, Shubhashish Tiwari, Kaushal Shukla, Praveen Pandey, Vipul Rastogi, Optik, International Journal for light and Electron Optics,240,(2021),166854

**DOCTORAL RESEARCH WORK**

The work was undertaken to improve the mechanical strength and processability of conducting polymers so as to use them for electronic devices. For this purpose composite of Polypyrrole and Polyaniline with insulating polymers such as poly vinyl alcohol (PVA), polymethylmethacrylate (PMMA) and polystyrene were prepared electrochemically. The samples were tested to detect toxic gases like Ammonia, Chlorine, Sulphur dioxide, Carbon dioxide, Nitrogen Oxide etc. with the intention to build up gas sensors. Rectifying action of some of the samples coated with In, Al, Bi was also verified. Conductive Textiles were prepared. These were used to make the devices like heating pads and pressure sensors. Use of such textiles as Gamma detector was illustrated. It is observed that they show good anti – flammability and can be used for electromagnetic field interference (EMI) shielding. They inhibit high electrical conductivity, antibacterial property.
The composite films were implanted with $Na^+$ and $Cl^-$ ions show good rectifying action. Thus all polymer diodes with good rectifying ratios were demonstrated.

**TOPICS OF CURRENT RESEARCH INTEREST:**

Molecular Electronics Devices, Conducitng Polymers, Knowledge based Textiles, Smart Textiles with functionalised finish, High Energy Radiation with Speciality Polymers, Use of

electron beam technology for increasing the shelf life of Ready to Eat food., Gas Sensors, Biosensors, Biomolecular detection,Thin Films, Plasma Enhanced Chemical Vapour

Deposition (PECVD),Polymer gels-Application to Artificial Muscles. Nanotechnology: Synthesis, Characterisatio., Application of Radiation for Restoration of Cultural Heritage.

**PARTICULARS OF CURRENT RESEARCH WORK:**

High energy radiation like electron beam & gamma are used to carry out polymerization of conducting polymer like polyaniline, polypyrrole, and polythiophenes to form composites, thin films and nanoparticles. "Smart Fabrics" are being developed by impregnating conducting polymers into textiles. Some of the fabrics already developed in our laboratory show good sensing and EMI shielding action. 'Flexible heating pads' were fabricated using conductive textiles. Nano particles of titanium dioxide were impregnated to produce dust free and germ free fabrics. Work on ion conductor gels has been undertaken to serve as soothing bandagers for burn patients and as an interface for ECG application. Electroactive polymers prepared can be used as 'actuators' and as 'artificial muscles'.

*"Shrink the size and expand the world"* – The science of nanotechnology deals with reducing particle size for enhancing the material properties. Polymer nano-composites of high performance polymers like Polyetheretherketone, Polymethylmethacrylate, Polypropylene, PET with inorganic fillers such as $CaCO_3$, flyash, talc, mica were synthesized to enhance various physical properties such as mechanical strength, modulus, rigidity, heat resistance etc. Electron beam Radiation technology instead of radioactive gamma is being used to increase the shelf life of Ready to eat food items as well as a tool to restore the cultural heritage such as wood artifacts, clothes, valuable books, etc.

i. Reviewer, European Polymer Journal, Elsevier Publications
ii. Co-ordinator, Refresher Course in Experimental Physics, Academic Staff College, University of Mumbai

## LIST OF PUBLICATIONS

## PEER REVIEWED AND REFERRED JOURNAL PUBLICATIONS

| Impact Factor Analysis | COUNTS |
|---|---|
| Total citations | **1666** |
| h-index | **18** |
| i10- index | **38** |

## REFERRED JOURNAL :-

1. ”Structural, Mechanical and Electrical properties of Electro-polymerised Polypyrrole Composite Films”, N V. Bhat; Vaishali Bambole and A.P. Gadre; “J. Appl. Polymer Sci.”, 80, 2511-2517,(2001).
2. “Investigation of electro polymerized polypyrrole composite films: Characterization and application to gas sensors”, N. V. Bhat; Vaishali Bambole and A. P. Gadre; “ J. Appl. Polymer Sci.” 88 (1), 22-29, (2003).
3. “Electro polymerized Aniline Composite: Characterisation and Application to Gas sensors”, N. V. Bhat and Vaishali Bambole, “ Material Research Innovations, Polychar ; (2003).
4. “Structural Properties of Sodium ion implanted PVA Films”, N. V. Bhat; V. A. Bambole; M. B. Kurup and M. M. Nate; “J. of Appl. Polymer Sci.”, 98(1), 276 -283, (2003).
5. “Use of polymer films as high energy ion radiation sensors”, N. V. Bhat; V. A. Bambole and M. M. Nate, “Nuclear Instruments Methods in Physics-B”
6. “Advances in Development of Smart and Intelligent Apparels”, A.N. Desai, N.V. Bhat,

D.T. Seshadri, V.A. Bambole, BTRA SCAN 34, 1-6, 2004

7. “Effect of gamma radiation on structure and morphology of PVA films”; N. V. Bhat; M. M Nate; V. A. Bambole; S. Sabharwal and M. B. Kurup, “Nuclear Instruments and Methods in Physics Research B”, 237(3-4), 585 – 592, (2005).
8. “Structure and Properties of poly (methyl methacrylate) + Polyaniline composite Films prepared by one-step Electrochemical Technique” V.A. Bambole, N.V. Bhat, “J.Polym.Matr., 23, No.4 (2006) 387-395.
9. Structural changes in Chlorine implanted poly (vinyl alcohol) films; V.A. Bambole, N.V.Bhat, M.B.Kurup and M.M.Nate “Nuclear Instruments and Methods in Physics Research B: Beam Interactions with Materials and Atoms”, 262, issue 1,(2007), 39—45.
10. “Effect of Particle Size of Mica on Properties of Polyester Thermoplastic Elastomer composites”, V. A. Bambole, M. S. Srikanth, S. T. Mhaske and P. A. Mahanwar, “International J. Plastic Technology”, 12,1081-1092,(2008).
11. “Effect of Particle Size and Concentration of Flyash on properties of polyester thermoplastic Elastomer composites”, V. A. Bambole, M. S. Srikanth; S. T. Mhaske and P. A. Mahanwar , “ J. Minerals Characterisation & Engineering”,8(3), 202-220, (2009).
12. “Effect of concentration of Mica on properties of polyeste Thermoplastics Elastomer composites”, V. A. Bambole, M. S. Srikanth, S. T. Mhaske and P. A. Mahanwar , “J. Mineral Materials characteriztion and Engineering “ , 8(4), 271-282, (2009).
13. ”UV Curable Acrylic Coatings for Heat Sensitive substrates”, Roshini Mhatre, V.A.Bambole, V.V. Shertukade and P.A.Mahanwar, “Pigment and Resin Technology”, 39(5), 221-227, (2009).
14. “Study of modified polypropylene for rotational moulding application” V. A Bambole, Tarunesh Sharma and P. A. Mahanwar, “International J. Plastics Technology”, 13 (1), 83- 94, (2009).
15. “Thermosetting acrylic emulsion for coating – A literature review”, S. Joseph, V.A. Bambole, P.A. Mahanwar, Paintindia, 59 (12), 2009.
16. “UV Curable Polyester Based Polyurethane Acrylate Nanocoatings”, Roshani A. Mhatre; V. A. Bambole; V. V. Shartukade and P. A. Mahanwar “Pigment & Resin

Technology”, 39(5), 268-276, (2010).

17. “Electrospinning of polymers, their modeling and applications”, A. Kulkarni, V. A. Bambole, P. A. Mahanwar, “Polymer-Plastics Technology and Engineering”, 49(5), 427- 441, 2010.
18. “Effect of flyash content, particle size of flyash, and type of silane coupling agents on the properties of recycled poly(ethylene terephthalate)/flyash composites”, Seena Joseph; V. A. Bambole, V. V. Sherhtukade and P. A. Mahanwar, “J. Applied Polymer Sci., 119(1), 201-208, (2011).
19. "Effect of concentration of mica and microsilica on particulate composites of poly (ethersulfone) and poly(ether-ether-ketone)”, S. Joseph, V. V Sherhtukade, V. A. Bambole and P. A. Mahanwar “J. Thermoplastic Composite Materials”, 24(3), 351-367, (2011).
20. “Effects of mica and Fly ash concentration on the properties of polyester thermoplastic elastomer composites”, M.S. Sreekanth; S. Joseph; S. T Mhaske; V. A. Bambole and P. A. Mahanwar, “J. Thermoplastic Composite Materials”, 24(3), 317-333, (2011).
21. “Mechanical Properties of Poly (ether ketone) Composites Reinforced by Carbon Nano-Platelet Chains and Nanoalumina”, Seena Joseph, V.A. Bambole and P. A. Mahanwar, “J. Thermoplastic Composite Materials”, 24(6) 755-766 (2011).
22. “Preparation and Characterization of Polypyrrole-Modified Henequen Fiber-Reinforce Polymethylmethacrylate Composite”, Abhijit G. Badgujar, Vaishali A. Bambole and Prakash A. Mahanwar Polymer-Plastics Technology and Engineering, 50 (2012), 1281-1287
23. “Performance of nanosilica in acrylic polyol 2K polyurethane coatings”, A.P. Kabra, P. Mahanwar, V. Shertukde, V. Bambole, Pigment & Resin Technology, 41, 4, 2012.
24. “Molecular Spintronics, Solid State Phenomenon”, Vol-189, pp-95-127 ferroiest Multiferrics Edited by Hardev Singh, Virk & Wolfgang Kleenmann ,Jatindra Yakmi & Vaishali Bambole Transtech publication, Switzerland.
25. “Effect of polypyrrole on the properties of conventional epoxy coatings”, Abhijit S., Prakash A. Mahanwar, V. A. Bambole, “Pigment & Resin Technology”, 42(5), 317-325, 2013.

26. “Effect of hollow glass microsphere and cenosphere on insulation properties of coatings” P.K. Sahu, V.A. Bambole and P.A. Mahanwar, Pigment & Resin Technology, vol.42, issue 4, 223-230.

27. “Selective Interfacial Localization in Conducting Polycaprolactum/Ethylene Vinyl Acetone/Carbon Black Composites”, V.A. Bambole, P.A. Mahanwar, S.K. Sinha, Polymer Composites, 2013.
28. “Polypyrrole in water borne epoxy coating”, P. A. Mahanwar, A. Sathyanarayana, V. A. Bambole and S. Sabharwal, Pigment & Resin Technology, 42(6), 362-373, 2013.
29. “Effect of particle size of fly ash cenospheres on the properties of acrylonitrile butadiene styrene-filled composites”, M. B. Kulkarni, V. A. Bambole and P. A. Mahanwa, “Journal of Thermoplastic Composite Materials”, 27(2) 251-267 (2014).
30. “Surface Treated and Untreated Henequen Fiber Reinforced PP Composites”, Pravin Gaikwad, Prakash Mahanwar and Vaishali Bambole, International Journal of Chemical. Envirnmentol& Biological Science, 2(4), 181-186 (2014).
31. “Electrospinning of polymers, their modeling and applications”, A. Kulkarni, V.A. Bambole, P.A. Mahanwar, Polymer-Plastics Technology and Engineering, 49(5), 427-441, 2010.
32. “Electron beam irradiation of ready to eat Indian cuisines for longer shelf life”, Shimmy Shankar, M.; Mulmule, Manoj; Bambole, Vaishali; Jamdar, Sahayog N.; Rawat, K.P, Journal of Radiation and Cancer Research; ISSN 0973-0168; Worldcat; v. 7(1); p. 12 (2016)
33. “Digital Signal Processing of Optical Encoder for High Resolution Angular Measurement of X-Ray Diffraction Goniometer”, Shrihari Shinde, Shirish Ghadigaonkar, Lalan Jaiswal, Abhishek Sakhare, Vaishali Bambole, H. Muthurajan, International Journal of Engineering Technology, Management and Applied Sciences, Volume 4, Issue 7, ISSN 2349-4476 (July 2016) pp 75 – 79.
34. “Combination of electon beam irradiation and thermal treatment to enhance the shelf-life of traditional Indian fermented food (Idli)”, Manoj D. Mulmule, Shimmy Shankar M, Vaishali Bambole, Sahayog N Jamdar K P Rawat, K S S Sarma, Radiation Physics and Chemistry, 131 95–99, (2017).
35. Study of electronic and optical properties of ZnO clusters using TDDFT method, Balasaheb J Nagare, SunilChavan, Vaishali Bambole, Mater. Res. Express 4 (2017) 106304

36. “Static polarizabilities and optical absorption spectra of boron clusters (n = 2–20, 38 and 40) using first principles”, Balasaheb J.Nagare, Sunil Chavan, Vaishali Bambole,

Computational and Theoretical Chemistry, Volume 1125, February 2018, Pages 54-62.

37. Effect on carbon doping on electronic structure and optical properties of ZnO clusters. Sunil Chavan ,Vaishali Bambole, IJSRST, Volume 4, Issue 5, 1779-1785, April 2018.
38. Optical properties of alkali substituted boron clusters using TDDFT method. Sunil Chavan Vaishali Bambole and Balasaheb Nagare, American Institute of Physics (AIP) Conference proceedings, 1989,020006 (2018) doi; 10.1063/1.5047682.
39. Reduced power consumption in nickel zinc ferrite nano particles doped blue phase chiral nematic liquid crystal devices. Journal of Molecular Liquids, JESSY.P.J. Vaishali Bambole, Rajendra Deshmukh, Nainesh Patel, 281 (2019) (IF= 4.513) pg 480-489.
40. Tissue Engineering: Use of Electrospinning Technique for Recreating Physiological Functions, 387-455, Vaishali Bambole and Jatinder Vir Yakhmi, Nanobiomaterials in Soft Tissue Engineering Applications of Nanobiomaterials, Elsevier Publications. ISBN 2016- 387-455.
41. Molecular Spintronics J.V. Yakhmi and V.A. Bambole, Ferroics and Multiferroics, Trans Tech Publications, ISBN- 13:978-3-03785-431-0
42. Electro Chemical Hydrogen Evolution of Ni doped Zinc Ferrite Nano particles prepared by Tamarind- Medicated sol-gel Auto Combustion. Ajinkya R Phale, Ravindra Kamble, Amol Pansare, Vaishali Bambole International Journal of Advance and Innovative Research vol. 6 Issue 1 (XIX) 2019 Part 2
43. Combination of electron beam irradiation and thermal treatment to enhance the shelf-life of traditional Indian fermented food (Idli); Manoj D. Mulmule, Shimmy Shankar M, Dr. Vaishali Bambole, Dr. Sahayog N Jamdar, K. P Rawat ,K.S.S. Sarma, Radiation Physics and Chemistry, S0969-806X(16)30545-X.
44. Silicon negative ion implantation induced vacancy defects in thermally grown SiO2 thin films; S. B. Vishwakarma, S. K. Dubey, R. L. Dubey, A. Yadav, V. Jadhav, V. Bambole,

    I. Sulania, D. Kanjilal & K. Devarani Devi. Radiation Effects & Defects In Solids, Issn: 1042-0150, 1029-4953
45. Multi-channel photonic bandgap engineering in hyperbolic graded index materials embedded one-dimensional photonic crystals, Bipin K. Singh Vaishali Bambole, Vipul

Rastogi, Praveen C. Pandey; Optics and Laser Technology,129 (2020) 106293 (Impact factor:2.18)

46. Photonic Band gap Consequences in One-dimensioal Exponential Graded Index

Photonic Crystals, Bipin K Singh,Vaishali Bambole, Shubhashish Tiwari, Kaushal Shukla, Praveen Pandey, Vipul Rastogi, Optik, International Journal for light and Electron Optics,240,(2021),166854

47. "Magnetically recoverable CoFe1.9Gd0.1O4 ferrite/polyaniline nanocomposite synthesized via green approach for radar band absorption" has been accepted for publication in Ceramics International. Ref.No.:CERI-D-21-05864R1

**INTERNATIONAL CONFERENCE PUBLICATIONS**

48. Structural and Electrical properties of Electropolymerised Polypyrrole Composite Films, N. V. Bhat, Vaishali Bambole and A. P. Gadre, "Polymers Beyond AD 2000' International Conference", I.I.T Delhi in Jan.1999 (Oral Presentation).
49. Conducting Polymers for Molecular Electronic Devices: Fabrication of diodes, N.V. Bhat, Vaishali Bambole, "India-Japan Workshop on 'New advanced materials in Molecular Electronics", NPL Delhi on 10-11 December 2001.
50. Synthesis & use of conductive textile fabrics, N. V. Bhat, Vaishali Bambole and D. T. Sheshadri, "International Conference on Polymers & Textiles," I.I.T Delhi on 15-16, Feb.2002.
51. Ion Implanted Polypyrrole Composite Films: Characterization And Application in Fabrication of p-n junction Diodes, N. V. Bhat, V. A. Bambole and M. B. Kuru, "International Seminar on Frontiers of Polymer Science and Engineering (MACRO 2002)" I.I.T. Kharagpur, 9th -11th 2002 .
52. Characterization and Application of Ion Implanted Polypyrrole Composite, .N. V. Bhat, V. A. Bambole & M. B. Kurup. International Seminar on Advances in Polymer Technology, Department of Science And Rubber Technology Cochin University of Science and Technology at Cochin, 13th- 14$^{th}$ Dec 2002 .
53. A.N.Desai,N.V.Bhat, V.A.Bambole In Proc. Of the International conf. on High Performance Textiles and Apparels, Kumarguru college of Technology, Coimbatore, India, P. 475, July 2004.

54. Novel Iono-Conductor Gels: Preparation and Characterization for Bio- Medical Application, V.A. Bambole and B. S. Vatsaraj, International Conference on Advances

in Polymer Blends, Composites, IPNS and Gels: Macro to Nano Scale ICBC 2005, M.G. University Kottayam, Kerala, March 21-23, 2005.

55. Preparation and Characterization of Polypyrrole and Sodium Carboxy methyl Cellulose Blend Films: Application to Gas Sensor, V. A. Bambole, International Conference on Advances in Polymer Blends, Composites, IPNS and Gels: Macro to Nano Scale ICBC 2005, M.G. University Kottayam, Kerala, March 21-23, 2005.
56. Blends of Waste Styrene Acrylonitrile (SAN) and Waste Polycarbonate(PC), P. A. Mahanwar, V. A. Bambole and Vinay Kumar Chaudhary. International Conference on Advances in Polymer Blends, Composites, IPNS and Gels: Macro to Nano Scale ICBC 2005, M.G. University Kottayam, Kerala, March 21-23, 2005.
57. Drying of water soluble Polymer: Partially Hydrolyzed Polyacrylamide (PHPA) synthesized by photo- polymerization,. V. A. Bambole, Rachna Pandey and P. A. Mahanwar. International Conference on Advances in Polymer Blends, Composites, IPNS and Gels: Macro to Nano Scale ICBC 2005, M.G. University Kottayam, Kerala, March 21-23, 2005.
58. Electro, chemo and mechanical Behavior of An Interpenetrating Polymer Network Hydrogel Composed of Polyacrylic Acid And Polyacrylamide, V. A. Bambole and V B. Patil, International Conference on Advances in Polymer Blends, Composites, IPNS and Gels: Macro to Nano Scale ICBC 2005, M.G. University Kottayam, Kerala, March 21-23, 2005.
59. Fly Ash Filled Polypropylene Composites, P. A. Mahanwar, H. Raghu, Rahul Mahajan and V. A. Bambole, presented at International conference on Advances in Textile Materials Technology, Management and Applications, Kumaraguru College of Technology, Coimbatore. India, 7$^{th}$ and 8th July, 2005 .
60. Preparation, Characterization and Performance of Conductive Fabrics : Cotton / Polyester, V. A. Bambole, P. A. Mahanwar and Y. A. Kamble presented at International conference on Advances in Textile Materials Technology , Management and Applications, Kumaraguru College of Technology, Coimbatore. India. 7$^{th}$ - 8$^{th}$July, 2005 .
61. Effect of Particle Size on Mica Filled Polypropylene, H. Raghu, Rahul Mahajan, P. A.

Mahanwar and V. A. Bambole , International Conference on Composites/Nano Engineering (ICCE –12), Spain,1-6 August 2005.

62. Low Density Polyethylene (LDPE) – Montmorillonite (MMT) Nanocomposites for Packaging, P. A. Mahanwar, H. Raghu and V. A. Bambole presented at International Conference on Composites/Nano Engineering (ICCE – 12) , Spain 1- 6 August 2005.
63. Characterization of 'Smart Fabrics: Application to Gas And Humidity Sensor, V. A. Bambole and Y. A. Kamble at International Conference on "Emerging Trends in Polymer & Textiles, Department of Textiles Technology, IIT, Delhi, 7-8 Jan 2005.
64. Development of Conductive Textile for Intelligent Fabrics, N. V. Bhat, V. A. Bambole, M. M. Nate and S. S. Upadhay, International Conference on Advances in Polymer Blends, Composites, IPNS and Gels: Macro to Nano Scale ICBC 2005, M.G. University Kottayam, Kerala, , March 21-23, 2005.
65. Effect of Coupling Agent - Titanates on Fly Ash Filled Polypropylene, V. A. Bambole , H. Raghu, Rahul Mahajan and P.A.Mahanwar presented at International Conference on Composites / Nano Engineering (ICCE –12) , Spain, being held on 1- 6 August, 2005.
66. Biodegradable Plastisols for Packaging application, V. A. Bambole, P. A.Mahanwar and Neetu Bhowate, International conference on advances in polymer blends, composites, IPNS and gels: Macro to nano scale ICBC 2005, M. G. University Kottayam, Kerala, March 21- 23, 2005.
67. Mica Filled Acrylonitrile Butadiene Styrene(ABS) Composites, V. A. Bambole, Shruti Thhakr, and P. A. Mahanwar, 13$^{th}$Annual International Conference on Composites/Nano Engineering (ICCE - 14) ,Boulder Colorado, USA, July, 2006.
68. Effect of particle size of mica on properties of Polyetherether ketone (PEEK) composites, V. A. Bambole and M. Rahil Parvez, Paper presented at ICCE – 15, Hainan Island ,China, July 15 – 21, 2007.
69. Acrylic Adhesive for Transdermal Therapeutic systems, V. A. Bambole, P. A. Mahanwar and Leema Joseph, International conference on Advances in Polymer Blends, Composites, IPNS and gels: Macro to Nano scale ICBC 2007, M. G. university Kottayam, Kerala, November 19- 25, 2007.
70. Conductive Polymeric Composite as Anode for Battery Application, V. A. Bambole and P. A. Mahanwar , poster presentation, Molecular Organic Electronic Devices

(MOED), at GNDU University, Amritsar, Punjab, September, 22-25th 2009.

71. Synthesis of Aluminum Trihydroxide (ATH) Nanoparticles and their use in fabrication of Flame Retardant Polypropylene/ATH Nanocomposites, V. A. Bambole, invited talk,

at “Advanced Nanomaterials and Nanotechnology (ICANN- 2011) December 8-10,2011 at IIT, Guwahati.

72. Investigating improvement in performance properties when nano-alumina is incorporated into polyester based urethance acrylate clear coat”, Palavi Deshmukh, Prakash Mahanwar, V.A. Bambole, International conference on Nanotechnology, Chandigarh, 13-15 Feb 2012.
73. Electron Beam crosslinking of Urethane acrylate: The effect of nanosilica on properties of Coating V. A. Bambole, invited talk at ‘Third International Conference on Natural polymers and Biomaterials (ICNP – 2012) 26-28 October 2012, Kottayam, Kerela
74. Electro spinning for the synthesis of conducting Nanofibres V.A. Bambole invited talk at “International conference on Multifunctional Materials, Energy and Environment” 21 -23 August 2013 at Sharda University, Knowledge park, Greater Noida-06
75. Excellent Microwave Absorbing and Magnetic Properties exhibited by NiZn Ferrite Nano Particles, Ravindra N Kambalea, Lalit C Bordeb, K G Sureshc, Vaishali Bambole, 3rd Indo-Austrian Symposium on Materials Engineering (AME 2016)19 to 20 December 2016, conducted by MEMS Department, Indian Institute of Technology, Bombay
76. “Digital Signal Processing of Optical Encoder for High Resolution Angular Measurement of X-Ray Diffraction Goniometer”, Shrihari Shinde, Lalan Jaiswal, Abhishek Sakhare, Vaishali Bambole, H. Muthurajan, International Conference on Signal, Image, Video & Audio Processing, Acharya Nagarjuna University, Guntur, 30 - 31 July 2016
77. “Nickel Thin Film Fabrication Using Electroless Technique and itsNano Stress – Strain Characterization”, Tanmay Mukim, Lalan Jaiswal, Payal Verma, Sneha Mishra, Vaishali Bambole, H. Muthurajan, Proceedings of International Conference on Advances in Nanomaterials and Nanotechnology, Organised by Centre for Nanoscience and Nanotechnology (CNN), Jamia Millia Islamia, New Delhi, 4 & 5 November 2016; ISBN: 978-93-85000-94-2
78. “Design and Calibration of Syringe Pump for dispensing microlitre volume into Microfludic systems”, Harsh Shah, Shrihari Shinde, Tahir, Vaishali Bambole, H.

Muthurajan, Proceedings of International Conference on Future Trends and Challenges in Mechanical Engineering (FTCME 2017), organised by Department of Mechanical

Engineering and Production Engineering, Sinhgad College of Engineering, Pune, during 17 – 19 February 2017, ISBN 978-81-932761-50, pp 167 – 173.

79. Synthesis and excellent Microwave Absorbing Properties of Nd doped NiZn Ferrite Nano Particles, Ravindra N Kambale, K G Suresh, Vaishali Bambole, Second International Conference on material Science (ICMS.), Organized by Dept. of physics, Tripura University , Tripura, 16 – 18 February, 2017
80. Synthesis, characterization and electromagnetic properties of Er doped Nickel Zinc ferrite nanoparticles, Ravindra N Kambale, Lalit C Borde, K G Suresh, Vaishali Bambole, 8th International conference on Advanced materials development and performance (AMDP 2017), conducted by dept. of Physics Pune University, 11-15 July 2017
81. Synthesis of NiCd-ferrite/Polyaniline Nanocomposite and Their Magnetic and Microwave Absorption Properties, Ravindra N Kambale, Lalit C Borde, K G Suresh, Vaishali Bambole, 4th International Conference on Nanoscience and Nanotechnology (ICONN-2017), SRM University, Kattankulathur, Chennai, August 09-11, 2017
82. Modification of Structural and optical properties of GaAs implanted with silicon negative ( Si-1) ions; Ajay Yadav , S.K.Dubey, R.L.Dubey, Vidya Jadhav, Vaishali Bambole, I. Sulania, Fouran Singh and D. Kanjilal; 4th International Conference on Nanostructure by Ion Beam ( ICNIB 2017) 11th to 13 october 2017, P 51
83. Structural and optical studies of silicon negative ion implanted SiO2; S.Vishwakarma, S.K Dubey, R.L Dubey, A.Yadav, V. Jadhav, V. Bambole, I. Sulania, F. Singh, P.K. Kulariya, D. Kanjilal; 4th International Conference on Nanostructure by Ion Beam ( ICNIB 2017) 11th to 13 October 2017. P 152.
84. Magnetic and Enhanced Microwave Absorption properties of NI-Co-Zn Ferrite/ Polyaniline Nano Composites; Ravindra N. Kambale, Akhilesh Patel, K.G. Suresh, Vaishali Bambole, International Journal of Engineering Technology science and Research ISSN 2394-3386 vol.5 Issue 2 Feb 2018
85. Magnetic and Enhanced Microwave Absorption properties of NI-Co-Zn Ferrite/ Polyaniline Nano Composites; Ravindra N. Kambale, Akhilesh Patel, K.G. Suresh, Vaishali Bambole, International Journal of Engineering Technology science and Research

ISSN 2394-3386 vol.5 Issue 2 Feb 2018.

86. A unique amorphous cobalt-phosphide-boride bifunctional electrocatalyst for enhanced

alkaline water-splittingA. Chunduria, S. Gupta, A. Bhide, R. Fernandes, M.K. Patel, V. Bambole, A. Miotello, N. Patel, Applied Catalysis B: Environmental (259 (2019) 118051.

87. Studies of SiO2 thin films implanted with 100keV silicon ions; Suraj B.Vishwakarma, , Sheshmani K. Dubey, R.L. Dubey, , V. Bambole, I. Sulania, D. Kanjilal, Materials Today: Proceedings 23 (2020) 345–351
88. Effects of silicon negative ion implantation in semi-insulating gallium arsenide; Ajay Yadav, S. K. Dubey, V. Bambole, R. L. Dubey, I. Sulania & D. Kanjilal; RADIATION EFFECTS & DEFECTS IN SOLIDS, 2019, VOL. 174, NOS. 7–8, 636–646 , ISSN: 1042-0150 ,1029-4953.
89. Photonic Band Gap Consequences in One-Dimensional Exponential Grade Index Photonic Crystals Optik (IF: 2.187)
90. Static polarizabilities and optical absorption spectra of boron clusters (n = 2–20, 38 and 40) using first principles; Balasaheb J. Nagare, Sunil Chavan , Vaishali Bambole, Computational and Theoretical Chemistry, 1125 (2018) 54–62.
91. Effect of carbon doping on electronic structure and optical properties of ZnO clusters; S Chavan, Vaishali Bambole, Int J S Res Sci. Tech. 2018 Mar-Apr;4(5):1779-1785.
92. Reduced power consumption in nickel zinc ferrite nanoparticles doped blue phase chiral nematic liquid crystal devices; Jessy P.J, Vaishali Bambole, , R.R. Deshmukh, , Nainesh Patel, Journal of Molecular Liquids 281 (2019) 480–489.
93. Multi-channel photonic bandgap engineering in hyperbolic graded index materials embedded one-dimensional photonic crystals; Bipin K. Singh, Vaishali Bambole, Vipul Rastogi, Praveen C. Pandey, Optics and Laser Technology 129 (2020) 106293.
94. Synthesis, characterization and electromagnetic properties of Er doped Nickel Zinc ferrite nanoparticles; Ravindra N Kambale, Lalit C Borde , K G Suresh , Vaishali Bambole,

**INVITED TALKS**

95. Invited talk at “International Conference on Ultrasonics and Materials Science for Advanced Technology, 2019, (ICUMSAT- 2019)” during November 16-18, 2019. Department of Physics Prof. Rajendra Singh (Rajju Bhaiya) Institute of Physical Sciences for Study and Research V.B.S. Purvanchal University, Jaunpur, U.P.- 222003, India. On Microwave Absorbing Properties Of $Ni_{0.5}Zn_{0.5}Fe_{1.9}Nd_{0.1}O_4$ Ferrite/Polyaniline Nanocomposite

96. Invited talk on “New Innovations in Science-Nation before self!” Womens day celebration at SVKM's Mithibai College of Arts,Chauhan Institute of Science &Amrutben Jivanlal College of Commerce And Economics,Vile Parle (W), Mumbai.
97. Invited talk on “New Innovations in Food Preservation!” Womens day celebration at SVKM's Mithibai College of Arts,Chauhan Institute of Science &Amrutben Jivanlal College of Commerce And Economics,Vile Parle (W), Mumbai, on 8$^{th}$ Feb.2019
98. Invited talk on “Irridiation for Food Safety: Applications of High Energy radiations for Enhancing Food Safety” at K.E.M hospital on the of World food Day. On 15$^{th}$ April 2015
99. Invited talk on “New Women in Science: Successfully Combating Prejudices” at National Seminar on Advanced Materials 2020 (A Special Contribution : Women Scientist) " [NSAM - 2020]” organized by Department of Physics, The Institute of Science, Dr. Homi Bhabha State University, Mumbai during 3rd and 4th March 2020 as a part of celebration of National Science Day on Women Day Celebration
100. Invited talk on “Novel Radar Absorbing Materials using Ferrite/Conducting Polymer Nanocomposites” at National Seminar on Advanced Materials 2018 (A Special Contribution : Women Scientist) " [NSAM - 2018]” organized by Department of Physics, The Institute of Science, Dr. Homi Bhabha State University, Mumbai during 23rd March 2018 as a part of celebration of National Science Day on Women Day Celebration

101. An invited talk was delivered for the Rotary Club of Hiranandani on “Kitchen to innovation” to motivate women to take up research from simple house hold principle involving Physics on 12th July 2020

102. A motivational talk on “Enhanced Role of Women Scientist to make the Nation a Powerhouse for National Reincarnation” was delivered on the platform of the “Policy Times group”, 21st July 2020

103. A motivational talk on “Higher Education- Indian Perspective-Scope and Challenges of Women in the field of Science” on the platform of Ambedkar Aviation Group (AAG) and Harvard Ambedkarite Scholars, 29th June 2020.

104. “Ready-To-Eat Food Products: Enhancing Safety And Shelf Life By Electron Beam Irradiation” at 5th International Conference on 'Ion beams in Materials Engineering and Characterization', (IBME 2018) to be held in Inter University Accelerator Centre, New Delhi from October 9-12, 2018

105. Ammonia gas sensors using Polypyrrole and its composites, N. V. Bhat, Vaishali Bambole, R. Nallathambi, and .P. Geetha IV National Seminar on Physics and Technology of Sensors, Feb. 1997.National Seminar on Physico-chemical Studies of solids including minerals and coals held at ISM, V. A. Bambole, Dhanbad, December, 2000.

106. Conductive Textile fibres for the development of Gas sensors, N. V. Bhat, Vaishali Bambole and A. P. Gadre, VII National Conference on Physics and Technology of Sensors held at Pune, Feb.2000. (Oral Presentation

107. National Conference on Device-Grade Material Development using Ion beams, V. A. Bambole, held at the Department of Physics, University of Mumbai, Mumbai, 3rd - 4th November, 2000.

108. Development of sensors for biomedical application, V. A Bambole and Rathod, (oral presentation) at NCBME 2006 at SPIT, Andheri (W), Mumbai. During, March 28-29th 2006.

109. Development of conductive fibers for smart apparel, N. V. Bhat, V. A. Bambole, D.T. Seshadri and M. M. Nate. 10th National Conference on Physics and Technology of Sensors, held in at Vishwakarma Institute of Technology, Bibwewadi, PUNE, 4th to 6th March 2004.

110. Electrical conductivity of composites of Polyaniline, N. V. Bhat, Vaishali Bambole and D.T .Seshadri, National Seminar on Physico-chemical Studies of solids including minerals and coals at ISM, Dhanbad, December, 2000.

111. Syntheis and characterization of Hydrogels (copolymers of Acrylic acid and

Acrylamide, V. A. Bambole, P. A. Mahanwar and Vinay Kumar Chaudhary, National seminar on recent developments in biomedical polymers and their applications,

Bangalore, May 13-14, 2005.

112. Studies on recycles polymer filled with agro waste, V. A. Bambole, P.A. Mahanwar and Vinay Kumar Chaudhary, National Conference on Polymers, by Society of Polymer Science, India", at Pune , 26th July, 2005.

113. Characterization of Smart Fabrics : Application to Gas and Humidity Sensor, V. A. Bambole and Y. A. Kamble, Emerging Trends in Polymers and Textiles, ,Department of Textile Technology, IIT, Delhi, 7-8th January, 2005.

114. Development of Sensors for Biomedical Application, V. A. Bambole and Rathod , NCBME 2006, SPIT, Andheri (W) Mumbai, March 28-29, 2006 .

115. Preparation of poly (vinyl chloride)+polypyrrole composite films by Electro-Chemical method and its use for Gas Sensor, V. A. Bambole, N. V. Bhat, and R. Nallathambi. MACRO2006, NCL, Pune, Dec 17-21,2006.

116. Electrical Properties of Polypyrrole (PPy) and Hydroxy Propyl Methyl Cellulose (HPMC) Blend films and Its Application to carbon dioxide Gas Sensor, V.A. Bambole and A. A. Bankhele, MACRO 2006,NCL Pune, Dec 17-21, 2006.

117. Development of sensors for biomedical application, V. A. Bambole and P. A. Mahanwar, at NCBME 2006 at SPIT, Andheri (W), Mumbai during March , 2006.

118. Preparation of Poly ( methyl Methacrylate ) + Polyaniline Composite films and its use for Gas Sensors, V. A. Bambole, N.V. Bhat and H. S. Mahajan, NSPTS – 12, BARC, Mumbai, March 7 – 9, 2007.

119. Preparationof conductive polymercomposite:NaCMC+PANiand Application as Humidity Sensor, V. A. Bambole, Y. A. Kamble, H. S. Mahajan, M. T. Thorat and P. Nihul, ICNAMA-2008,Shivaj, University, Kolhapur, December 9-11, 2008.

120. Nano Emulsions for Biomedical application, V. A. Bambole, P. A. Mahanwar and Leema Joseph, Inter- University Research festival AVISHKAR-2008, SNDT, Churchgate, Mumbai. 10-12 January, 2008.

121. Pressure Sensitive Adhesivs for Transdermal drug delivery, V. A. Bamoble, P. A. Mahanwar And Lemma Joseph, Notational level young Researcher's conference (YRC), ,UICT, Mumbai 22-23, January, 2008.

122. Synthesis of Polypyrrole +PS/PMMA Composites: Application as Ammonia Gas Sensor, V. A. Bambole, P. A. Mahanwar, H. S. Mahajan and Y.A. Kamble, MACRO 2009, Recent advances in Polymeric Materials, Department of Chemistry, IIT Madras, March 9-11,2009.

123. Synthesis of electron beam curable resin for coatings, V.A.Bambole, P. A. Mahanwar, Pallavi Deshmukh, Sunil Sabharwal, and Shweta Umale, Recent Advances in Polymer Technolgy, (RAPT), UDCT, Jalgaon , 26-27, December 2009.

124. Synthesis of electron beam curable resin from Naturally occurring material, V. A. Bambole , P. A. Mahanwar, Merlin Thandu and Shweta Umale, Advances in Polymer Technology, (RAPT), UDCT, Jalgaon , 26-27, December 2009.

125. Conductive polymer - textile composites as cathode for battery application, V. A. Bambole and P.A.Mahanwar, Advances in Polymer Technolgy, (RAPT), UDCT,

Jalgaon , 26-27, December 2009.

126. Effect of particle size and concentration of filler on then properties of PEEK composites, V. A. Bambole, P. A.Mahanwar, Pradnya Dange, Sandeep Khairnar and Mohamad Rahil Parvez, Advances in Polymer Technolgy, (RAPT), UDCT, Jalgaon , 26-27, December 2009.
127. Biodegradable polymer composites, V.A.Bambole, P.A. Mahanwar, Aditya Kulkarni and Pournima Pahurkar, Advances in Polymer Technology, (RAPT), UDCT, Jalgaon , 26-27, December 2009.
128. Thermosetting acrylic emulsion for coating- A literature review, Abhijeet Satyanarayan, S.Joseph, V.A. Bambole and P.A. Mahanwar, "Paint India",59,12,, 2009
129. Novel insights into Polymer nanocomposites, Invited talk, V.A.Bambole, National Conference on Recent Trends in Chemical Sciences – 18 – 19 September 2014, Devchand College, Arjun Nagar, Kolhapur.
130. Molecular Electronics: "Unveiling futuristic technologies", Invited talk, V.A.Bambole, Indian Science Congress, 3 – 7 January 2015, Kalina Campus, University of Mumbai.
131. Recent Advances in Polymers for Electronic Applications, Invited talk, V.A.Bambole, National Conference "Macro Technevista" on theme "Recent Advances in polymer Science & Technology", V.A.Bambole, 23$^{rd}$ to 24$^{th}$ January 2015, LIT, Nagpur.
132. Microwave Absorbing and Magnetic Properties exhibited by Ni0.2 Co0.3 Zn0.5 Fe2 O4 Ferrite/polyaniline Nano composite, Ravindra N Kambalea, Lalit C Borde, K G Suresh, Vaishali Bambole, National Conference on Innovation in Nanomaterials and Nanotechnogy 2017, organized by Dept. of Phy.and Chem. RajaeshiShahu Arts, Commerce and Science College Pathri, Aurangabad, 21-22 January 2017.
133. Synthesis of Cobalt dopedNi-Zn Ferrite Nanoparticles and Study of its Magnetic and Microwave Absorption properties, Ravindra N. Kambale, Akhilesh K. Patel, K. G. Suresh, Sandeep Yadav, Vaishali Bambole, DAE Symposium, Dec 2017
134. Effects on Silicon Negative Ion Implantation in $SiO_2$, S.B. Vishwakarma, S.K Dubey, R.L Dubey, A.Yadav, V. Jadhav, V. Bambole, I. Sulania, F. Singh, P.K. Kulariya, D. Kanjilal; 62nd DAE Solid State Physics Symposium (DAE SSPS-2017). December 26-30 2017. Bhabha Atomic Research Centre, Trombay, Mumbai, India
135. Effect on charge recombination on Photoactivity and Antimicroal Property of Silver doped titanium dioxide photo catalyst, Ranjana Varma, Nirmala Thorat, Vaishali Bambole, Nainesh Patel, National Conference in Applied Sciences and Humanities (NCASH - 2018), Thakur College of Engineering & Technology, Mumbai, 23 & 24 Feb 2018

**Publication out of the Post-Doctoral Research work:**

1. Multi-channel photonic bandgap engineering in hyperbolic graded index materials embedded one-dimensional photonic crystals, Bipin K. Singh Vaishali Bambole, Vipul Rastogi, Praveen C. Pandey; Optics and Laser Technology,129 (2020) 106293 (Impact factor:2.18)
2. Photonic Band gap Consequences in One-dimensioal Exponential Graded Index Photonic Crystals, Bipin K Singh,Vaishali Bambole, Shubhashish Tiwari, Kaushal Shukla, Praveen Pandey, Vipul Rastogi, Optik, International Journal for light and Electron Optics,240,(2021),166854