**National Centre for Nanoscience and Nanotechnology**  
School of Nanosciences and Photonics  
University of Madras

<table>
<thead>
<tr>
<th></th>
<th>Name of the Department</th>
<th>National Centre for Nanoscience and Nanotechnology</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Year of establishment</td>
<td>2006</td>
</tr>
<tr>
<td>3</td>
<td>Is the Department part of a School/Faculty of the university?</td>
<td>Yes, School of Nanoscience and Photonics</td>
</tr>
<tr>
<td>4</td>
<td>Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt., etc.)</td>
<td>PG-M. Sc. Nanoscience and Nanotechnology and PhD</td>
</tr>
<tr>
<td>5</td>
<td>Interdisciplinary programmes and departments involved</td>
<td>YES (Physics, Chemistry and Biology, Biomedical)</td>
</tr>
<tr>
<td>6</td>
<td>Courses in collaboration with other universities, industries, foreign institutions, etc.</td>
<td>NIL</td>
</tr>
<tr>
<td>7</td>
<td>Details of programmes discontinued, if any, with reasons</td>
<td>YES-M.Tech (Nanoscience and Nanotechnology)-three years changes into two years master degree program</td>
</tr>
<tr>
<td>8</td>
<td>Examination System: Annual/ Semester/ Trimester/Choice Based Credit System</td>
<td>CBCS</td>
</tr>
<tr>
<td>9</td>
<td>Participation of the department in the courses offered by other departments</td>
<td>YES</td>
</tr>
</tbody>
</table>

**10. Number of teaching posts sanctioned, filled and actual (Professors/AssociateProfessors/Asst. Professors/others)**

<table>
<thead>
<tr>
<th></th>
<th>Sanctioned</th>
<th>Filled</th>
<th>Actual (including CAS &amp; MPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate Professors</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Asst. Professors</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11. Faculty profile with name, qualification, designation, area of specialization, experience and research under guidance

<table>
<thead>
<tr>
<th>Name</th>
<th>Qualification</th>
<th>Designation</th>
<th>Specialization</th>
<th>No. of Years of Experience</th>
<th>No. of Ph.D./M.Phil. students guided for the last 4 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. S. Balakumar</td>
<td>M.Sc., M.Phil., Ph.D.</td>
<td>Associate Professor &amp; Director i/c</td>
<td>Nanomaterials</td>
<td>18</td>
<td>6-pursuing</td>
</tr>
</tbody>
</table>

12. List of senior Visiting Fellows, adjunct faculty, emeritus professors

NIL

13. Percentage of classes taken by temporary faculty – programme-wise information

M.Sc – Nanoscience and Nanotechnology – 70%

14. Programme-wise Student Teacher Ratio (Based on the permanent and guest faculties-5)

<table>
<thead>
<tr>
<th>Programme</th>
<th>I year</th>
<th>II year</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Sc – Nanoscience and Nanotechnology</td>
<td>11:6</td>
<td>17:6</td>
</tr>
</tbody>
</table>

15. Number of academic support staff (technical) and administrative staff:

<table>
<thead>
<tr>
<th></th>
<th>Sanctioned</th>
<th>Filled</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Staff</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

16. Research thrust areas as recognized by major funding agencies

Nanobiotechnology Nanoelectronics and Nanosensors funded by CSIR, DST UGC and DRDO.
17. Number of faculty with ongoing projects from a) national b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.

<table>
<thead>
<tr>
<th>Name of the agency</th>
<th>Started year</th>
<th>Completed year</th>
<th>Total budget</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSIR (Joint Project with CLRI)</td>
<td>2010</td>
<td>2014</td>
<td>24 lakhs</td>
<td>On-going</td>
</tr>
<tr>
<td>NCNSNT Project</td>
<td>2011</td>
<td>2015</td>
<td>10 lakhs</td>
<td>On-going</td>
</tr>
<tr>
<td>UGC Major Research Project</td>
<td>2012</td>
<td>2015</td>
<td>12 lakhs</td>
<td>On-going</td>
</tr>
<tr>
<td>DRDO Project</td>
<td>2013</td>
<td>2016</td>
<td>15 lakhs</td>
<td>On-going</td>
</tr>
</tbody>
</table>

18. Inter-institutional collaborative projects and associated grants received

National collaboration - CLRI, IGCAR, DMRL and RRCAT

International collaboration – University of South Africa, South Africa

2. CINVESTEV, Mexico

3. Centre for High Pressure studies, Los Vegas, USA

4. Institute of Materials Research and Engineering, Singapore

<table>
<thead>
<tr>
<th>Name of the agency</th>
<th>Started year</th>
<th>Completed year</th>
<th>Total budget</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSIR (Joint Project with CLRI)</td>
<td>2010</td>
<td>2014</td>
<td>24 lakhs</td>
<td>On-going</td>
</tr>
<tr>
<td>DRDO Project on Fe3N (Joint Project with DMRL, Hyderabad)</td>
<td>2013</td>
<td>2016</td>
<td>15 lakhs</td>
<td>On-going</td>
</tr>
</tbody>
</table>

19. Departmental projects funded by CSIR, UGC, DRDO etc.; total grants received.

Rs. 54 lakhs

20. Research facility / centre with

National recognition: National Centre for Nanoscience and Nanotechnology
• State recognition
• National recognition
• International recognition

21. Special research laboratories sponsored by / created by industry or corporate bodies - Nil

22. Publications:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of papers published in peer reviewed journals (national / international)</td>
<td>93</td>
</tr>
<tr>
<td>2</td>
<td>Chapters in Books</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Edited Books</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Books with ISBN with details of publishers</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Citation Index – range / average</td>
<td>14.29</td>
</tr>
<tr>
<td>6</td>
<td>h-index</td>
<td>11</td>
</tr>
</tbody>
</table>

23. Details of patents and income generated

Awarded: 8, pending for approval in US: 2, Know-how-1)

6. High K artificial lattices for capacitor applications to use in CU or AL BEOL, Patent No. 6,830,971, December 14, 2004
8. Method of optical loss reduction for waveguides in electronic and optical components integration (PAT06-059/SPT-NDT-014), - Filed in US
9. Disclosure: Method of Controlling the Shape and Strain in SiGe or Ge Nanowires (Know – how- 2008)
10. High Speed Nanowires Semiconductor Devices based on Hetero structure and formation of such (Patent filed, 2007)

24. Areas of consultancy and income generated- Through the Central Instrumentation facilities, MHRD-Government of India and Tamilnadu government funding

25. Faculty selected nationally / internationally to visit other laboratories /institutions / industries in India and abroad

Invited talk on Epitaxial growth, 13th National Seminar on Crystal Growth, SSN College,
India, Jan 27-29, 2009

**Invited talk** on SiGe Substrates, National Seminar on Recent Advancements in Materials and Energy, Voorhees College, India, Jan 27-29, 2009

**Invited talk** on “Silicon Technology”, National Seminar on Crystal Growth, Alagappa University, Karaikudi

**Invited talk** on Introduction to Nanoelectronics, International Workshop on Nanotechnology and Instrumentation, 17-18th Sep, IIT, Madras

**Public Lecture** on Nanoscience and Nanotechnology, National Day Lecture, Periyar Science Centre, Chennai-25, India

**Invited lecture** on Power of Small, Vels University, 3rd November 2009

**Invited Lecture** in the Refresher Course on Nanoscience on “Role of CMP on Nanodevices”, during 11th November to 1st Dec 2009

**Invited Lecture** on Nanoelectronics and Nanoscopy, Tamilnadu Agricultural University, Coimbatore

**Invited Special Lecture** on “Application of Nanotechnology in Engineering and Medicine”, 11th Dec 2009 in SriRan Engineering College, Chennai

**Invited Lecture** on “Why Nano? What is Nano?” in Chennai Science Club on 2nd Jan 2010, CLRI, Chennai

**Invited Special Lecture** on “Introduction to Nano” at A.M. Jain College, 22nd Feb 2010,

**Invited Special Lecture** on Nature inspired Nanotechnology” at Guru Nanak Colleges, 27th Feb 2010.

**Invited lecture** on Recent trends in Si Nanotechnology, One Day Seminar on Recent Trends in Nanotechnology, Queen Mary’s College, Madras University on 3rd Feb 2010

**Invited lecture** for Teachers Training Institute on Social and Environmental Implications of Nanotechnology, 5th Feb 2010

**Invited lectures** on “Applications of Nanoelectronics Materials-1”, in Awareness programme on Nanotechnology, @7th-28th Feb 2010, Centre for Nanoscience and Nanotechnology, School of Physics, Bharathidasan University, Tamilnadu, India

**Invited lectures** on “Applications of Nanoelectronics Materials-II”, in Awareness programme on Nanotechnology, @7th-28th Feb 2010, Centre for Nanoscience and Nanotechnology, School of Physics, Bharathidasan University, Tamilnadu, India

**Invited lecture** on “Synthesis of Oxide nanomaterials” 3rd March 2010, International Conference on Nanoscience and Nanotechnology, Alagappa University, Karaikudi

**Invited lecture on**: Nano in Sports, 12th March 2010, National Workshop on Sports Technology and Sports Management, Sports University, Chennai

**Invited lecture** on Characterization of Nanomaterials : Powder X-ray diffraction, 23rd June 2010, Refresher Course on Nanosciences for Agriculture Scientists

**Invited lecture** on Physical Properties of Nanomaterials , 23rd June 2010, Refresher Course on Nanosciences for Agriculture Scientists

**Invited lecture** on Nature Nanotechnology, Symposium on Nanobiotechnology, July 25th, 2010, Chetinad Medical College, Kellapakkam, Chennai

**Invited lecture on**: Nanoscopy, Awareness Program on Nanoscience and Nanotechnology, 25th August 2010

**Invited lectures on Nanoscience**, Refresher Course on Solid State theory, Dept of theoretical Physics, University of Madras, 31th August 2010
Invited lectures on Nanomaterials, Refresher Course on Solid State theory, Dept of theoretical Physics, University of Madras, 1st September 2010

Invited lectures on Nanomaterials, Refresher Course on Condensed Matter Physics, University of Madras, 1st September 2010

Invited lectures on Nanophenomena, Refresher Course on Physics, Bharathiyar University, 12th Nov 2010

Invited lectures on Nature Nanostructures, Refresher Course on Physics, Bharathiyar University, 12th Nov 2010

Invited Lecture on Informal Nanoscience, National Conference on Nanosciences, 16th Nov 2010, SIT college, Chennai

Invited Lecture on Nano to Young Scientists, Winter Science Camp 2010 26th Dec 2010, Science City

Invited Lecture on Nanophenomena, National Conference on Nanoscience and Nanobiotechnology, 12th Jan 2011, Queen Mary’s College, Chennai

Invited lecture on Nanoscopy, National Workshop on Preparation and Characterization of Nanomaterials, April 2011

Invited lecture on Nanomaterials, Orientation Program for TRB Zoology teachers, 18th May 2011

Invited lecture on Nanomaterials, Orientation Program for TRB Biotechnology teachers, 20th May 2011

Invited lecture on Social and Ethical implications of Nanotechnology, NITTTRI, 18th Feb 2011

Invited Lecture on Si Nanowires for Nanoelectronics, Nanomeet 2011, Anna University, Chennai-25

Invited lecture on Nanomaterials, Orientation Program for TRB Zoology teachers, 18th May 2011

Invited lecture on Nanomaterials, Orientation Program for TRB Biotechnology teachers, 20th May 2011

Invited lecture on Nanomaterials, Orientation Program for TRB Biotechnology teachers, 20th May 2011

Invited lecture on Development in Nanoelectronics, 18th May 2011, Summer School on Physics, Department of Nuclear Physics, University of Madras, Chennai

Invited lecture on Nanoscience- Phenomena at Nanoscale, 16th August 2011, Refresher Course on Chemistry, Academic Staff College, Chennai

Invited lecture on Advanced Nanoelectronic Materials, 8th September 2011, Refresher Course on Biophysics, Centre for Advanced Studies in Crystallography and Biophysics, University of Madras, Chennai-25

Invited lecture on SPMs: A cluster of visualization techniques, Asian -Pacific workshop on Advanced Materials Characterization, 24th September 2011

Special Lecture on Recent trends in Application of Nanotechnology, Hindustan University, Chennai, 27th September 2011

Invited Lecture on “Phenomena at Nanoscale”, AICTE Faculty Development Program on Nanoscience, 20th Dec 2011, Anna University, Chennai

NAAC Reaccreditation - Evaluative Report
School of Nanoscience and Photonics
National Centre for Nanoscience and Nanotechnology

**Invited talk** on “Introduction to Nanomaterials” National conference on Recent trends in Nanoscience and Nontechnology, 19th Feb 2011, 10 -11am

**Invited talk** on “Nano and its applications”, National Seminar on Recent trends in nanoscience Science, R. V. College, Chegalpud, 19th Feb 2012, 2-3 pm

**Invited talk** on Nano for students, DST-Inspire Programme, J israelahem Engineering College, Chennai, 19th Feb 2012

**Invited talk** on “Metal oxide Nanomaterials for sensor and photocatalytic applications for :” International Conference on “ Recent Trends in Advanced Materials” 22nd February 2011, VIT University, Chennai

**Invited talk on “Multiferroic multifunctional Nanostructures**, Nanomeet 2012, 27th Feb 2012


**Invited talk** on Nano for students, DST-Inspire Programme, J israelahem Engineering College, Chennai, 5th March 2012

**Invited talk** on “Emerging Multifunctional Nanomaterials”, National Seminar on Advanced Materials 29-30, March 2012, Bharathiul University, Coimbatore


**Invited Talk in Summer School on Physical Sciences on “Physics of Nano”, June 2012, University of Madras, Chennai**

**Special lecture on Nanobiomaterials**, Department on Biomedical Engineering, Sathyabama University, Chennai

**Invited lecture** on Scanning Probe Techniques, National Workshop on Preparation, Characterization of Crystalline Materials and their applications, July 16th-17th, 2012, Anna University,

**Invited lecture on “On the Nanoscale Engineering of Multifunctional Nanomaterials”, 7th August 2012, UGC Refresher Course on New Nanomaterials for catalysis and sensor applications: physical chemistry perspectives, University of Madras, Chennai- 25

**Invited lecture on “Science at Small scale”, Summer School 2012- Higher Education for college and University teachers with a focus on teaching, research and administration, 6th July 2012, Academic Staff College, UNOM, Chennai-5

**Invited Lecture on Nanoscale Materials**, UGC Refresher Course on Physics, 24th August 2012, CAT in Biophysics and Crystallography, UNOM, Chennai


**Invited talk on Physics of Core shell Nanostructures**, 56th DAE-SSP2012, IIT, Bombay, 3-7 Dec 2012

**Invited lecture on Si Nanoelectronics**, Faculty Development Program, Dhanalkshmi College of Engineering, Tambaram, 15th Dec 2012

**Invited talk on Multifunctional Nanomaterials**, Indian Science Congress, 16th Dec 2012, KASC, Coimbatore

**Invited talk, on Bioglass**, International Workshop on Crystal Growth and Characterization, 22nd Dec 2012
NAAC Reaccreditation - Evaluative Report
School of Nanoscience and Photonics
National Centre for Nanoscience and Nanotechnology

**Invited talk on Successive growth of Nanosilver,** National Seminar on Crystal growth, 25th Dec 2012

**Invited talk on Multiferroics for Photocatalytic applications,** Second International Workshop on Nanomaterials, Anna University, Chennai-25

26. **Faculty serving in**

- Member of Board of Studies, Department of Physics (for Nanoscience and Nanotechnology), Queen Mary’s College, Chennai
- Member of Board of studies, Department of Physics and Nanotechnology, SRM University, Chennai
- Member, Advisory Board, Centre for Nanoscience and Nanotechnology, Gandhigram Rural University, Gandhigram-624 302, INDIA
- Member, Board of Studies, Centre for Nanoscience and Nanotechnology, Pondicherry Central University, Puducherry
- Technical Expert member for Centre for Nanoscience and Nanotechnology, Anna University
- Technical Expert to procure Major equipments, Crystal Growth Centre, Anna University, Chennai
- Technical External Expert to procure Nano related Equipments, CLRI, Chennai-25

27. **Conferences/ Symposiums/Summer School organized:**

- First National Summer Training School on Nanoscience and Nanotechnology, 10th May to 30th May, 2011, NCNSNT, Chennai.
- Exploring Nano-domain, NCNSNT, 9th Feb 2012
- Nano-revelation 2012, Science City
- Summer Training School on Nanoscience and Nanotechnology, 25th May to 14th June, 2012, NCNSNT, Chennai
- Symposium on Nanomedicine, ICMAT2013, 30th June to 5th July, Singapore
27. Faculty recharging strategies (UGC, ASC, Refresher / orientation programs, workshops, training programs and similar programs). Dr. Balakumar, NCNSNT served as Coordinator, Co-Coordinator and Co-Chair in the following the events.

- Refresher Course on Nanoscience, 11th Nov-2009 to 1st Dec 2009, National Centre for Nanoscience and Nanotechnology, Madras University, Chennai -25, India.
- Refresher Course on Nanoscience, 18th Nov-2009 to 8th Dec 2010, India.
- Refresher Course on Nanoscience, 7th Nov-2009 to 8th Dec 2011, India.
- Refresher Course on Nanoscience, 15th Nov-2012 to 5th Dec 2012, India

28. Student projects

Percentage of students who have done in-house projects including inter-departmental projects –2011 to 012 - 100%
2010 to 2011 - 70%

Percentage of students doing projects in collaboration with other universities / industry / institute – 2011 to 2012 – NIL
2010 to 2011-25% in CLRI and 25% in IIT Madras
29. **Awards / recognitions received at the national and international level by**

- **Faculty** –
  
  - IME Team Excellence Award on Nanowires project, 2008
  - IME Long Term Service award, 2007
  - IEEE Senior Membership Award, 2004
  - JSPS Fellowship, Japan 2000
  - STA Fellowship, 2001
  - NSTB Fellowship by Singapore A-Star -1997-1999
  - CUHK University fellowship (1995-97)
  - CSIR Research Fellowship to carry out Ph.D, 1994
  - CSIR Travel Award to attend IMf1993, USA
  - DST Full Travel Award to attend and Chair MRS 2009

- **Doctoral / post doctoral fellows** –
  
  - 1- DST inspire Fellowship
  - 1- Lady Tata Memorial Fellowship

- **Students** - NIL

30. **Seminars/ Conferences/Workshops organized and the source of funding (national / international) with details of outstanding participants, if any.**

  **(Details furnished in Appendix II).**

  **List of outstanding participants:**

  **Conference/Workshop/Seminar Organized in the Centre (MHRD/Tamil Nadu Govt)**

1. **Title** : National Workshop on Preparation and Characterization of Nanomaterials  
   **Date** : April 2011  
   **Funding source** : University of Madras

2. **Title** : First National Summer Training School on Nanoscience and Nanotechnology at NCNSNT, Chennai.  
   **Date** : 10th May to 30th May, 2011  
   **Funding** : Science City, Tamil Higher Education

3. **Title** : Exploring Nano-domain, NCNSNT,  
   **Date** : 9th Feb 2012  
   **Funding source** : University of Madras

4. **Title** : Second National Summer Training School on Nanoscience and Nanotechnology at NCNSNT, Chennai.  
   **Date** : 10th May to 30th May, 2012  
   **Funding** : Science City, Tamil Higher Education
5. Title: Nano-revelation 2012, Science City  
Date: 2012-2013  
Funding source: Science city

6. Title: Symposium on Nanomedicine, ICMAT2013, Singapore, Organized and Conducted at Suntec Singapore  
Date: 30th June to 5th July  
Funding: Singapore Materials Research Society

7. List of Refresher courses conducted in the Centre (UGC)  
First refresher course on Nanoscience  
Date: 11th Nov to 1st Dec 2009  
No. of participants: 80  
8. Second refresher course on Nanoscience  
Date: 18th Nov to 8th Dec 2010  
No. of participants: 80  
9. Third refresher course on Nanoscience  
Date: 8th Nov to 28th Dec 2011  
No. of participants: 51  
10. Fourth refresher course on Nanoscience  
Date: 15th Nov to 5th Dec 2012  
No. of participants: 41

List of summer training program conducted in the Centre (Science City, Tamil Nadu Higher Education)

11. First Summer Training School on Nanoscience and Nanotechnology,  
Date: 10th May to 30th May, 2011  
No. of participants: 50  
12. Second Summer Training School on Nanoscience and Nanotechnology,  
Date: 24th May to 14th June, 2012  
No. of participants: 56

Committee in Various Bodies

a) International Committee


b) National Committee

- Advisory Board Member, National Seminar on Crystal growth, Alagappa University, Chennai.
- TANU Nanoscience Centre Technical Committee member, 2009.
- BD University Nanoscience Centre expert committee member 2009-09-23.
- Subject Expert for Purchase Committee for Centre for Nanoscience and Nanotechnology, Anna University, Chennai-25.
• Subject Expert for Equipment Selection Committee, Crystal Growth Centre, Anna University, Chennai-25.
• Core Committee Member, National Centre for Nanoscience and Nanotechnology, Madras University, Chennai -05.
• Session Chair for Nanotechnology, International Conference on Biotechnology, 25th June 2010, SRM University, Kancheepuram
• Research Board Member, Research –Cell, Sriram Engineering College, Chennai
• Scientific Committee Member, Chennai Science Festival, 2012
• Scientific Advisory Board, National Workshop on Preparation, Characterization of Crystalline Materials and their applications, July 16th-17th,2012, Anna University,
• Scientific Advisory Board, National Seminar on Crystal Growth, Jan 2013
• Member, Research Committee, NCNSNT, Chennai-25
• Member, Academic Committee, NCNSNT, Chennai-25
• Coordinator for Basic Sciences, Chennai Science Festival -2013, Science City, Chennai-25

c) Editorial Boards
1. S. Balakumar Guest Editor, Proceedings for MRS Meeting on CMP, 2009, Springer publications
2. Guest Editors for the Special Issues: S. Balakumar ;Multifunctional Polymer Nanocomposites and their Applications, Journal of Advances in Condensed Matter Physics
3. S. Balakumar, Guest Editor for the ICMAT Proceedings to be published Proceedia Engineering, 2013

Board of Studies
• Member of Board of Studies, Department of Physics, KASC College (Autonomous), Coimbatore-29.
• Member of Board of Studies, Department of Physics ( for Nanoscience and Nanotechnology), Queen Mary’s College, Chennai
• Member of Board of studies, Department of Physics and Nanotechnology, SRM University, Chennai
• Member, Advisory Board, Centre for Nanoscience and Nanotechnology, Gandhigram Rural University, Gandhigram-624 302, INDIA
• Member, Board of Studies for Nanoscience and Nanotechnology, Pondicherry Central University,

31. Code of ethics for research followed by the departments -
UGC regulations on minimum standard and procedure for the award of M.Phil/Ph.D. degree – 2009 are followed.
### 32. Student profile programme-Wise:-

<table>
<thead>
<tr>
<th>Name of the Programme (refer to question no. 4)</th>
<th>Applications received</th>
<th>Selected Male</th>
<th>Selected Female</th>
<th>Pass percentage Male</th>
<th>Pass percentage Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Tech (2007-08)</td>
<td>500</td>
<td>6</td>
<td>6</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>M.Tech (2008-09)</td>
<td>440</td>
<td>9</td>
<td>8</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>M.Sc. (2009-10)</td>
<td>220</td>
<td>6</td>
<td>9</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>M.Sc. (2010-11)</td>
<td>91</td>
<td>4</td>
<td>8</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>M.Sc. NanoScience &amp; Nanotechnology (2011-12)</td>
<td>58</td>
<td>8</td>
<td>8</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>M.Sc. (2012-13)</td>
<td>69</td>
<td>4</td>
<td>12</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

### 33. Diversity of students

<table>
<thead>
<tr>
<th>Name of the Programme (refer to question no. 4)</th>
<th>% of students from the same university</th>
<th>% of students from other universities within the State</th>
<th>% of students from universities outside the State</th>
<th>% of students from other countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Sc - Nanoscience and Nanotechnology (2010-2012)</td>
<td>47.368% (9 students)</td>
<td>42.105% (8 students)</td>
<td>10.5% (2 students)</td>
<td>NIL</td>
</tr>
<tr>
<td>M.Sc - Nanoscience and Nanotechnology (2011-2013)</td>
<td>58.33% (7 students)</td>
<td>41.667% (5 students)</td>
<td>NIL</td>
<td>NIL</td>
</tr>
<tr>
<td>M.Sc - Nanoscience and Nanotechnology (2012-2014)</td>
<td>72.222% (13 students)</td>
<td>27.778% (5 students)</td>
<td>NIL</td>
<td>NIL</td>
</tr>
<tr>
<td>PhD</td>
<td>83.33% (5 students)</td>
<td>16.67% (1 student)</td>
<td>NIL</td>
<td>NIL</td>
</tr>
</tbody>
</table>

### 34. How many students have cleared Civil Services and Defence Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.

- **GATE**: 2

### 35. Student progression

<table>
<thead>
<tr>
<th>Student progression</th>
<th>Percentage against enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG to PG</td>
<td>-</td>
</tr>
<tr>
<td>PG to M.Phil.</td>
<td>15%</td>
</tr>
<tr>
<td>PG to Ph.D.</td>
<td>15%</td>
</tr>
<tr>
<td>Ph.D. to Post-Doctoral</td>
<td>-</td>
</tr>
<tr>
<td>Employed</td>
<td></td>
</tr>
<tr>
<td>- Campus selection</td>
<td></td>
</tr>
<tr>
<td>- Other than campus recruitment</td>
<td>80%</td>
</tr>
<tr>
<td>Entrepreneurs</td>
<td>5%</td>
</tr>
</tbody>
</table>
36. **Diversity of staff**

<table>
<thead>
<tr>
<th>Percentage of faculty who are graduates of the same university</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>from other universities within the State</td>
<td>100%</td>
</tr>
<tr>
<td>from universities from other States</td>
<td></td>
</tr>
<tr>
<td>from universities outside the country</td>
<td></td>
</tr>
</tbody>
</table>

37. **Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period**

   NIL

38. **Present details of departmental infrastructural facilities with regard to**

   a) Library - Yes
   b) Internet facilities for staff and students - Yes
   c) Total number of class rooms - 2
   d) Class rooms with ICT facility - 2
   e) Students’ laboratories - 1
   f) Research laboratories - 1

39. **List of doctoral, post-doctoral students and Research Associates : Enclosed**

   a) from the host institution/university

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Doctoral Student</th>
<th>Year of Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>S. Sathish</td>
<td>04.01.2012</td>
</tr>
</tbody>
</table>

   b) from other institutions/universities

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Doctoral Student</th>
<th>Year of Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>C. Ashok Raja</td>
<td>13.05.2013</td>
</tr>
</tbody>
</table>
40. **Number of post graduate students getting financial assistance from the university:**

<table>
<thead>
<tr>
<th>Name of the Programme</th>
<th>Students getting financial assistance</th>
</tr>
</thead>
</table>
| M.Sc - Nanoscience and Nanotechnology (2011-2013) | SC scholarship -2  
MBC scholarship -3  
BC Scholarship-2 |
| M.Sc - Nanoscience and Nanotechnology (2012-2014) | SC scholarship -5  
MBC scholarship -3  
BC Scholarship-2 |

41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.
   
   **NIL**

42. Does the department obtain feedback from
   
   a. **Faculty on curriculum as well as teaching-learning-evaluation?** If yes, how
      
      Yes. Feedback received from the faculties is placed before the Departmental Committee to revise the curriculum.
   
   b. **Students on staff, curriculum and teaching-learning-evaluation and how does the department utilize the feedback?**
      
      Yes, helps to develop a positive attitude and take up corrective measures
   
   c. **Alumni and employers on the programmes offered and how does the department utilize the feedback?**
      
      Yes, the department uses the feedback to modify courses

43. **List the distinguished alumni of the department (maximum 10)**
   
   Nil

44. **Give details of student enrichment programmes (special lectures / workshops /seminar) involving external experts.**

**List of monthly seminar series organized by the Centre**

<table>
<thead>
<tr>
<th>Program Title</th>
<th>Sponsor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nano-revelation 2012</td>
<td>Science city, Chennai - 25</td>
</tr>
</tbody>
</table>

Conductance of the program: Once in a month (Seminar series)
### Revelation No. | Theme of the Seminar | Status
---|---|---
2. | Nano construction (Assembling Nanomaterials) | 20.03.2012
6. | Nanomedicine, Biomaterials and Nanotoxicity | 17.08.2012
7. | Carbon Nanomaterials and their applications | 02.11.2012
8. | Sensing through Nano | 08.08.2013
9. | Nanotechnology for everyone and everything (pollution control, space, sports, defense etc) | 22-08-2013
11. | Novel nanomaterials ( nanoclay/nanocomposite, nanocoatings, thin films, core shells, nanopores, Zeolites, Nanosponges etc) | To be organized in November 2013

45. List the teaching methods adopted by the faculty for different programmes.
   Audio Visual Aids, Participatory Learning, Reading, Seminars, Group Discussions, Team Work, Peer group learning, Remedial Coaching, and Seminars by subject experts

46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?
   Continuous assessment tests, classroom interaction, internship training, projects, semester end results.

47. Highlight the participation of students and faculty in extension activities.

**International papers published by Scholars (2008-2013)**


NAAC Reaccreditation - Evaluative Report  
School of Nanoscience and Photonics  
National Centre for Nanoscience and Nanotechnology


Conference/Seminar/Workshop attended by Scholars/Students

2012-13

1. Fabrication of Bi$_{1-x}$Dy$_x$FeO$_3$ thin films by spin and dip coating techniques: A comparative study on the structural, morphological and optical properties, M. Sakar, K. Selva Shamili, S. Balakumar and S. N. Jaisankar, Nanomeet’13, 19-20th September 2013, Anna University, Chennai 25. (Best poster award)
2. Fabrication of PMMA/Bioglass monoliths and its mechanical properties, Durgalakshmi D., Nishitha A., Meenal K., Balakumar S., Nanomeet’13, 19-20th September 2013, Anna University, Chennai 25.


5. Comparison of two novel methods for the synthesis of ZnO Nanoparticles, S. Sathish, S. Balakumar, Nanomeet’13, 19-20th September 2013, Anna University, Chennai 25.


11. Observation of Substituent Concentration Dependent Multiferroicity in Bismuth Ferrite (BiFeO3) Nanostructures, Sakar Mohan, Balakumar Balakumar Subramanian, Indranil Bhaumik, Pradeep Kumar Gupta, Jaisankar Sellamuthu N., 7th International Conference on Materials for Advanced Technologies (ICMAT’13), 30th June to 5th July 2013, Suctec Singapore.

12. Surface Plasmon Induced Photodegradation of Toxic Pollutants in Water with Inorganic Semiconducto-Metal Core/Shell Nanostructures under Sunlight Irradiation, Ajay Rakkesh Rajendran, Sakar Mohan, Balakumar Subramanian, 7th International Conference on Materials for Advanced Technologies (ICMAT’13), 30th June to 5th July 2013, Suctec Singapore.
13. Phytochemical synthesis and Characterizations of Silver Nanoparticles using 
Fenugreek leaf extract, Ashokraja C. Naisini A., Durga M, and S. Balakumar,
ICONSAT’13, March 18-20, SRM University, Chennai.

Sathish and S. Balakumar, ICONSAT’13, March 18-20, SRM University, 
Chennai.

15. Development of Plasmon Sensitized Hybrid Nanostructures for Solar light driven 
photocatalytic energy conversation application” R. Ajay Rakkesh and S. 
Balakumar, 24th Annual General Meeting (AGM) of the Materials Research 
Society of India (MRSI) at IGCAR, Kalpakkam, during February 11-13, 2013.

16. “Photocatalytic efficiency of multiferroic bismuth ferrite nanoparticles for 
ergy applications” Sakar M and S. Balakumar, 24th Annual General Meeting 
(AGM) of the Materials Research Society of India (MRSI) at IGCAR, 
Kalpakkam, during February 11-13, 2013.

17. Observation of defect driven ionic conductivity in Gd doped Barium Cerate 
Nanostructures, S. Jayashree, M. Sakar and S. Balakumar, Second International 
Workshop on Advanced Functional Materials (SIWAN’13), January 2830th 
2013, Anna University, Chennai. (Best poster award)

18. Bandgap Engineering in ZnO Nanostructures by Substituting Transition Metal 
and Rare earth ions M. Sakar, N.V. Lakshmi and S. Balakumar, Second International 
Workshop on Advanced Functional Materials (SIWAN’13), January 2830th 
2013, Anna University, Chennai.

19. Development of Gadolinium doped Ceria Nanoparticles for SOFC Applications 
Durgalakshmi D, G. Karthik and S. Balakumar, Second International Workshop 
on Advanced Functional Materials (SIWAN’13), January 2830th 2013, Anna 
University, Chennai.

20. Effect of Capping Agents on The Synthesis Of Zinc Oxide Nanoparticles By 
Coprecipitation Method S.Sathish and S. Balakumar, Second International 
Workshop on Advanced Functional Materials (SIWAN’13), January 2830th 
2013, Anna University, Chennai.

21. Morphological Effect of Tungsten trioxide on Electrochromic properties by 
Hydrothermal Method, A. Tamilselvan and S. Balakumar, Second International 
Workshop on Advanced Functional Materials (SIWAN’13), January 2830th 
2013, Anna University, Chennai.

22. Core/Shell Nano-Structuring of Metal Oxide Semiconductors and their 
1512, 34 (2013)

23. Nano-Bioglass (NBG) for Bone Regeneration Applications -Preparation and its 
Characterization, D. Durgalakshmi, S. Balakumar, AIP Conf. Proc. 1512, 122 
(2013)

24. Evolution of Silver/Gold Triangular Nanoframes from Prismatic Silver/Gold 
Core/Shell Nanostructures and their SERS Properties, Parthiban P, Sakar M, 


29. Effect of Gold Chloride Concentration on Silver Triangular nano-platelets at Different HAuCl₄:Na₃C₆H₅O₇ Ratios, P. Parthiban, K. Sakar and S. **Balakumar**, National Seminar on Advanced Materials: Processing and Applications (NSAMPA-2012), 27th -30th March 2012 (Best Paper Award)

30. Effect of metal ion dopant on the Structural and Luminescence properties of ZnO nanostructures R. Vallikodi, R. Balaji, R. Baranidaran, R. Ajay Rakkesh and S. **Balakumar**, National conference on popularization of chemical sciences, Jan 2012, Gurunanak college, Chennai. (Best Paper Award)

31. Effect of Europium substitution on the Structural and Physical Properties of Nanostructured BiFeO₃, Tamilselvan A and S. Balakumar, in International Conference on Recent trends in Advanced Materials (ICRAM - 2012), VIT University, Vellore, India.

32. Structural, Electrical Transport and Optical Studies of Metal Ion Doped ZnO Nanostructures R. Ajay Rakkesh and S. **Balakumar**, International Conference on Advanced Material 2012, Loyola college, India.

2011


40. Low temperature synthesis of single phase Bismuth ferrite (BiFeO₃) nanocrystals by soft chemical method M. Sakar and S. Balakumar in “International workshop on Advanced Functional Nanomaterials” (Feb 21-24, 2011) at Anna University, India.


42. Fabrication and characterization of Ceria (CeO₂) Nanopowders, Rubini Rajakumar, M. Sakar, P. Manimuthu and S. Balakumar, in “International workshop on Advanced Functional Nanomaterials” (Feb 21-24, 2011) at Anna University, India.

43. Pure and Rare Earth (RE) doped single phase Bismuth ferrite (BiFeO₃) nanocrystals, M. Sakar, A. Jaya kumar, K. Saravana kumar and S. Balakumar in “National level conference on Materials for Applied Nanoscience & Nanotechnology Research - Nanomeet 2011” (March 7-8, 2011) at Anna University, India.

44. Fabrication of ZnO-TiO₂ core/shell nanostructures by low temperature solution phase method, R. Ajay Rakkesh and S. Balakumar in “National level conference on Materials for Applied Nanoscience & Nanotechnology Research - Nanomeet 2011” (March 7-8, 2011) at Anna University, India.


2010

48. Give details of “beyond syllabus scholarly activities” of the department.

- Students were actively participating in science exhibitions and explaining the role of nanoscience in day to day life to school and college students
- Getting internship training from industries and central laboratories
- Participating national and international sports meets
- Participating Chennai Science Festival to create awareness on Nanoscience among public
- Encouraging in social service activities

49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.

NIL

50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.

The Department is making the equipment available for carrying out research for students working under extramural category.

Students from many organizations were benefited by getting their characterizations and projects from this centre

51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.

**Strengths:**

- Streaming to reach out to students of different levels.
- Various projects has been given from the first year for understanding the nanoscience from hands on experience.
- Research: Six research scholar we actively doing research in various novel research topic in recent trends of nanosciences and students from outside colleges and universities were doing project studies in this centre.
Students obtaining various soft skill programme and leadership training programme.

**Weaknesses:**
- Shortage of staff

**Opportunities:**
- Faculty well equipped as external experts
- To organize seminars
- To train students to get better placement.

**Challenges:**
- Mixed ability groups in the classes

52. **Future plans of the department.**

It is proposed to increase the research facilities available and carry out research activity.

- Some action plans are in the process of being proposed to increase the research output by attracting more number of research students. Plans are ahead to increase the accommodation in the Department.

- PG diploma in Nanotechnology
  - 2 years M. Tech Program