




## Faculty Details proforma for DU Web-site

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cc: [director@ducc.du.ac.in](mailto:director@ducc.du.ac.in))

|                                             |                        |                                                                                               |                              |                          |      |                                                                                     |
|---------------------------------------------|------------------------|-----------------------------------------------------------------------------------------------|------------------------------|--------------------------|------|-------------------------------------------------------------------------------------|
| Title                                       | Prof./Dr./Mr./Ms./Mrs. | First Name                                                                                    | SHYAMA                       | Last Name                | RATH | Photograph                                                                          |
| Designation                                 |                        | Professor                                                                                     |                              |                          |      |  |
| Address                                     |                        | Office: P-24,<br>Department of Physics and Astrophysics,<br>University of Delhi, Delhi-110007 |                              |                          |      |                                                                                     |
| Phone No                                    | Office                 | +91-11- 27667155, 27667793                                                                    |                              |                          |      |                                                                                     |
|                                             | Residence              |                                                                                               |                              |                          |      |                                                                                     |
|                                             | Mobile                 |                                                                                               |                              |                          |      |                                                                                     |
| Email                                       |                        | srath@physics.du.ac.in                                                                        |                              |                          |      |                                                                                     |
| Web-Page                                    |                        | <a href="http://people.du.ac.in/~srath/">http://people.du.ac.in/~srath/</a>                   |                              |                          |      |                                                                                     |
| <b>Educational Qualifications</b>           |                        |                                                                                               |                              |                          |      |                                                                                     |
| Degree                                      |                        | Institution                                                                                   |                              |                          | Year |                                                                                     |
| Ph.D.                                       |                        | Indian Institute of Technology, Delhi                                                         |                              |                          | 1994 |                                                                                     |
| PG                                          |                        | Indian Institute of Technology, Kanpur                                                        |                              |                          | 1988 |                                                                                     |
| UG                                          |                        | Utkal University, Bhubaneswar                                                                 |                              |                          | 1986 |                                                                                     |
| <b>Career Profile</b>                       |                        |                                                                                               |                              |                          |      |                                                                                     |
| University of Delhi                         |                        | Professor                                                                                     | Feb, 2011-<br>date           | Teaching and Research    |      |                                                                                     |
| International Atomic Energy                 |                        | Consultant                                                                                    | Dec, 2017-<br>March, 2018    | Consultancy              |      |                                                                                     |
| University of Delhi                         |                        | Associate Professor                                                                           | Feb. 2008-<br>Feb, 2011      | Teaching and Research    |      |                                                                                     |
| Chulalongkorn University, Bangkok, Thailand |                        | Visiting Faculty                                                                              | Aug, 2013-<br>present        | Research                 |      |                                                                                     |
| University of Delhi                         |                        | Reader                                                                                        | Feb, 2005 to<br>Feb. 2008    | Teaching and research    |      |                                                                                     |
| I.I.T., Delhi                               |                        | Young Scientist<br>Principal Investigator                                                     | Oct-2002 to<br>February 2005 | Research project         |      |                                                                                     |
| St. Stephens College, Delhi                 |                        | Lecturer                                                                                      | Aug, 02 to<br>Sept, 02       | Teaching (Undergraduate) |      |                                                                                     |
| Univ of Surrey, U.K.                        |                        | Research Scientist                                                                            | Nov, 99 to July,<br>2002     | Post-doctoral Research   |      |                                                                                     |
| Imperial College, London, U.K.              |                        | Research Scientist                                                                            | Jan, 99 to Nov,<br>1999      | Post-doctoral Research   |      |                                                                                     |
| Univ. of Electro-communications, Tokyo      |                        | Research Scientist                                                                            | April 96 to<br>Sep, 1998     | Post-doctoral Research   |      |                                                                                     |
| I.I.T., Delhi                               |                        | Project Scientist                                                                             | May, 95 to<br>Apr, 96        | Research project         |      |                                                                                     |

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| <b>Administrative Assignments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| Member of various committees at the departmental and university, member of organizing committees of national and international conferences                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
| <b>Areas of Interest / Specialization</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| <p><u>Broad Area: Experimental Condensed matter physics</u></p> <ul style="list-style-type: none"> <li>(i) Fabrication and characterisation of semiconductor thin films/heterostructures/nanostructures</li> <li>(ii) Optical spectroscopy (Raman, photoluminescence, and spectroscopic ellipsometry)</li> <li>(iii) Metal oxide semiconductors: synthesis, optical and electrical properties</li> <li>(iv) Ion beam modification of materials</li> <li>(v) Optical sensing with porous Si and semiconductor nanoparticles</li> <li>(vi) Photon correlation metrology and quantum optics</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <b>Subjects Taught</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| <ol style="list-style-type: none"> <li>1. Atomic and Molecular Physics (M.Sc Final )</li> <li>2. Quantum Mechanics (M.Sc Previous)</li> <li>3. Nuclear and Particle Physics (M.Sc Final)</li> <li>4. Lasers and Spectroscopy (M.Sc Final)</li> <li>5. Experimental Solid State Physics (M.Sc Phys.)</li> <li>6. Introductory Physics (M.Tech in Nanoscience and Nanotechnology)</li> <li>7. Electromagnetic Theory (B.Sc)</li> <li>8. Waves and Optics (BSc)</li> <li>9. Waves and Optics Lab (M.Sc)</li> <li>10. B.Sc Physics Lab (M.Sc)</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| <b>Research Guidance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| <p>List against each head (If applicable)</p> <ol style="list-style-type: none"> <li>1. Supervision of awarded Doctoral Thesis: : 04</li> <li>2. Ongoing;04</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| <b>Publications Profile (last 5 years)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
| <ol style="list-style-type: none"> <li>1. <i>Optimization of the Concentration of Molybdenum Disulfide (MoS<sub>2</sub>) for Formation of Atomically Thin Layers</i>, Vineeta and Shyama Rath, <i>Springer Proceedings in Physics</i>, (accepted)</li> <li>2. <i>High-yield synthesis and liquid-exfoliation of two-dimensional belt like hafnium disulphide"</i> Harneet Kaur; Sandeep Yadav; Avanih Srivastava; Nidhi Singh; Shyama Rath; Jörg Schneider; Om Sinha; Ritu Srivastava, <i>Nano Research</i>, 343-353 <a href="https://doi.org/10.1007/s12274-017-1636-x">https://doi.org/10.1007/s12274-017-1636-x</a> (2018)</li> <li>3. One-step synthesis of Au-coated porous silicon as a surface enhanced Raman scattering substrate for biomolecule detection, Vijayarangamuthu Kalimuthu, Shyama Rath, , <i>Materials Letters</i>, Volume 204, pp. 115–119 (2017) <a href="https://doi.org/10.1016/j.matlet.2017.06.030">https://doi.org/10.1016/j.matlet.2017.06.030</a></li> <li>4. <i>Spectroscopic ellipsometry study of the free carrier absorption and bandgap of ZnO thin films: Effect of nonstoichiometry</i> C. Singh, S.Nozaki, and Shyama Rath <i>J. Appl. Phys.</i> 118 (2015) DOI: 10.1063/1.4935629</li> <li>5. <i>UV photoluminescence from nanocrystalline tin oxide synthesized by a one-step hydrothermal method</i> VijayarangamuthuKalimuthu Shyama Rath <i>Materials Letters</i>157(2015)11–14</li> <li>6. <i>Nanostructured tin oxide as a surface-enhanced- Raman-scattering substrate for detection of nitroaromatic compounds</i>, K.Vijayarangamuthu and Shyama Rath, <i>Int. J. Appl. Ceram. Technol.</i>, (2014) DOI:10.1111/ijac.12266</li> <li>7. <i>Nanoparticle size, oxidation state, and sensing response of tin oxide nanopowders using Raman spectroscopy</i> K. Vijayarangamuthu and Shyama Rath, <i>Journal of Alloys and Compounds</i> 610, 706 (2014),</li> </ol> |  |

8. *Effect of Thermal Annealing and Swift Heavy Ion Irradiation on the Optical Properties of Indium Oxide Thin Films*, Neeti Tripathi, and Shyama Rath, ECS Journal of Solid State Science and Technology, 3 (3) P21-P25 (2014)
9. *Facile synthesis of ZnO nanostructures and investigation of structural and optical properties*, Neeti Tripathi, and Shyama Rath, Materials Characterization. 86 263 (2013)
10. *Spectroscopic ellipsometry and multiphonon Raman spectroscopic study of excitonic effects in ZnO films*, Chaman Singh and Shyama Rath, J. Appl. Phys. 113 art. no. 163104 (2013)
11. *Antireflection properties of graphene layers on planar and textured silicon surfaces*, R. Kumar, A.K. Sharma, M. Bhatnagar, B.R. Mehta, S. Rath, Nanotechnology 24(16) 165402 (2013)
12. *Effect of Co doping and thermal annealing on the optical properties of tin oxide nanopowders*, K. Vijayarangamuthu and S. Rath, Appl. Phys. A doi 10.1007/s00339-013-7805-1 (2013)

#### Conference Organization/ Presentations (in the last three years)

##### Invited Talks:

- ❖ Micro-spectroscopic profiling of the layer-dependent optical properties of 2D materials, International Conference on Microscope and XXXIX Annual Meeting of Electron Microscope Society of India, Bhubaneswar July, 2018
- ❖ Spectroscopic characterization of wide bandgap oxide semiconductors, International Workshop on Advanced Materials and Device Technology November 22 - 24, 2017 (IWAMDT-2017) Anna University. Centre for International Affairs, Anna University, Chennai - 60002522-24 Nov., 2017
- ❖ Optoelectronic Device Parameters Of Wide Bandgap Semiconductors Determined By Spectroscopic Ellipsometry, 9th International Conference on Materials for Advanced Technologies, Singapore, June 2017
- ❖ Simultaneous determination of the optical and electrical properties of ZnO films using spectroscopic ellipsometry International Conference on Technologically Advanced Materials (ICTAM) and Asian Meeting on Ferroelectricity (AMF10) November, 2016
- ❖ Optical Spectroscopy as a diagnostic tool for microelectronic materials and devices Faculty Development Programme on Advances in Microelectronics and Plasma Diagnostics Delhi Technological University and IEEE EDS Delhi Chapter 2<sup>nd</sup> September, 2016
- ❖ Modulation of electronic and optical properties of 2D-semiconductors by ion beams "Ion Beam-Induced Spatio-temporal Structural Evolution of Matter: Towards New Quantum Technologies" from University of Torino, Italy International Atomic Energy Agency, Vienna 23 -27 May 2016
- ❖ Optical probes for device parameters of ZnO films Symposium, "Thin Film Processing and Devices" International Conference on Advanced Electroaterials, Jeju, Korea, Nov 2015
- ❖ *Higher Education and Social Enterprise* International seminar on "University Engagement" January 2015 at Srinakharinwirot University, Thailand, January 2015
- ❖ Effect of argon pressure on the structural and optical properties of rf-sputtered ZnO thin films: *Sojiphong Chatraphorn, Chaman Singh, Reena Goyal, Shyama Rath*, Siam Physics Congress 2015 May 2015, Thailand
- ❖ Modelling and experimental investigations of irradiation effects in Si radiation detectors Siam Physics Congress 2015 May 2015, Thailand
- ❖ Resource Person: Seminar on *Nanotechnology and Nanomaterial Overview*, July, 2014, Asian Institute of Technology, Thailand.
- ❖ Session Chair: Symposium Thin Film Processing and Devices, ICAE 2015, Nov 2015, Jeju, Korea

##### Conference Presentations:

1. *Effects of non-stoichiometry and Al-doping on the optical and electrical properties of ZnO thin films*, SIAM Physics Congress held in March, 2014 in Thailand

2. "Improvement in room temperature UV emission in sol-gel synthesized tin oxide nanoparticles by doping", *International Conference on Advanced Materials and Nanotechnologies*, Hanoi, Vietnam, December, 2012

**Research Projects (Major Grants/Research Collaboration)**

| <b>Research Projects:<br/>S.No</b> | <b>Name of Agency</b>                            | <b>Title of project</b>                                                                                                  | <b>Period of support</b> | <b>Completed/on-going</b> |
|------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------|
| 1.                                 | International Atomic Energy Agency, Vienna       | Utilization of Ion Accelerators for Studying and Modelling of Radiation Induced Defects in Semiconductors and Insulators | 2011-2016                | completed                 |
| 2.                                 | Defence Research Development Organisation, India | Synthesis & characterization of metal, metal-oxide, and polymeric substrates for detection of nitroaromatic compounds    | 2010-2012                | completed                 |
| 3.                                 | University Grants Commission, India              | Nanocrystalline porous silicon for optical biosensing                                                                    | 2008-2011                | completed                 |
| 4.                                 | Inter-University Accelerator Centre, India       | Swift heavy ion modification of In <sub>2</sub> O <sub>3</sub> films                                                     | 2008-2011                | completed                 |
| 5.                                 | Univ. of Delhi, R & D Grant,                     | Nanomaterials Research and Optical Metrology                                                                             | 2007-13                  | ongoing                   |

**Awards and Distinctions**

1. University Position in Physics Honours (Bachelor of Science) in Utkal University, India in 1986
2. National Scholarship by Ministry of Human Resource and Development, during Masters' course
3. Qualified JRF CSIR Fellowship 1988
4. Graduate Aptitude Test in Engineering (GATE) Fellowship in 1988
5. Monbusho Fellowship by Government of Japan in 1996
6. Royal Society, U.K.- Dept. of Science & Technology for *Indo-U.K. Networking Meetings* (April-May, 2004)
7. Funding under Japan Society for Promotion of Science –Indian National Science Academy Bilateral Collaboration (October-November, 2011)
8. Consultancy with International Atomic Energy Agency, Dec, 2017-2018

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| <b>Association With Professional Bodies</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>1. <i>Reviewer: American Institute of Physics, Institute of Physics, U.K., Elsevier, Springer. Taylor &amp; Francis Journals,, Japanese Journal of Applied Physics,</i></p> <p>2. Review Committee Member of NCERT Physics textbook for Class 12.</p> <p>3. Review Committee Member of NCERT Physics textbook Exemplar Problems in Physics for Class 11.</p> <p>4     <i>Memberships</i></p> <p>      Materials Research Society, India (Life Member)<br/>      Indian Laser Association (Life member)</p> |
| <b>Other Activities</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| ❖                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

Signature of Faculty Member

- You are also requested to also give your complete resume as a DOC or PDF file to be attached as a link on your faculty page.