Curriculum Vitae



Devaraju Gurram, PhD

: Colombo ESU Résidence, Via L Einaudi, Padova, Italy

: +39.3890103926

: g.devaraju@gmail.com & devaraju.gurram@unipd.it

RESEARCH AND ACADEMIC EMPLOYMENT

Post-Doctoral Fellow	**University of Padova, Italy**
April 2015-till date	Department of Physics and Astronomy
	Supervisor: Prof G Mattei
Lecturer	**IIIT Basar (RGUKT), Telangana State, India**
May 2014-April 2015	Department of Physics
Post-Doctoral Fellow	**University of Padova, Italy**
May 2013-April 2014	Department of Physics and Astronomy
	Supervisors: Prof G Mattei and Prof P Mazzoldi
Lecturer (Coordinator)	**Rajiv Gandhi University of Knowledge Technologies, Hyderabad, India**
April 2012-May 2013	Department of Physics
CSIR-SRF	**University of Hyderabad, India**
April 2010 – April 2012	School of Physics
	Supervisor: Prof A P Pathak
JRF	**University of Hyderabad, India**
Aug 2006-April 2010	School of Physics
	Supervisor: Prof A P Pathak
Teaching Assistant	**University of Hyderabad, India**
Aug 2009-July 2011	Department of Physics
	Under Prof Anand P Pathak
Assistant Professor	**Royal College of Engineering, Andhra Pradesh, India**
July 2004-Aug 2006	Department of Physics
Teaching Assistant	**Ramaiah's Institute for IIT training**
July 2001-Aug 2006	Supervisor: Dr Chukka Ramaiah
	New Nallakunta, Hyderabad

EDUCATION

Ph.D. (Physics) University of Hyderabad
April 2012 School of Physics,
Advisor: Prof A P Pathak
Thesis Title: ***Swift Heavy Ion induced effects in III- V Compound Semiconductors***

M.Sc. (Physics) University of Hyderabad
May 2003 School of Physics,
Advisor: Prof A P Pathak
Title: ***Rutherford Backscattering Spectroscopy Study of Channelling and Channelling Radiation at Stacking Faults***

B.Sc. (M.P.C) Bhavan's New Science College, OU, Hyderabad
April 2000 Department of Physics

SUMMARY OF POSTDOCTORAL RESEARCH WORK AT NANOSTRUCTURES GROUP, UNIVERSITY OF PADOVA, ITALY

- Improving efficiency of rare earth ions like Erbium ions which has got important applications in telecommunications by coupling with plasmonic and pre-plasmonic nanostructures of gold achieved by physical vapour deposition.

- Pre plasmonic involves Nanoclusters of gold with few atoms that has higher absorption cross section than Erbium ions which then resonantly couples and enhances emitter cross section.
- Plasmonic nanostructures involves gold nanoparticles where localized surface plasmons are non-radiative which couples with Erbium level and triggers luminescence of emitters.
- Erbium up conversion at 980 nm through propagating modes in plasmonic nanostructures.
- Energy transfer process depends on overlapping of orbitals. As the degree of decoupling increases Au hardly couples with Er ions leading to sensitization, and as such there is no radiative energy transfer in long range interactions. Energy transfer between Au and Er is short range by multipole-multipole interaction.

SUMMARY OF PHD RESEARCH DONE AT UNIVERSITY OF HYDERABAD, INDIA

My research experience includes knowledge of Materials Science and Accelerator for Ion- Solid interactions. Ion beams from accelerators have versatile uses at different energy regimes as a

probe, ion substitution and damage creation and annihilation. Depending on velocity of ion and target atomic number, ion interacts differently with target electrons and atoms as it traverses. As the deposited energy is enormous in short intervals (pico seconds), energy dissipation to its neighboring atoms or matrix depends on how strong is electron phonon coupling and its local density of states. Thus, thorough knowledge of atoms bonding, density, strain, defects, coupling constants and coordination numbers is important from materials point of view. Our study is more interdisciplinary science and involves collaborative research. In the process, learnt several advanced characterization techniques, and ready to adopt new challenges in new avenues.

Salient findings from my PhD thesis work is as follows

- Radiation resistant testing and tailoring band gap in High end advanced materials like InGaAs/InP and AlGaN/GaN hetero-structures and multi quantum wells

- Measurements on irradiated AlGaN/GaN multi quantum wells yield annihilation of defects and improved structural properties at moderate electronic energy loss and fluence. However, beyond threshold electronic energy loss at higher fluence deterioration of interfaces has been noticed.
- Post annealing process in InGaAs/InP multi quantum wells improves interface quality but changes strain which is correlated with the shift in band gap of 40 meV and 70 meV.
- Most important finding could be Yellow luminescence and Blue luminescence from Bulk GaN after ion beam bombardment by PL measurements and have been attributed to *N* and *Ga* vacancies, respectively.

- Synthesis of GaN nanoparticles at room temperature by magnetron sputtering. It is observed that GaN nanoparticles are radiation resistant.

PUBLICATIONS LIST

1. **Ion beam modification of strained InGaAs/InP characterized by HRXRD, PL and AFM**, G Devaraju , S. Dhamodaran , A P Pathak , G Sai Saravanan , J Gaca , M Wojcik ,A Turos , S A Khan , D K Avasthi , B M Arora, Nucl. Instr. and Meth. B, 266, 3552 (2008)

2. **Ion beam modification studies of InP based multi quantum wells,** S Dhamodaran, G Devaraju, A P Pathak, A Turos, D K Avasthi, R Kesavamoorthy, B M Arora, Nucl. Instr. and Meth. B, 266, 1810 (2008)
3. **Effects of swift heavy ion irradiation on band gap of strained AlGaN/GaN Multi Quantum Wells**, G Devaraju, N Sathish, A P Pathak, A Turos, M Bazzan, E Trave, P Mazzoldi, B M Arora,. Nucl. Instr. and Meth. B, 268, 3001(2010)
4. **Ion beam studies of multi-quantum wells of III-nitrides,** A P Pathak, G Devaraju , N Sathish, I Kyriakou, Vacuum, 84,1049 (2010)
5. **Synthesis of Ge nanocrystals by atom beam sputtering and subsequent rapid thermal annealing**, N Srinivasa Rao, A P Pathak, N Sathish, G Devaraju V Saikiran, P K Kulriya, D C Agarwal, G Sai Saravanan, D K Avasthi, Solid State Communications, 150, 2122 (2010)
6. **SHI induced re-crystallization of Ge implanted SiO_2 films,** N Srinivasa Rao, A P Pathak, N Sathish, G Devaraju , S A Khan, K Saravanan, B K Panigrahi, K G M Nair, D K Avasthi, Nucl. Instr. and Meth. B, 268, 11-12, 1741 (2010)
7. **Electronic stopping dependence of Ion beam induced modifications in GaN,** G Devaraju, A P Pathak, N Sathish, N Srinivasa Rao, V Saikiran, A I Titov, Nucl. Instr. and Meth. B, 269, 890 (2011)
8. **Growth and characterization of nc-Ge prepared by microwave annealing**, N Srinivasa Rao, A P Pathak, G Devaraju, V Saikiran, Vacuum, 85,927(2011)
9. **Photoluminescence and Photoluminescence excitation studies in 80 MeV Ni ions irradiated MOCVD grown GaN,** G Devaraju, A P Pathak, N Srinivasa Rao, V Saikiran, Francesco Enrichi, Enrico Trave, Nucl. Instr. and Meth. B, 269, 1925 (2011)
10. **Ion beam treated strained AlGaN/GaN multi quantum wells: HAADF- STEM, HRTEM, Raman and HRXRD characterizations,** G Devaraju, A P Pathak, N Srinivasa Rao, V Saikiran, D Wang, T Scherer, A K Mishra & C Kübel, Radiation Effects & Defects in Solids, 167, 612 (2012)
11. **Ion beam mixing effects in nearly lattice matched AlInN/GaN hetero structures by swift heavy ion irradiation,** G Devaraju, S V S Nageswara Rao, N Srinivasa Rao, V Saikiran, T K Chan, T Osipowicz, M B H Breese & A P Pathak, Radiation Effects & Defects in Solids, 167, 506 (2012)

12. **Effects of concentration and thermal annealing on the optical activation of Er implanted into GaN layers,** N Sathish, A P Pathak, G Devaraju, E Trave, P Mazzoldi, S Dhamodaran & V N Kulkarni, Radiation Effects & Defects in Solids,167, 512 (2012)
13. **Synthesis and Tailoring of GaN nanoparticles by RF magnetron sputtering at Room Temperature,** G Devaraju, A P Pathak, N Srinivasa Rao, V Saikiran, S V S Nageswara Rao & A I Titov, Radiation Effects & Defects in Solids, 167, 659 (2012)
14. **SHI irradiation induced effects in functionalized MWCNTs**, V Saikiran, A P Pathak, N Srinivasa Rao, G Devaraju, Joyashish Debgupta, I Kyriakou & D Emfietzoglou, Radiation Effects & Defects in Solids, 167, 569 (2012)
15. **Ion beam irradiation effects on Ge nanocrystals synthesized by using RF sputtering followed by RTA**, V Saikiran, N Srinivasa Rao, G Devaraju, G S Chang, A P Pathak, Nucl. Instr. and Meth. B, 315, 161 (2013)
16. **Formation of Ge nanocrystals from ion-irradiated GeO_2 nanocrystals by swift Ni ion beam**, V Saikiran, N Srinivasa Rao, G Devaraju, G S Chang, A P Pathak, Nucl. Instr. and Meth. B, 312, 1(2013)
17. **SHI irradiation fluence and energyloss dependence effects on Ge NCs with different initial sizes embedded in SiO2,** V Saikiran, N Srinivasa Rao, G Devaraju, A P Pathak, Nucl. Instr. and Meth. B, 323, 14 (2014)
18. **Ion beam studies of Hafnium based alternate high-k dielectric films deposited on silicon,** N Manikanthababu, T K Chan, A P Pathak, G Devaraju, N Srinivasa Rao, P Yang, M B H Breese, T Osipowicz, S V S Nageswara Rao, *Nucl. Instr. and Meth. B, 332, 389 (2014)*
19. **Energy-transfer from ultra-small Au nanoclusters to Er3+ ions: a short –range mechanism**, T Cesca, K Boris, N Michieli, C Maurizio, C Scian, G Devaraju, G Battaglin, P Mazzoldi ,G Mattei, , ***Phys. Chem. Chem. Phys.***, 2014,**16**, 15158-15163

CONFERENCE PROCEEDINGS

1. **Band Gap Engineering of Nano Scale AlGaN Epitaxial Layers by Swift Heavy Ion Irradiation**, N Sathish, G Devaraju, N Srinivasa Rao, A P Pathak, A Turos, S A Khan, D K Avasthi, E Trave and P Mazzoldi, ***MRS Symposium Proceedings, Vol 1181, 53 (2009)***

2. **Investigation of strain in AlGaN/GaN Multi Quantum Wells by complementary techniques**, G. Devaraju, N. Sathish, A. P. Pathak, S. Dhamodaran, J. Gaca, M. Wojcik, A. Turos, and B. M. Arora, ***AIP Conf. Proc. 1099, 353 (2009)***
3. **RBS,XRD, Raman and AFM studies of Microwave Synthesized Ge Nanocrystals**, N Srinivasa Rao, A P Pathak, G Devaraju, V Saikiran, S V S Nageswara Rao, *MRS Proceedings, 1354 (2011)*
4. **Ion Beams for synthesis and modification of nanostructures in semiconductors**, A P Pathak, N Srinivasa Rao, G Devaraju, V Saikiran and S V S Nageswara Rao, ***MRS Proceedings, 1354 (2011)***
5. **Structural Changes Induced by Swift Heavy Ion Beams in tensile strained Al $_{(1-x)}$In$_x$N /GaN Hetero-structures**, G Devaraju, A P Pathak, N Srinivasa Rao, V Saikiran, N Sathish and S V S Nageswara Rao, ***MRS Proceedings, 1354 (2011)***
6. **SHI effects on Ge+SiO_2 composite films prepared by RF sputtering**, N Srinivasa Rao, A P Pathak, N Sathish, G Devaraju, V Saikiran, ***AIP Conf. Proc, 1336*, 341 (2011)**
7. **Characterization of GeO_2 Nano crystals prepared by microwave annealing**, V Saikiran, N Srinivasa Rao, G Devaraju and A P Pathak, ***AIP Conf. Proc,1336, 264 (2011)***

ORAL PRESENTATIONS

- 24th International Conference on Atomic Collisions in Solids 2010 (ICACS 24-2010), Krakow-Poland.
- Materials Research Society Spring Meeting-2011, San Francisco, USA.

RANKS AT UNIVERSITY LEVEL

- 8th Rank at National Level Test-2001 for MSc (Physics), University of Hyderabad, India
- 7th Rank at National Level Test-2001 for MSc (Tech), National Institute of Technology, Warangal, India

RESEARCH EXPERIENCE

- **JRF in UFUP** project sanctioned to Prof A P Pathak from Aug 2006 to July 2008.
- **JRF in Center for Nano technology** from July 2008 to March 2010.
- **CSIR–SRF** from April 2010 to April 2012.

- Visiting scholar in **Prof Mazzoldi's Lab** at **University of Padova, Italy** from 28th Feb to 15th March, 2009.
- Visiting scholar in **Prof Mazzoldi's Lab** at **University of Padova, Italy** from 08.07.2010 to 17.07.2010
- Selected for **Research Fellowship in Science for Meritorious Students (RFSMS)** from Centre for Advanced studies sponsored by UGC at School of Physics, University of Hyderabad.
- Selected for **Young Researchers from India and Nepal**, **University of Padova**, **Italy** for the year 2013 & 2015.

RESEARCH TRAVEL GRANTS

- DST-PURSE grant at University of Hyderabad sanctioned funds to attend and present paper at 24th International Conference on Atomic Collisions in Solids (ICACS-24), Krakow-Poland.
- Selected for DST- Young scientist scheme to attend and present research work at Materials Research Society Spring Meeting (MRS)-2011, San Francisco, USA.

CONFERENCES/WORKSHOPS (INTERNATIONAL AND INTERNATIONAL)

- Workshop on Nanotechnology with ion beams and possible application, October 31st – November 1st 2006, IUAC-New Delhi.
- Attended workshop on "Advanced X-Ray Techniques for Characterization of Nano Materials (XTNM-2008)", February 27-29, 2008, DMRL, Hyderabad.
- 18th International Conference on Ion Beam Analysis (IBA 2007), September 23-28 2007, University of Hyderabad, Hyderabad.
- Material Characterization and surface modification in Research and Industry using ion Accelerator (MCIA) , March 31 to April 4, 2008, Institute of Physics (IOP), Bhubaneswar, India.
- Optoschool 2008**,** Tata Institute of Fundamental Research **(**TIFR**)**, Mumbai, July 27 to Aug 2 ,2008.
- Gallium Nitride: Growth, Characterization and Device applications, 13th June, 2008, GAETEC**,** Hyderabad.
- Workshop on Advanced simulations for ion beam analysis by IAEA and ICTP**,** 22–27 Feb., 2009, Trieste, Italy.

- 24th International Conference on Atomic Collisions in Solids, July 19-23, 2010, Krakow-Poland.
- Materials Research Society Spring Meeting-2011**,** April 24 - 29, 2011, San Francisco, USA.
- 50th International conference of Electron Microscopy**,** July 6 - 8, 2011, DMRL, Hyderabad.
- Frontiers in Physics, Oct. 27 - 28, 2011, School of Physics, University of Hyderabad.
- Plasmonica 2015, 1st to 3rd July 2015, Department of Physics and Astronomy, University of Padova, Italy
- 33rd Course of the International School of Atomic and Molecular Spectroscopy on " Nano-Optics: Principles enabling basic research and applications", 4th -19th July 2015, Erice, Italy

HANDS ON EXPERIENCE

- Physical Vapour Deposition
- High-Resolution X-ray Diffraction (HRXRD)
- Raman Spectroscopy
- Atomic Force Microscopy/Scanning Electron Microscopy (AFM/SEM)
- TEM Sample preparation
- Rutherford Backscattering Spectrometry (RBS)
- UV-VIS spectrophotometer

BASIC PROGRAMING SKILLS

- Mathematica
- MATLAB

PERSONAL DETAILS

Born on 01st Aug 1979
Brought up by Dr Chukka Ramaiah
Married to Swapna
Interested in Reading, travelling and listening to music

REFERENCES

Prof A P Pathak
School of Physics
University of Hyderabad
Hyderabad, INDIA
PIN-500046 Hyderabad
Phones: +91 40 23010181 / 23134316
Fax : +91 40 23010181 / 23010227
Email: anandp5@yahoo.com , appsp@uohyd.ernet.in
Web: http://sop.uohyd.ac.in/~appsp/

Prof G Mattei
Department of Physics and Astronomy
University of Padova
via Marzolo 8, I-35131 Padova, ITALY
Phone: +39.049.8277045
Fax : +39.049.8277003
E-mail: giovanni.mattei@unipd.it
Web: http://materia.fisica.unipd.it/nsg01/people/

Dr D K Avasthi
Scientist-H
Inter University Accelerator Center (IUAC)
Aruna Asaf Ali Marg
New Delhi, INDIA
Mobile No: +91 9818077001
Email: dka@iuac.res.in, dka4444@gmail.com