



Dr. Edmund P. Samuel

Post-Doctoral Fellow

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Experience

- May 2014 - June 2015 **Assistant Professor** at Materials Science and Engineering Department, Jimma University, **Jimma Ethiopia**
Taught 'Crystalline Structures', 'Electronic ceramic' to Ph.D. Ceramic Engineering.
- August 2011- March 2014 **Post Doctoral Fellow** at Optical Functional Materials Laboratory, Toyota Technological Institute, **Nagoya, Japan**
- August 2009- July 2011 **Scientist 'B'** in IACQER, Nanotechnology laboratory for optoelectronics and Biosensors, Ragu Engineering College, **Vishakhapatnam, India**
- October 2008- July 2009 Senior Research Fellow (Ext.) on CSIR One year project
- 2004-2007 Contributory Lecturer at Department of Electronics, North Maharashtra University, **Jalgaon, India**
Courses taught: Mathematical Methods in Electronics, Semiconductor Devices, Communications and Optoelectronics

Research Interest

- Graphene based Lithium battery simulation and materials modeling
- Photonic Crystal and optical fibers specially tellurite/phospho-tellurite microstructured optical fiber.
- GaN/AlGaN, ZnO/MgZnO, ZnO/CdZnO, and AlGaN/ZnO Heterostructure and Single quantum well, Multiple quantum well
- Optical properties and analysis of Quantum wires and Dots for GaN/AlGaN
- Maxwell equations (for optical properties), Kroning-Penny Model, Self Consistent Solution of Schrödinger and Poisson equations by Finite Difference Method and 6x6 Hamiltonian.

Academic Details

- 2008 **Doctor of Philosophy in Electronics**
North Maharashtra University, Jalgaon India
Thesis: *Development of Computer Simulation Tools for the Nitride Based Quantum Well Ultra Violet Laser Diodes*
Advisor: *Prof. D. S. Patil*
- 2003 **Master of Science in Electronics**
North Maharashtra University, Jalgaon India
63% First class
- 2000 **Bachelor of Science in Electronics,**
North Maharashtra University, Jalgaon India
62% First class

Expertise

- Working on Lithium Cobalt Oxide crystal structure using Density Functional Theory.
- Developed Simulation tools for optical properties by solving Maxwell equation for different heterostructure and quantum structures.
- Developed simulation tools using quasi transmitting boundary method (QTBM) for electrical properties of various quantum structures.
- Developed Self-consistent models using Finite difference method to realize various electrical characteristics of quantum well and multiple quantum well.
- Developing Simulation tools for Photonic crystal waveguide and biosensors
- Hamiltonian solution for electrical properties analysis of quantum wire
- Expert in developing various computer aided tools using MATLAB and 'C'. Hands on training of T-CAD
- Working on ZnO biosensor for Glucose detection

Computer Skills

Software: COMSOL, Material Studio, MATLAB, Origin, Mode Solution.

Languages: C

Operating Systems: Windows and LINUX.

Experimental Skills

- **Training Program on Thin Film Synthesis and Characterization Techniques** attended at **Centre for Nanoscience & Nanotechnology**, Sathyabama University, Chennai (**20th -21st February 2015**): Worked thoroughly on DC and

RF Sputtering, X-ray diffractometer, Atomic force Microscope and Field Emission Scanning Electron Microscope

- **Hands on Training to Fabricate MOS at CEN, IISc Bangalore (9th to 17th August 2010):** Worked on wet bench cleaning, Thermal evaporation with shadow mask, sintering, Characterization with Agilent 4155, Micro PL, RF sputtering, thickness measurement by Dektak Profilometer and Ellipsometer
- **Familiarization workshop on Nanofabrication technologies** attended at **IISc Bangalore (15th - 16th of April 2010):** Worked thoroughly on IV and CV characterization on Keithley

Publications

Journals : 22

National/International Conferences: 47

Journals:

1. D S Patil, Kanchan Talele, **E P Samuel**, Ulhas S Sonawane, “Self-consistent analysis of electron transport in GaN/AlGa_N super lattice nanostructure for light emission”, *Optik-International Journal for Light and Electron Optics*, Vol. 127, No. 18, pp.7374-7381, 2016 (IF~0.51)
2. Ulhas S Sonawane, **E P Samuel**, Chetan K Kasar, DS Patil, “Nanosimulation of electron confinement in cerium doped zinc oxide nanowire structure for light emitting devices”, *Optik-International Journal for Light and Electron Optics*, Vol. 127, No. 12, pp.4937-4940, 2016 (IF~0.51)
3. Tong Hoang Tuan, Edmund Samuel, Tonglei Cheng, Koji Asano, Takenobu Suzuki, Yasutake Ohishi, “Optical parametric amplification in dual-pumped tellurite hybrid microstructured optical fiber with engineered chromatic dispersion”, *Journal of Physics: Conference Series*, Vol. 619, No. 1, pp.012052, 2016 (IF~0.45)
4. D. Dinghuan, G. Weiqing, C. Tonglei, **E. Samuel**, T. Suzuki, Y. Ohishi, “Highly Efficient Fast Light Generation in a Tellurite Fiber Embedded in Brillouin Laser Ring Cavity”, *Photonics Technology Letters, IEEE*, Vol. 26, No.17, pp. 1758, 2014. (IF~2.176)
5. H. Badhane, **E. P. Samuel** and D. K. Gautam, “Influence of post annealing on sol–gel deposited ZnO thin films”, *Surface Review and Letters*, Vol. 21, No. 4, pp.1450046, 2014 (IF~0.367).
6. Ulhas S. Sonawane, **E.P. Samuel**, Ujwala Zope, D.S. Patil, “Analysis of electron confinement in GaN/Al_xGa_{1-x}N quantum wire nanostructure”, *Optik– International Journal for Light and Electron Optics*, Vol. 124, No. 9, pp.802-806, 2013 (IF~0.51).
7. K. Talele, **E. P. Samuel** and D. S. Patil, “Analysis of carrier transport properties in GaN/Al_{0.3}Ga_{0.7}N multiple quantum well nanostructures”, *Optik – International Journal for Light and Electron Optics* vol. 122 pp.626-630, 2011 (IF~0.51).

8. Ujwala Zope, **E.P. Samuel**, M.P. Bhole and D.S. Patil “Optical field distribution in ZnO/MgZnO quantum dot nanostructure at 375-nm wavelength” *Physica E*, 42(1), pp. 38-42, 2009 (IF~1.532).
9. H. Badhane, **E. P. Samuel** and D. S. Patil, “Peak Optical Gain at 377 nanometer and near field intensity in Zinc Oxide based quantum wells using electromagnetic theory”, *Journal of Electromagnetic Waves and Applications*, Vol. **23**, pp.351, 2009 (IF~2.965).
10. **E. P. Samuel**, D. S. Patil, “Analysis of properties of nitride based quantum well laser diode using Luttinger-Kohn Hamiltonian”, *Optoelectronics and Advanced Materials-Rapid communication*, Vol. **2**, No. 8, pp.498, 2008 (IF~0.304).
11. H. Badhane, **E. P. Samuel** and D. S. Patil, “Investigation of optical gain in ZnO/MgZnO quantum well incorporating piezoelectric polarization”, *Optoelectronics and Advanced Materials-Rapid communication*, Vol. **3**, No. 3, pp. 200, 2008 (IF~0.304).
12. K. Talele, **E. P. Samuel**, and D. S. Patil, “Investigation of Near Field Intensity in GAN MQW in 300-375 Nanometer Wavelength Ranges”, *Journal of Electromagnetic Waves and Applications*, Vol. **22**, pp.1122, 2008 (IF~2.965).
13. M. P. Bhole, **E. P. Samuel**, D. S. Patil, “Analysis of Near and Far field intensities in ZnO based heterostructure waveguides”, *J. of Modern Optics*, Vol. **55**, No. 9, pp.1427, 2008 (IF~1.17).
14. M. P. Bhole, **E. P. Samuel**, D. S. Patil, “Numerical Simulation of Optical Confinement in ZnO based Heterostructure Waveguide at 375 nm Wavelength”, *International J. of Modern Physics B*, Vol. **22**, No. 12, pp.1985, 2008 (IF~0.32).
15. Ujwala Zope, **E. P. Samuel**, D. S. Patil, “Optical confinement in GaN based quantum dot embedded heterostructure”, *Optoelectronics and Advanced Materials-Rapid communication*, Vol. **2**, No. 1, pp.4, 2008 (IF~0.304).
16. **E. P. Samuel**, D. S. Patil, “Analysis of Electron Confinement in Quantum Well Biased Laser Diode Using Transmitting Boundary Method”, *Optoelectronics and Advanced Materials-Rapid communication*, Vol. **1**, No. 12, pp.698, 2007 (IF~0.304).
17. **E. P. Samuel** and D. S. Patil, “Effect of Aluminum Mole Fraction and Well Width on the Probability Density Spreading in GaN/AlGaIn Quantum Well”, *Optoelectronics and Advanced Materials-Rapid communication*, Vol. **1**, No. 8, pp.394, 2007 (IF~0.304).
18. **E. P. Samuel**, Kanchan Talele, Ujwala Zope and D. S. Patil, “Semi-classical Analysis of Hole Capture in Gallium Nitride Quantum Wells”, *Optoelectronics and Advanced Materials-Rapid communication*, Vol. **1**, No. 5, pp. 221, 2007(IF~0.304).
19. S. A. Gaikwad, **E. P. Samuel**, D. S. Patil, D. K. Gautam, “Temperature Dependent Analysis of Refractive Index, Band gap and Recombination Coefficient in Nitride Semiconductor Lasers”, *Indian Journal of Pure and Applied Physics*, Vol. **45**, pp.238, 2007 (IF~0.763).
20. S. A. Gaikwad, **E. P. Samuel**, D. S. Patil and D. K. Gautam, “Theoretical analysis of effect of temperature on threshold parameters and field intensity in GaN material based heterostructure”, *Bulletin Material Science*, Vol. **30**, No.3, pp.255, 2007 (IF~0.88).
21. K. Talele, **E. P. Samuel**, and D. S. Patil, “Carrier Transport Studies and Scattering Mechanism in GaN/AlGaIn Superlattice for High Speed Lasers”, *Optoelectronics and Advanced Materials-Rapid communication*, Vol. **1**, No. 11, pp.576, 2007 (IF~0.304).

22. **E. P. Samuel**, M P Bhole and D S Patil, "Mode Confinement and Near Field Intensity Analysis in a GaN-based Blue-Green Laser Diode", *Semiconductor Science and Technology*, Vol. **21**, pp. 993, 2006 (IF~1.723).

Conferences:

1. T Cheng, TH Tong, **E P Samuel**, D Deng, X Xue, T Suzuki, Y Ohishi, "Broad and ultra-flat optical parametric gain in tellurite hybrid microstructured optical fibers", SPIE OPTO 2015
2. Hoang Tuan Tong, **Edmund Samuel**, Tonglei Cheng, Koji Asano, Zhongchao Duan, Takenobu Suzuki, and Yasutake Ohishi, "Ultra-flat and broadband optical parametric amplification in highly nonlinear tellurite hybrid microstructured optical fibers", Nonlinear Photonics held at Barcelona Spain during 27th-31st July 2014 pp JM5A.22
3. D. Deng, W. Gao, T. Cheng, **E. Samuel**, T. Suzuki, and Y. Ohishi, "Highly Efficient Fast Light Generation in a Single-mode Tellurite Fiber Embedded in a Brillouin Laser Ring Cavity," in CLEO: 2014, OSA Technical Digest (Optical Society of America, 2014), paper JTu4A.65
4. **Edmund Samuel**, Tong Hoang Tuan, Koji Asano, Takenobu Suzuki, Yasutake Ohishi, "Optical Parametric Gain of Tellurite/Phosphate Highly Nonlinear Optical Fiber", DCNET/ICE-B/OPTICS 2013: 407-411 (Doi 10.5220/0004610704070411)
5. **E.P. Samuel** and D. S. Patil, "Exploration of nanowire for optoelectronics devices", *International workshop on the Physics of Semiconductor Devices (IWPSD 2009)* held at Jamia Millia Islamia, New Delhi during 15th- 19th Dec. 2009 pp.733
6. **E. P. Samuel**, D. S. Patil, "Investigation of Piezoelectric on Optical Properties of Nitride Materials in Quantum heterostructure", *SAMPDA-2008*, held at YASHADA MD CENTRE, Pune, pp.118, 2008.
7. **E. P. Samuel**, "Development of Simulation Tools for Ultra-Violet GaN based Quantum Well Laser diode", *National Laser Symposium-2007* held at Vadodra during 17th -19th Dec. 2007 (Ph.D. Thesis Presentation), pp. 5, 2007.
8. **E. P. Samuel**, S. A. Gaikwad, K. Dhande, K. Bhole, M. Badhe, D. S. Patil, and D. K. Gautam, "Modal analysis and field confinement in Gallium Nitride based laser diode at 375 nanometer wavelength", *ICOT-2004*, held at North Maharashtra University, Jalgaon, pp.139, 2004.
9. **E. P. Samuel**, Kundan Dhande, Karuna Bhole, D. S. Patil, D. K. Gautam, "Effect of active layer thickness on the field confinement at different wavelengths for the blue laser diode", *National Laser Symposium-2003*, pp.201, 2003.
10. **E. P. Samuel**, M. P. Bhole, S. A. Gaikwad, D. S. Patil, D. K. Gautam, "Analysis of the GaN/AlGaN Single Quantum Well Ultraviolet Laser Diode", *National Laser Symposium-2005*, pp.146, 2005.
11. **E. P. Samuel** and D. S. Patil, "Computer Analysis of 670 nm strained Quantum Well Laser Diode", *C. V. Raman Memorial Seminar RMS-2006*, pp.14, 2006.
12. **E. P. Samuel**, D. S. Patil, "Analysis of Field Intensity and Electron Probability Density in Single Quantum Well Ultra Violet Laser Diode", *XXXII Optical Society of India Symposium-07*, held at Baroda, pp.106, 2007.
13. **E. P. Samuel**, D. S. Patil, "Intervalley Field Intensity Analysis of III-V Nitride Material Based Quantum Well Ultraviolet Laser Diode", *National Conference on Advances in Materials Science (AMS-2007)*, pp.16, 2007.
14. Ulhas Sonawane, U. Zope, **E. P. Samuel**, D. S. Patil, "Study of electron confinement in GaN/Al_{0.25}Ga_{0.75}N square shaped quantum Nano-wire", National Laser Symposium-2012.

15. Ujwala Zope, Ulhas Sonawane, **E. P. Samuel**, D. S. Patil, "Analysis of wave function and absorption in GaN based quantum dot nanostructures", *International Conference ICNB-2011*.
16. Sayali Patil, **E. P. Samuel**, D. S. Patil, "Information security in computer networks using random key for cryptography", *International Conference ICNB-2011*.
17. Ulhas Sonawane, **E. P. Samuel**, U. Zope, D. S. Patil, "study of probability density and electron wave distribution in GaN/AlGaIn quantum wire", *International Conference ICNB- 2011*.
18. Kanchan Talele, Ulhas Sonawane , **E.P. Samuel** and D.S. Patil, "Analysis of optical and electrical properties of superlattice nanostructure", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 17
19. H.P. Bhadane, **E.P. Samuel** and D.S. Patil, "Theoretical investigations of optical confinement in ZnO/MgZnO quantum well nanostructure at 375 nanometer wavelength", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 20
20. L. Nand Kumar, **E.P. Samuel**, Vandana G. , Enosh Lanell E. "MEMS: the most promising technology", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 95
21. Ujwala Zope, Ulhas Sonawane , **E.P. Samuel** and D.S. Patil, "Computer simulation of optical field intensities in quantum dot nanostructures", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 116
22. Ulhas Sonawane , **E.P. Samuel**, Kanchan Talele, Ujwala Zope, and D.S. Patil, "Investigation of electron properties in quantum wire nanostructure", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 130
23. Mradul Kumar, Rajdeep, P.S. R. Chowdary , **E.P. Samuel**, "Nanorobotics for biomedical applications: Proposal and Analysis", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 142
24. Pankaj Kumar Gautam, **E.P. Samuel**, R.S. Dubey, D. K. Gautam, "Analysis of spectral properties of one dimensional photonic crystal waveguide", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 145
25. Praveen Kumar, A. Vijay Kumar , **E.P. Samuel**, "Smarter mechatronic systems for automotive industry development", International conference on nanotechnology and biosensors (ICNB-2010) held at Raghu engineering college, Vishkhapatnam, during 20th -21st Jan. 2010, pp 175
26. Ulhas Sonawane , Kanchan Talele, **E.P. Samuel** and D. S. Patil, " Investigation of mole fraction dependence of Quantum wire using Kronig Penny model", *National Laser Symposium-2009*, held at BARC, Mumbai during 12th -16th 2010
27. Kanchan Talele, Ulhas Sonawane , **E.P. Samuel** and D. S. Patil, " Analysis of Electrical and Optical Properties of Superlattice Nanostructure" *National Laser Symposium-2009*, held at BARC, Mumbai during 12th -16th Jan 2010
28. Kanchan Talele, **E.P. Samuel** and D. S. Patil, "Effect of Applied Bias Voltage on the Threshold Current in III-V Quantum Well Nanostructures", international workshop on the Physics of Semiconductor Devices (IWPSD 2009) held at Jamia Millia Islamia, New Delhi during 15th- 19th Dec. 2009 pp.905

29. Kanchan Talele, **E. P. Samuel**, D. S. Patil, "Exploration of electron confinement and transport phenomena using transfer matrix method", accepted in International Conference on Transport and Optical Properties of Nanomaterials (ICTOPON2009), Allahabad, India.
30. Kanchan Talele, **E. P. Samuel**, D. S. Patil, "Analysis of Optical and Electrical Properties of Nitride based Superlattice Nanostructures at 375 Nanometer wavelength", *SAMPDA-2008*, held at YASHADA MD CENTRE, Pune, pp.119, 2008.
31. D. S. Patil, P. Kothawade, K. Dhande, K. Bhole, **E. P. Samuel**, S. A. Gaikwad and D. K. Gautam, "Field intensity analysis in Gallium Nitride based channel substrate planar blue laser diode", *ICOT-2004*, held at North Maharashtra University, Jalgaon, pp.125, 2004.
32. D. S. Patil, Kanchan Talele, **E. P. Samuel**, Ujwala Zope, "Analysis of wave function intensity in complex quantum structures of GaN/AlGaN", *ICQNM – 2007 held at Guadeloupe*, French Carribean, 2007.
33. Kailas Parande, **E. P. Samuel**, S. A. Gaikwad, D. S. Patil, "Estimation of electron and current density in GaN quantum well using Schrödinger model", *PHOTONICS-2006*, held at Hyderabad, pp.230, 2006.
34. Ujwala Zope, Kanchan Talele, **E. P. Samuel**, D. S. Patil, "Exploration of Near and Far field intensities in embedded quantum dot heterostructure at 375 nanometer wavelength", *PHOTONICS-2006*, held at Hyderabad, pp.229, 2006.
35. D. S. Patil, **E. P. Samuel**, N. D. Pawar, M. P. Bhole, D. K. Gautam, "Exploration of optical confinement in Gallium Nitride based blue laser diode at 507 nanometer wavelength", *National Laser Symposium-2003*, pp.199, 2003.
36. M. P. Bhole, **E. P. Samuel**, Arati Bhangale, S.A.Gaikwad, D. S. Patil, "Analysis of interface Phonon Modes in GaN/ZnO heterostructure for inter-sub band Lasers", *National Laser Symposium-2005*, pp.149, 2005.
37. Harshal Gajare, **E. P. Samuel**, D. S. Patil, D. K. Gautam, "Use of Transport Integrals for electron transport in nitride semiconductor", *NSAIE-2006*, held at Chopda, Dist. Jalgaon, pp.58, 2006.
38. Kanchan Talele, Ujwala Zope, **E. P. Samuel**, D. S. Patil, "Analysis of threshold current density in Quantum Cascade Lasers", *NSAIE-2006*, held at Chopda, Dist. Jalgaon, pp.60, 2006.
39. Ujwala Zope, Kanchan Talele, **E. P. Samuel**, D. S. Patil, "Error Analysis of various computational methods to obtain reliable solution of dynamic wave function in Quantum dots", *NSAIE-2006*, held at Chopda, Dist. Jalgaon, pp.61, 2006.
40. M. P. Bhole, **E. P. Samuel**, D. S. Patil, "Band gap engineering of $Mg_xZn_{1-x}O$ and $Cd_xZn_{1-x}O$ compounds for effective carrier confinement", *Recent Trends in Materials Science RTMS-2006*, M-7, 2006.
41. Harshala Gajare, **E. P. Samuel**, M. P. Bhole, D. S. Patil, D. K. Gautam, "Analysis of Physical Parameters in Gallium Nitride based Quantum Well laser Diode", *Advances in Electronic Materials and Devices AEMD-2006*.
42. Mangesh Patil, **E. P. Samuel**, Ujwala Zope, D. S. Patil, "Analysis of Carrier Density in Coupled Quantum Dot Laser Diode using Bessel Functions", *XXXII Optical Society of India Symposium-07*, held at Baroda, pp.118, 2007.
43. Gauri Kasar, **E. P. Samuel**, Ujwala Zope, D. S. Patil, "Analysis of Wave Function and Current Density in GaN/AlGaN Quantum Dot Laser Diode", *XXXII Optical Society of India Symposium-07*, held at Baroda, pp.116, 2007.

44. Rajshri S. Dhandar, **E. P. Samuel**, D. S. Patil, "Intervalley Field Intensity Analysis of III-V Nitride Material Based Quantum Well Ultraviolet Laser Diode", *XXXII Optical Society of India Symposium-07*, held at Baroda, pp.86, 2007.
45. V. K. Tomar, **E. P. Samuel**, D. K. Gautam, "Analysis of 1D Photonic Crystal for Enhancing Laser Action", *National Laser Symposium-2005*, pp.240, 2005.
46. Arti Bhangale, M. P. Bhole, **E. P. Samuel**, D. S. Patil, "Growth Kinetics of Zinc Oxide using Chemical Vapor Deposition for modern optoelectronics devices", Bilaspur
47. P S R Chowdary, Rahul Varma and **E. P. Samuel**, "Investigation of Deflection and Quality factor in Silicon Based MEMS", Accepted in DEVICE 2010.

Awards

- [1] Post doctoral fellowship at Toyota Technological Institute, Nagoya, Japan (August 2011-March 2014)
- [2] Council of Scientific and Industrial Research Fellowship (SRF Ext.) (1st Oct 2008-31st July 2009)
- [3] Second Best Paper Award in SAMPADA-2008

Memberships

- [1] Life member of Indian Laser Association (ILA).
- [2] Life Membership of Material Research Society of India (LMB1563).
- [3] Life member of Electron Microscopy Society of India.

References

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I hereby declare solemnly that all the information given above is true and to the best of my knowledge and belief.

Edmund P. Samuel