

Detailed CV

Name : Dr. Thirumaleshwara N Bhat

Educational Qualification : Ph D

Designation : DST-INSPIRE Faculty



Address for Correspondence: Department of Materials Science

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Research Areas : III-Nitride Semiconductors materials and Devices

Photovoltaic materials and Devices

Professional Teaching Experience : 4 Years (2016 – On going)

- 1) Semiconductors: Energy bands, effective mass. Direct and indirect band gaps. Donors and acceptors, carrier concentrations at thermal equilibrium. Crystal growth, Contact phenomenon, semiconductor-semiconductor, metal- semiconductor contacts, Schottky and Ohmic contacts.
- 2) Metals: Band structure- Brillouin zones, Wigner Seitz approximation. Energy wave vector curves. Brillouin zones relation with Bragg planes etc.
- 3) Fabrication of semiconductor devices: Fabrication of junctions, wafer preparation, monolithic IC masking, etching, elements of lithography.
- 4) Lasers and applications: Spontaneous emission, stimulated transitions, rate equation balance amplifications in a medium, population inversion methods, oscillation threshold, optical resonator theory.
- 5) Photovoltaic and solar cells: Material requirement, efficiency, efficiency limits, spectral response, types of solar cells- conventional tandemsolar cells, heterojunction solar cells etc.

Research Guidance (M.Phil. /Ph.D.):

Ongoing Registered Students' list

- 1) Ms. Shraddha C. H
- 2) Mr. NithinSalian

Research Projects (List)(if applicable)

Completed:

As Co-PI of the Project : (2013-2016) 3. Project Title :GaN based HEMTs on large area Silicon wafers. Institute of Materials Research & Engineering A*STAR Singapore.

Ongoing :

1. As PI of the project : (2018- Ongoing)
Project Title : Development of Flexible and Hybrid Monolithic Perovskite Solar Cells by Integrating with Multi-functional Chalcogenide layers for High Performance ; ECR Award Project funded by SERB, DST, Govt of India, Fund Amount ~ INR- 28 Lakhs.
2. As PI of the project : (2016- Ongoing)
Project Title : Design and fabrication of flexible CZTS photovoltaic cells with integration of solar concentrator for high performance; INSPIRE-Faculty Award Project funded by DST, Govt of India, Fund Amount ~ INR- 35 Lakhs.

Professional Collaboration(if applicable)

International: IMRE, ASTAR, Singapore

National : IIT, Jodhpur, IISc, Bangalore, MIT, Manipal

Research Journal Publications (list)

International

1. Adarsh Nigam, NeerajGoel, Thirumaleshwara N Bhat, Md. Tawabur Rahman, Surani Bin Dolmanan, QiquanQiao, SudhiranjanTripathy, Mahesh Kumar “Real time detection of Hg²⁺ ions using MoS₂ functionalized AlGa_N/Ga_N high electron mobility transistor for water quality monitoring” Sensors and Actuators: B. Chemical 309 127832 (2020).
2. Adarsh Nigam, Vijendra Singh Bhati, Thirumaleshwara N. Bhat, Surani Bin Dolmanan, SudhiranjanTripathy, and Mahesh Kumar “Sensitive and Selective Detection of Pb²⁺ Ions Using 2,5-Dimercapto-1,3,4-Thiadiazole Functionalized AlGa_N/Ga_N High Electron Mobility Transistor” IEEE Electron Device Letters 40 1976 (2019).
3. Adarsh Nigam, Thirumaleshwara N. Bhat, Vijendra Singh Bhati, Surani Bin Dolmanan, SudhiranjanTripathy, and Mahesh Kumar “MPA-GSH functionalized AlGa_N/ Ga_N High Electron Mobility Transistor based sensor for Cadmium ion detection” IEEE Sensors Journal 19 2863 (2019).

4. D. Sarkar, G. Sanjeev, T. N. Bhat, M. G. Mahesha “Effect of electron beam irradiation on thermally evaporated Ge₂Sb₂Te₅ thin films” *Journal of Optoelectronics and Advanced Materials* 20 84 (2018).
5. B K Pandey, T N Bhat, B Roul, K K Nanda and S B Krupanidhi “BTO/GaN heterostructure based on Schottky junction for high-temperature selective ultra-violet photo detection” *J. Phys. D: Appl. Phys.* 51 045104 (2018).
6. Adarsh Nigam, Thirumaleshwara N Bhat , SaravananRajamani, Surani Bin Dolmanan, SudhiranjanTripathy and Mahesh Kumar “Effect of self-heating on electrical characteristics of AlGaIn/ GaN HEMT on Si (111) substrate” *AIP Advances* 7, 085015 (2017).
7. Thirumaleshwara N Bhat, B K Pandey and S B Krupanidhi “Polarization-induced interfacial coupling modulations in BaTiO₃/GaN heterojunction devices” *J. Phys. D: Appl. Phys.* 50, 275101(2017).
8. S. Ghosh, S. Saha, Z. Liu, M. Motapothula, A. Patra, N. Yakovlev, Y. Cai, S. Prakash, X. H. Huang, C. B. Tay, C. X. Cong, T. Bhat, S. B. Dolmanan, J. Chen, W. Lü, Z. Huang, S. Tripathy, S. J. Chua, T. Yu, M. Asta, A. Ariando & T. Venkatesan “Origin and Quenching of Novel ultraviolet and blue emission in NdGaO₃: Concept of Super-Hydrogenic Dopant” *Sci. Reports* 6, 36352 (2016).
9. S. Arulkumaran, K. Ranjan, G. I. Ng, J. Kennedy, P. P. Murmu, T. N. Bhat and S. Tripathy “Thermally stable device isolation by inert gas heavy ion implantation in AlGaIn/GaN HEMTs on Si” *J. Vac. Sci. Technol. B* 34, 042203 (2016).
10. N. Dwivedi, R. J. Yeo, L. J. K. Yak, N. Satyanarayana, C. Dhand, T. N. Bhat, Z. Zhang, S. Tripathy, and C. S. Bhatia “Atomic Scale Interface Manipulation, Structural Engineering, and Their Impact on Ultrathin Carbon Films in Controlling Wear, Friction, and Corrosion” *ACS Appl. Mater. Interfaces*, 8 (27), 17606 (2016)
11. W. H. Tham, D. S. Ang, L. K. Bera, S. B. Dolmanan, T. N. Bhat, R. S. Kajen, H. R. Tan, S. L. Teo and S. Tripathy “Gold-free contacts on Al_xGa_{1-x}N/GaN high electron mobility transistor structure grown on a 200-mm diameter Si(111) substrate” *J. Vac. Sci. Technol. B* 34, 041217 (2016).
12. T. Partida-Manzanera, J. W. Roberts, T. N. Bhat, Z. Zhang, H. R. Tan, S. B. Dolmanan, N. Sedghi, S. Tripathy and R. J. Potter “Comparative analysis of the effects of tantalum doping and annealing on atomic layer deposited (Ta₂O₅)_x(Al₂O₃)_{1-x} as potential gate dielectrics for GaN/Al_xGa_{1-x}N/GaN high electron mobility transistors” *J. Appl. Phys.* 119, 025303 (2016).
13. W. H. Tham, D. S. Ang, L. K. Bera, S. B. Dolmanan, T. N. Bhat, V. K. X. Lin, and S. Tripathy “Comparison of the Al_xGa_{1-x}N/GaN Heterostructures Grown on Silicon-on-Insulator and Bulk Silicon Substrates” *IEEE Transactions on Electron Devices*, 63345 (2016).
14. W. H. Tham, L. K. Bera, D. S. Ang, S. B. Dolmanan, T. N. Bhat, and S. Tripathy “Al_xGa_{1-x}N/GaN MISHEMTs with a Common Gold-Free Metal Stack for Source/Drain/Gate” *IEEE Electron Device Letters* 361291 (2015).

15. B. Roul, M. Kumar, M. K. Rajpalke, T. N. Bhat and S. B. Krupanidhi “Binary group III nitride based heterostructures: Band offsets and transport properties” *Journal of Physics D: Applied Physics Topical Review*, 48423001 (2015)
16. Lwin Min Kyaw, Lakshmi Kanta Bera, Thirumaleshwara N. Bhat, Yi Liu, Hui Ru Tan, Surani Bin Dolmanan, Eng Fong Chor and Sudhiranjan Tripathy “Channel temperature measurements of $\text{In}_x\text{Al}_{1-x}\text{N}/\text{GaN}$ high electron mobility transistors on Si (111) using optical spectroscopy” *Journal of Vacuum Science and Technology B* 33 051203 (2015).
17. G. K. Dalapati, S. K. Batabyal, S. Masudy-Panah, Z. Su, A. Kushwaha, T. It Wong, H. F. Liu, T. Bhat, A. Iskander, Y.-F. Lim, L. H. Wong, S. Tripathy and D. Chi “Sputter grown sub-micrometer thick $\text{Cu}_2\text{ZnSnS}_4$ thin film for photovoltaic device application” *Materials Letters* 150 45 (2015).
18. Basanta Roul, Mahesh Kumar, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, S. B. Krupanidhi, Nitesh Kumar and A. Sundaresan, “Observation of Room Temperature Ferromagnetism in InN Nanostructures” *Journal of Nanoscience and Nanotechnology*, 6 4426 (2015)
19. W.Z. Wang, S.L. Selvaraj, K.T. Win, S.B. Dolmanan, T. Bhat, N. Yakovlev, S. Tripathy, and G.Q. Lo “Effect of Carbon Doping and Crystalline Quality on the Vertical Breakdown Characteristics of GaN Layers Grown on 200mm Silicon Substrates” *Journal of Electronic Materials* DOI:10.1007/s11664-015-3832-3(2015)
20. H. F. Liu, S. B. Dolmanan, T. N. Bhat, and S. Tripathy “Comment on “Determination of alloy composition and strain in multiple AlGaIn buffer layers in GaN/Si system” [Appl. Phys. Lett. 105, 232113 (2014)]” *Applied Physics Letters* 106, 176101 (2015)
21. S. Arulkumar, G. I. Ng, K. Ranjan, C. M. M. Kumar, S. C. Foo, K. S. Ang, S. Vicknesh, S. B. Dolmanan, T. Bhat and S. Tripathy “Record-Low Contact Resistance for InAlN/AlN/GaN HEMTs on Si with Non-Gold Metal” *Jap. J. Applied Physics* 54, 04DF12 (2015).
22. L. M. Kyaw, Y. Liu, M. Y. Lai, T. N. Bhat, H. R. Tan, P. C. Lim, S. Tripathy and E. F. Chor “Effects of Annealing Pressure and Ambient on Thermally Robust RuOx Schottky Contacts on InAlN/AlN/GaN-on-Si(111) Heterostructure” *ECS Transactions* 66(1), 249(2015)
23. L. M. Kyaw, L. K. Bera, Y. Liu, M. K. Bera, S. P. Singh, S. B. Dolmanan, H. R. Tan, T. N. Bhat, E. F. Chor, and S. Tripathy “Probing channel temperature profiles in $\text{Al}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$ high electron mobility transistors on 200mm diameter Si(111) by optical spectroscopy” *Applied Physics Letters*, 105, 073504 (2014).
24. S. Tripathy, L. M. Kyaw, S. B. Dolmanan, Y. J. Ngoo, Y. Liu, M. K. Bera, S. P. Singh, H. R. Tan, T. N. Bhat, and E. F. Chor “ $\text{In}_x\text{Al}_{1-x}\text{N}/\text{AlN}/\text{GaN}$ High Electron Mobility Transistor Structures on 200 mm Diameter Si(111) Substrates with Au-Free Device Processing” *ECS Journal of Solid State Science and Technology*, 3 (5) Q84-Q88 (2014).

25. T.N. Bhat, S. B. Dolmanan, Y. Dikme, H. R. Tan, L. K. Bera, and S. Tripathy "Structural and optical properties of Al_xGa_{1-x}N/GaN high electron mobility transistor structures grown on 200 mm diameter Si (111) substrates" *Journal of Vacuum Science Technology B*, 32, 021206 (2014).
26. Mohana K. Rajpalke, BasantaRoul, Thirumaleshwara N. Bhat, Mahesh Kumar, Neeraj Sinha, V. M. Jali, and S. B. Krupanidhi, "Effects of growth temperature on nonpolar a-plane InN grown by molecular beam epitaxy" *Physica Status Solid (c)* 10, 409 (2014).
27. L. M. Kyaw, S. B. Dolmanan, M. K. Bera, Y. Liu, H. R. Tan, T. N. Bhat, Y. Dikme, E. F. Chor, and S. Tripathy "Influence of RuO_x Gate Thermal Annealing on Electrical Characteristics of Al_xGa_{1-x}N/GaN HEMTs on 200mm Silicon" *ECS Solid State Letters*, 3 (2) Q5-Q8 (2014).
28. L. K. Bera, W. H. Tham, R. S. Kajen, S. B. Dolmanan, M. Krishna Kumar, V. K. X. Lin, D. S. Ang, T. N. Bhat, N. Yakovlev, and S. Tripathy "Effect of Ge Diffusion on Al_xGa_{1-x}N/GaN High Electron Mobility Transistors on a Thin Silicon-On-Insulator", *ECS Solid State Letters*, 2 (12) Q105-Q108 (2013).
29. Thirumaleshwara N. Bhat, Mohana K. Rajpalke, BasantaRoul, Mahesh Kumar and S. B. Krupanidhi "Impact of substrate nitridation on the photoluminescence and photovoltaic characteristics of GaN on p-Si(100) by molecular beam epitaxy" *Journal of Materials Science: Materials in Electronics*, 24, 3371(2013).
30. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, and S. B. Krupanidhi "Study of InN nanorods growth mechanism using ultrathin Au layer by plasma-assisted MBE on Si(111)" *Applied Nanoscience*, 4121 (2013).
31. Mahesh Kumar, BasantaRoul, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, A. T. Kalghatgi, and S. B. Krupanidhi "Electrical transport studies of MBE grown InGaN/Si isotype heterojunctions" *Current Applied Physics*, 13, 26 (2013).
32. Thirumaleshwara N Bhat, BasantaRoul, Mohana K Rajpalke, Mahesh Kumar, and S B Krupanidhi "Spectroscopic studies of In₂O₃ nanostructures; photovoltaic demonstration of In₂O₃/p-Si heterojunction" *Journal of Nanoscience and Nanotechnology*, 13, 498 (2013).
33. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, and S. B. Krupanidhi "Substrates impact on growth of InN nanostructures by droplet epitaxy" *Physica Status Solid (c)* 10, 409 (2013).
34. Mohana K Rajpalke, Mahesh Kumar, BasantaRoul, Thirumaleshwara N Bhat, and S B Krupanidhi "Molecular beam epitaxial growth of (1 1 -2 2) GaN on m-plane sapphire" *Physica Status Solid (c)* 10, 381 (2013).
35. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, and S. B. Krupanidhi "Structural characterization and ultraviolet photoresponse of MBE grown GaN nanodots" *Applied Physics Express* 5, 085202 (2012).

36. Mahesh Kumar, Thirumaleshwara N Bhat, Mohana K Rajpalke, BasantaRoul, A T Kalghatgi, and S B Krupanidhi "Indium flux, growth temperature and RF power induced effects in InN layers grown on GaN/Si substrate by plasma-assisted MBE" *Journal of Alloys and Compounds* 513, 6 (2012).
37. Mahesh Kumar, Thirumaleshwara N. Bhat, BasantaRoul, Mohana K. Rajpalke, A. T. Kalghatgi, and S. B. Krupanidhi "Carrier concentration dependence of donor activation 10 energy in n-type GaN epilayers grown on Si (111) by plasma-assisted MBE" *Materials Research Bulletin* 47, 1306 (2012).
38. Mahesh Kumar, Mohana K. Rajpalke, BasantaRoul, Thirumaleshwara N. Bhat, A. T. Kalghatgi, and S. B. Krupanidhi "Determination of MBE grown wurtzite GaN/Ge₃N₄/Ge heterojunctions band offset by X-ray photoelectron spectroscopy" *Physica status solidi (b)* 249, 58 (2012).
39. Mahesh Kumar, BasantaRoul, Thirumaleshwara N Bhat, Mohana K Rajpalke, A T Kalghatgi, and S B Krupanidhi "Band-structure lineup at In_{0.2}Ga_{0.8}N/Si heterostructures by x-ray photoelectron spectroscopy" *Japanese Journal of Applied Physics* 51, 020203 (2012).
40. Mahesh Kumar, BasantaRoul, Thirumaleshwara N Bhat, Mohana K Rajpalke, A T Kalghatgi, and S B Krupanidhi "Valence band offset at GaN/ β -Si₃N₄ and β -Si₃N₄/Si(111) heterojunctions formed by plasma-assisted molecular beam epitaxy" *Thin Solid Films* 520, 4219 (2012).
41. Mahesh Kumar, BasantaRoul, Thirumaleshwara N Bhat, Mohana K Rajpalke, A T Kalghatgi, and S B Krupanidhi "Carrier transport studies of III-nitride/Si₃N₄/Si isotype heterojunctions" *Physica Status Solid (a)* 209, 994 (2012).
42. BasantaRoul, Thirumaleshwara N Bhat, Mahesh Kumar, Mohana K Rajpalke, A T Kalghatgi, and S B Krupanidhi "Analysis of the temperature-dependent current-voltage characteristics and the barrier-height inhomogeneities of Au/GaN Schottky diodes" *Physica Status Solid (a)*, 209, 1575 (2012).
43. BasantaRoul, Mohana K Rajpalke, Thirumaleshwara N Bhat, Mahesh Kumar, A T Kalghatgi, and S B Krupanidhi "Influence of GaN underlayer thickness on structural, electrical and optical properties of InN films grown by PAMBE" *Journal of crystal growth*, 354, 208 (2012).
44. BasantaRoul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, A. T. Kalghatgi, and S. B. Krupanidhi "Effect of carrier concentration of InN on the transport behavior of InN/GaN heterostructure based Schottky junctions" *Solid State Communications*, 152, 1771 (2012).
45. Mohana K. Rajpalke, Thirumaleshwara N. Bhat, BasantaRoul, Mahesh Kumar, and S. B. Krupanidhi "Current transport in nonpolar a-plane InN/GaN heterostructure Schottky junction" *Journal of applied Physics*, 112, 023706 (2012).
46. Mahesh Kumar, BasantaRoul, Arjun Shetty, Mohana K Rajpalke, Thirumaleshwara N Bhat, A T Kalghatgi, and S B Krupanidhi "Temperature

dependence of carrier transport in InN quantum dots grown by droplet epitaxy on silicon nitride/Si substrate” Applied Physics Letters 99, 153114 (2011).

47. Mahesh Kumar, Mohana K. Rajpalke, BasantaRoul, Thirumaleshwara N. Bhat, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “The impact of ultra thin silicon nitride buffer layer on GaN growth on Si (111) by RFMBE” Applied Surface Science 257, 2107 (2011).

48. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “Kinetics of self-assembled InN quantum dots grown on Si (111) by plasma-assisted MBE” Journal of Nanoparticle Research 13, 1281 (2011).

49. Mahesh Kumar, Mohana K. Rajpalke, BasantaRoul, Thirumaleshwara N. Bhat, P. Misra, L. M. Kukreja, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “Temperature dependent photoluminescence of GaN grown on β -Si₃N₄/Si(111) by plasma-assisted MBE”, Journal of Luminescence 131, 614 (2011).

50. Mahesh Kumar, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, BasantaRoul, Neeraj Sinha, A. T. Kalghatgi and S. B. Krupanidhi “Negative differential capacitance in n-GaN/pSi heterojunction” Solid State Communications 151, 356 (2011). 11

51. Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, BasantaRoul, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “Growth of InN layers on Si (111) using ultra thin silicon nitride buffer layer by NPA-MBE” Materials Letters 65, 1396 (2011).

52. Mahesh Kumar, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, BasantaRoul, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “Study of band offsets in InN/Ge heterojunctions” Surface Science 605, L33 (2011).

53. Mahesh Kumar, Mohana K. Rajpalke, BasantaRoul, Thirumaleshwara N. Bhat, S. Dash, A. K. Tyagi, A. T. Kalghatgi, and S. B. Krupanidhi “Reduction of oxygen impurity at GaN/ β Si₃N₄/Si interface via SiO₂ to Ga₂O conversion by exposing of Si surface under Ga flux” Journal of crystal growth 327,284 (2011).

54. Mahesh Kumar, BasantaRoul, Thirumaleshwara N Bhat, Mohana K Rajpalke, A. T. Kalghatgi, and S. B. Krupanidhi “Barrier inhomogeneity and electrical properties of InNnanodots/Si heterojunction diodes” Journal of Nanomaterials 2011, 189731 (2011).

55. Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, BasantaRoul, A. T. Kalghatgi, and S. B. Krupanidhi “Size dependent band gap of MBE grown InN quantum dots measured by scanning tunneling spectroscopy” Journal of Applied Physics 110, 114317 (2011).

56. Mahesh Kumar, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, BasantaRoul, A. T. Kalghatgi, and S. B. Krupanidhi “Transport and infrared photoresponse properties of InNnanorods/Si heterojunction” Nanoscale Research Letters 6, 609 (2011).

57. Mohana K. Rajpalke, Thirumaleshwara N. Bhat, BasantaRoul, Mahesh Kumar, P. Misra, L. M. Kukreja, Neeraj Sinha and S. B. Krupanidhi “Growth temperature induced effects in nonpolar a-plane GaN on r-plane sapphire substrate by RF-MBE”, *Journal of crystal growth* 314, 5 (2011).

58. BasantaRoul, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, Mahesh Kumar, Neeraj Sinha, A. T. Kalghatgi and S. B. Krupanidhi “Temperature dependent electrical transport behavior of InN/GaNheterostructure based Schottky diodes” *Journal of applied Physics* 109, 044502 (2011)

59. Mohana K. Rajpalke , BasantaRoul, , Mahesh Kumar, Thirumaleshwara N. Bhat, Neeraj Sinha and S. B. Krupanidhi “Structural and optical properties of nonpolar (1 1-2 0) a-plane GaN grown on (1 -1 0 2) r-plane sapphire substrate by plasma-assisted molecular beam epitaxy” *ScriptaMaterialia* 65, 33 (2011).

60. Thirumaleshwara N. Bhat, Mahesh Kumar, Mohana K. Rajpalke, BasantaRoul, Neeraj Sinha, and S. B. Krupanidhi “Band alignment in InN/p-Si(100) heterojunction determined by x-ray photoelectron spectroscopy” *Journal of AppliedPhysics* 109, 123707 (2011).

61. Thirumaleshwara N. Bhat, Mohana K. Rajpalke, BasantaRoul, Mahesh Kumar, Neeraj Sinha, and S. B. Krupanidhi “Evidence for ambient oxidation of Indium nitride quantum dots” *physica status solidi (b)* 248, 2853 (2011).

62. BasantaRoul, Thirumaleshwara N. Bhat, Mahesh Kumar, Mohana K. Rajpalke, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “Barrier height inhomogeneities in InN/GaNheterostructure based Schottky junctions” *Solid State Communications* 151, 1420 (2011).

63. BasantaRoul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, Neeraj Sinha, A. T. Kalghatgi and S. B. Krupanidhi “Effect of N/Ga flux ratio on transport behavior of Pt/GaN Schottky diodes” *Journal of Applied Physics* 110, 064502 (2011).

64. BasantaRoul, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, Mahesh Kumar, A. T. Kalghatgi, S. B. Krupanidhi, Nitesh Kumar and A. Sundaresan “Experimental evidence of 12 Ga-vacancy induced room temperature ferromagnetic behavior in GaN films” *Applied Physics Letters* 99, 162512 (2011).

65. Thirumaleshwara N. Bhat, Mohana K. Rajpalke Mahesh Kumar, BasantaRoul, S. B. Krupanidhi “Substrate nitridation induced modulations in transport properties of wurtzite GaN/p-Si (100) heterojunctions grown by molecular beam Epitaxy” *Journal of Applied Physics* 110, 093718 (2011).

66. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, P. Misra, L. M. Kukreja, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “Improved growth of GaN layers on ultra-thin silicon nitride/Si (111) by RF-MBE” *Materials Research Bulletin* 45, 1581 (2010).

67. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, Neeraj Sinha, A. T. Kalghatgi and S. B. Krupanidhi “Droplet epitaxy of InN quantum dots on Si (111) by RF plasma- assisted Molecular Beam Epitaxy” *Advanced Science Letters* 3, 379 (2010).

68. Mahesh Kumar, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, BasantaRoul, P. Misra, L. M. Kukreja, Neeraj Sinha, A. T. Kalghatgi, and S. B. Krupanidhi “Selfassembled flowerlike nanostructures of InN and GaN grown by plasma-assisted molecular beam epitaxy”, *Bulletin of Material Science* 33, 221 (2010).

69. Thirumaleshwara N. Bhat, BasantaRoul, Mohana K. Rajpalke, Mahesh Kumar, S. B. Krupanidhi and Neeraj Sinha, “Temperature dependent transport behavior of n- InNnanodot/p-Si heterojunction structures” *Applied Physics Letters* 97, 202107 (2010).

70. BasantaRoul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, Neeraj Sinha, A. T. Kalghatgi and S. B. Krupanidhi “Indium nitride nanomatrixobjects grown on csapphire by plasma-assisted molecular beam epitaxy” *Nanoscience and nanotechnology letters* 2, 257 (2010).

In refereed conference proceedings:

1. Shraddha, Murari M S , Veena K , ManjunathaPattabi , Thirumaleshwara N Bhat “Effect of Oxygen Incorporation on the Structural and Morphological Properties of CZTS Thin Films Deposited on Mo Foils” *AIP Conf. Proc.* **2265**, 030497 (2020)

2. Mohana K. Rajpalke, Thirumaleshwara N. Bhat, BasantaRoul, Mahesh Kumar and S. B. Krupanidhi “Molecular Beam Epitaxial Growth of Nonpolar a-plane InN/ GaNHeterostructures” *MRS Proceedings*, 1396, mrsf11-1396-o07-11 (2012).

3. Thirumaleshwara N. Bhat, Mohana K. Rajpalke, Mahesh Kumar, BasantaRoul, and S. B. Krupanidhi “Comparative studies on photovoltaic performance of InN nanostructures/p-Si (100) heterojunction devices grown by molecular beam epitaxy” *MRS Proceedings*, 1391, mrsf11-1391j07-21 (2012).

4. Thirumaleshwara N. Bhat, Mohana K. Rajpalke, Mahesh Kumar, BasantaRoul, and S. B. Krupanidhi “WurtziteInNnanodots on Si(100) by molecular beam epitaxy” *SPIE proceeding*, 8549, 85492G (2012).

5. Mohana K. Rajpalke, Thirumaleshwara N. Bhat, Mahesh Kumar, BasantaRoul and S. B. Krupanidhi “Growth and properties of nonpolar a-plane GaN grown on rsapphire by plasma assisted molecular beam epitaxy” *SPIE proceedings*, 8549, 85492W (2012).

6. Neeraj Sinha, V. M. Jali, Thirumaleshwara N. Bhat, BasantaRoul, Mahesh Kumar Mohana K. Rajpalke, S. B. Krupanidhi “Indium Nitride (InN) Nanostructures GrownbyPlasma- Assisted Molecular Beam Epitaxy (PAMBE)” *AIP Conf. Proc.* 1393, 77(2011)

National :N.A

Books / Book chapters / Translations published : N.A

Papers/ poster presentations in Conferences / Seminars / Symposia (list)

International

1. T. N. Bhat, L. M. Kyaw, L. K. Bera, S. B. Dolmanan, E. F. Chor, and S. Tripathy "In_xAl_{1-x}N/GaN high electron mobility transistors on Si(111) substrates with Au-free processing" ICNS , Beijing China Aug 30- Sept 04 2015
2. T. N. Bhat, S. B. Dolmanan, L. K. Bera, and S. Tripathy "Stress-induced surface morphology variations in GaN-based HEMT structures grown on 150 mm diameter Si(111)" ICNS , Beijing China Aug 30- Sept 04 2015
3. S. B. Dolmanan, S. TRIPATHY, T. Bhat, T. H. Ru, L. K. Bera, Y. Dikme "Insitu growth monitoring of Al_xGa_{1-x}N/GaN high electron mobility structure on 200 mm diameter Si (111)" International Workshop on Nitride Semiconductors (IWN) 2014, Poland, Wroclaw (Poland), 24-29 Aug 2014
4. L. M. Kyaw, S. Tripathy, S. B. Dolmanan, L. K. Bera, T. Bhat, Y. Liu, M. K. Bera, S. P. Singh, and E. F. Chor "Micro-Raman and Photoluminescence Thermography of Al_xGa_{1-x}N/GaN HEMTs Fabricated on 200 mm Diameter Si(111)" International Workshop on Nitrides (IWN), 014, Poland, 25-29 Aug 2014
5. T. P. Manzanera, S. Tripathy, S. B. Dolmanan, T. Bhat, Z. Zheng, T. H. Ru, J.W. Roberts, S. Mather, R.J. Potter "Atomic Layer Deposition of high-k Ta-doped Al₂O₃ layers as Gate Dielectric for AlGa_N/Ga_N High Electron Mobility Transistors on 8-inch Si(111) Substrate" ALD 2014, Kyoto, Japan, June 15-18 2014
6. Thirumaleshwara. N Bhat, S. B. Dolmanan, and S. Tripathy, "Correlation of structural and optical properties of AlGa_N/Ga_N heterostructures grown on 150 and 200 mm diameter silicon substrates" IUMRS-ICA, Bangalore, India December 16-20 2013.
7. Mahesh Kumar, Basanta Roul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke and S. B. Krupanidhi "Effect of Si (111) Substrate Nitridation on GaN Epilayers by RFMBE" ICNS-10 Washington DC, USA, August 25-30, 2013.
8. Thirumaleshwara N. Bhat, Mohana K. Rajpalke, Basanta Roul, Mahesh Kumar and S. B. Krupanidhi "Conductive Atomic Force Microscopic Studies of InN Nanorods/ Si(100) Heterojunctions Grown by Molecular Beam Epitaxy" ICNS-10 Washington DC, USA, August 25-30, 2013.
9. Basanta Roul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, and S. B. Krupanidhi "Observation of Room Temperature Ferromagnetism in InN Nanostructures" ICNS-10 Washington DC, USA, August 25-30, 2013.
10. Basanta Roul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, and S. B. Krupanidhi "Electrical Transport Behavior at the InN/GaN Heterostructures Interface" ICNS10 Washington DC, USA, August 25-30, 2013.
11. Mohana K. Rajpalke, Thirumaleshwara N. Bhat, Basanta Roul, Mahesh Kumar, and S. B. Krupanidhi "Molecular Beam Epitaxial Growth of Nonpolar A-Plane InN/ GaN Schottky Heterojunction" ICNS-10 Washington DC, USA, August 25-30, 2013.

12. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, A. T. Kalghatgi and S. B. Krupanidhi "Growth of InN Nanorods on Si(111) Using Ultrathin Au Layer by Plasma-assisted MBE" MRS Fall Meeting, Boston, November 26- 30, 2012.
13. BasantaRoul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, A. T. Kalghatgi and S. B. Krupanidhi "Observation of room temperature ferromagnetism in Ga deficient GaN epitaxial films" IWN2012 Sapporo, Japan, October 14-19, 2012.
14. Mohana K. Rajpalke, MaheshKumar, Thirumaleshwara N. Bhat, BasantaRoul and S. B. Krupanidhi "Current transport in nonpolar a-plane InN/GaN heterostructure Schottky junction" IWN2012 Sapporo, Japan, October 14-19, 2012.
15. Thirumaleshwara N. Bhat, BasantaRoul, Mohana K. Rajpalke, Mahesh Kumar, and S. B. Krupanidhi "Impact of substrate nitridation on the photoluminescence and photovoltaic characteristics of GaN grown on p-Si (100) by molecular beam epitaxy" IWN2012 Sapporo, Japan, October 14-19, 2012.
16. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, A. T. Kalghatgi and S. B. Krupanidhi "Growth of InN Nanostructures by droplet epitaxy techniques" ISGN4 2012, St. Petersburg, Russia, July 16-19 2012.
17. Mahesh Kumar, BasantaRoul, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, A. T. Kalghatgi and S. B. Krupanidhi "UV photoresponse of GaN nanodots grown by Molecular Beam Epitaxy " ISGN4 2012, St. Petersburg, Russia, July 16-19 2012.
18. Mahesh Kumar, BasantaRoul, Thirumaleshwara N. Bhat, Mohana K. Rajpalke, A. T. Kalghatgi and S. B. Krupanidhi "InGaN- based blue light emitting diodes grown by plasma assisted molecular beam epitaxy" IWPSD 2011, IIT Kanpur, December 19-22 2011.
19. BasantaRoul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, A. T. Kalghatgi and S. B. Krupanidhi "Electrical transport behavior at the InN/GaN heterostructures interface" IWPSD 2011, IIT Kanpur, December 19-22 2011.
20. Mohana K. Rajpalke, Thirumaleshwara N. Bhat, Mahesh Kumar, BasantaRoul and S. B. Krupanidhi "Growth and properties of nonpolar a-plane GaN grown on sapphire by plasma assisted molecular beam epitaxy" IWPSD 2011, IIT Kanpur, December 19-22 2011.
21. Thirumaleshwara N. Bhat, Mohana K. Rajpalke, Mahesh Kumar, BasantaRoul and S. B. Krupanidhi "Wurtzite Indium Nitride nanodots on Si(100) by molecular beam epitaxy" IWPSD 2011, IIT Kanpur, December 19-22 2011.
22. Mohana K. Rajpalke, Thirumaleshwara N. Bhat, BasantaRoul, Mahesh Kumar and S. B. Krupanidhi "Structural Dependent Optical Properties of Nonpolar A-Plane GaN Grown on r- 15 Sapphire by Plasma Assisted Molecular Beam Epitaxy" MRS Fall Meeting, Boston, November 28-December 2, 2011.
23. BasantaRoul, Mahesh Kumar, Mohana K. Rajpalke, Thirumaleshwara N. Bhat, A. T. Kalghatgi and S. B. Krupanidhi "The Effect of N/Ga Ratio on Structural, Morphological and Optical Properties of GaN Films and on Pt/GaN Schottky Diodes" MRS Fall Meeting, Boston, November 28-December 2, 2011.

24. Thirumaleshwara N. Bhat, Mohana K. Rajpalke, Mahesh Kumar, Basanta Roul and S. B. Krupanidhi "Shape Dependent Photovoltaic Performance of InN Nanostructures/p-Si(100) Heterojunction Grown by Molecular Beam Epitaxy" MRS Fall Meeting, Boston, November 28-December 2, 2011.

National N.A

Regional N.A

Invited / plenary talks delivered (list) (if applicable)

1. T. N. Bhat - Lecture Series in Physics', , Department of Physics St Agnes College (Autonomous) Mangaluru on 06, March 2020 (*Invited lecture)
2. T. N. Bhat "BaTiO₃/GaN Heterojunctions" First Indian Materials Conclave and 30th AGM, MRSI Bangalore India. Feb 12-Feb 15 2019 (*Invited Talk)
3. T. N. Bhat "Energy efficient materials and devices" workshop on "Eco-friendly products and practices-2018 Sahyadri college of engineering & management, Mangaluru, April 27-28, 2018 (*Invited talk)
4. T. N. Bhat " GaN Based High Electron Mobility Transistors on Silicon" CMPA-2017 Manipal Institute of Technology, Manipal September 22-23, 2017 (*Invited talk)
5. T. N. Bhat "Design and fabrication of semiconductor devices- Fabrication of high electron mobility transistors" Science Academies' Lecture Workshop on Condensed and Soft Matter Physics held at Dept. of Physics, Mangalore University February 22-24, 2017 (*Invited talk)
6. T. N. Bhat "LED and its applications : Group III-Nitride white light emitting diodes " Science Academies' Lecture Workshop on Condensed and Soft Matter Physics held at Dept. of Physics, Mangalore University February 22-24, 2017 (*Invited talk)
7. T. N. Bhat "GaN based HEMTs on Silicon" IUMRS-ICYRAM-2016 Bangalore India. Dec 11-Dec 15 2016 (*Invited Talk)

Impact of publications in terms of (Non-science faculty can leave out this item, if unable to fill up).

h-index : 16

i10 index : 38

Citation index : 805

Conferences / Seminars / Workshops / Symposia organized(if applicable) : N.A

Awards / Fellowship / Recognition (Specify)(if applicable)

SERB-ECR Award SERB- Govt of India 2017

DST-INSPIRE Faculty Award DST- Govt of India 2016

Institute RA fellowship IISc- Bangalore 2012

CSIR-International travel grant CSIR-Govt of India 2011

IIScPh.D Fellowship MHRD – Govt of India 2007

Membership of Professional Bodies : N.A

Any other Information :N.A