

Anirban Bhattacharyya

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Education

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| Ph. D. Electrical Engineering, Boston University (USA) | 2005 |
| Specialization: Electro-Optics
Dissertation: <i>III-Nitride based Ultraviolet Emitters produced by Molecular Beam Epitaxy</i>
Advisor: Prof. T. D. Moustakas | |
| M. Tech. Materials Science, Indian Institute of Technology (Kanpur, India) | 1999 |
| M. Sc. Electronic Science, University of Calcutta (India) | 1996 |
| B. Sc. Physics, University of Calcutta (India)
St. Xavier's College, Calcutta | 1993 |

Current Employment:

Assistant Professor, Institute of Radio Physics and Electronics, University of Calcutta (April 2009 till Date)

Current Research at University of Calcutta

The focus has been the development of research infrastructure at the University of Calcutta in the area of growth of semiconductor epitaxial films and nanostructures, and development of optoelectronic devices based on them. The recent areas of research include:

- Growth of AlGaIn Nanorods by Plasma Assisted Molecular Beam Epitaxy
- Development of AlGaIn Quantum wells with improved optical characteristics for UV LEDs
- Study of the effect of compositional inhomogeneities in AlGaIn alloys on UV Photodetectors
- Development AlGaIn Quantum Well-based Wavelength selective ultraviolet photodetectors
- Spatially selective deposition of ZnO nanowires grown by VLS process on to textured surfaces
- Optical characterization of semiconductor thin films and nanostructures
- Study of the effect of co-doping in ZnO thin films and development of UV photodetectors
- Microfluidics and MEMS: Development of micro-needles, micro-channels and micro-cantilevers
- Development of UV Distributed Bragg Reflectors

Research at Boston University (Electrical and Computer Engineering Department)

Senior Research Associate (2007-2009), Research Associate (2005-2007), Doctoral Research (1999 – 2009)

Major responsibilities included growth of III-Nitride materials and device structures by molecular beam epitaxy; characterization of their structural, morphological, optical and electronic properties; processing, fabrication and testing of optoelectronic devices. Mentored and trained students in MBE growth.

Teaching:

- **Nanostructures and Nanomaterials** (*M. Tech.*)
- **Physics of Electronic Materials** (*M.Sc., Department of Electronics Science*)
- **Solid State Electronic Devices**, (*B. Tech*)
- **Laboratory classes: Microelectronics, MEMS,**

Funded Projects:

- **“Development of III-Nitride White and Ultraviolet LED Technology For Green Energy & Societal impact”** Funded by Office of the Principal Scientific Advisor to the Govt. of India.
- **“Development of Ultraviolet PIN photodetectors by Molecular Beam Epitaxy for Solar Blind Focal Plane Arrays”**, Funded by SERB
- **“New principles and fabrication technologies of extreme 2D and 0D AlGaInN nanoheterostructures for high efficiency mid- and deep-ultraviolet spontaneous and laser emitters”** Funded by Department of Science and Technology under the BRICS Program.
- **“Ultraviolet Light Emitting Diodes grown by Molecular Beam Epitaxy for Solid State Lighting”**, Funded by: Department of Information Technology, Govt of India, Duration 2011-2013 **(completed)**

Doctoral Students:

- Degree awarded: Pallabi Pramanik, 2018

Patents

1. Theodore D. Moustakas, Adam Moldawer, **Anirban Bhattacharyya**, Joshua Abell, “Optical Devices Featuring Non-polar Textured Semiconductor Layers” U. S. Patent No. 8,592,800 (Issue Date: Nov. 26, 2013)

Awards

MRSI Medal, 2016

Research Publications: ~75

Research Publications (Selected, Reverse Chronological)

2019

1. "Determining the polarity of droplet epitaxy grown AlGa_nN nanorods using piezoresponse force microscopy", S Parida, G Mangamma, C Singha, A Bhattacharyya, S Dhara, **Nano-Structures & Nano-Objects** 20, 100398, (2019)
2. "AlGa_nN multiple quantum wells by PA-MBE for deep UV emission: Effect of growth interruptions", S Sen, C Singha, A Saha, A Das, PG Roy, P Pramanik, A Bhattacharyya **Journal of Crystal Growth**, 523, 125159 (2019)
3. "Long-range Solid-state Electron Transport through Ferritin Multilayers", Sudipta Bera, Jayeeta Kolay, Pallabi Pramanik, Anirban Bhattacharyya and Rupa Mukhopadhyay, **Journal of Materials Chemistry C** accepted on June 23 (2019) [I. F. 5.976] doi: [10.1039/c9tc01744e](https://doi.org/10.1039/c9tc01744e)
4. "Development of silicon microneedle arrays with spontaneously generated micro-cavity ring for transdermal drug delivery", Alakananda Das, Chirantan Singha and Anirban Bhattacharyya, **Microelectronics Engineering**, (Accepted)
5. "A simple method to overcome the limitation of hybrid monochromator in the identification of peaks in the HRXRD pattern of Al_{0.4}Ga_{0.6}N / Al_{0.6}Ga_{0.4}N multi quantum wells", T. K. Sharma, R Kumar, AK Sinha, Pallabi Pramanik, Sayantani Sen, A Bhattacharyya, **Materials Science and Engineering: B**, Vol 240, 92-96 (2019)

2018

6. "Mg and Al doped ZnO thin film: Photo-induced "oxygen breathing" under UV illumination", Arpita Das, Pushan Guha Roy, Sayantani Sen, Anirban Bhattacharyya, **Thin Solid Films**, Vol 662, 54-59, (2018)
7. "Bioelectronics at graphene–biofilm interface: Schottky junction formation and capacitive transitions", Sanhita Ray,

Sayantani Sen, Alakananda Das, Anirban Bose, Anirban Bhattacharyya, Avishek Das, Sanatan Chattopadhyay, Shib Shankar Singha, Achintya Singha, Hirak K Patra, Anjan Kr Dasgupta, **Medical Devices & Sensors**, Volume 1, Issue 3 (2018)

8. "Growth of AlGa_nN alloys under excess group III conditions: Formation of vertical nanorods" Chirantan Singha Sayantani Sen, Pallabi Pramanik, Mainak Palit, Alakananda Das, Abhra Shankar Roy, Susanta Sen, Anirban Bhattacharyya, **J. Crystal Growth**, 281, 40-47, (2018)

2017

9. "Selective deposition of ZnO nanowires on silicon micro-pyramidal arrays", A Das, PG Roy, C Singha, A Bhattacharyya, **Materials Science in Semiconductor Processing** 71, 352-356 (2017)
10. "Surface optical phonon modes in hexagonal shaped Al_{0.97}Ga_{0.03}N nanostructures" AK Sivadasan, Chirantan Singha, KG Raghavendra, S Amirthapandian, A Bhattacharyya, Arup Dasgupta, Sandip Dhara, **Applied Physics (A)**, 123, 527 (2017).

2016

11. "Compositional inhomogeneities in AlGa_nN thin films grown by molecular beam epitaxy: Effect on MSM UV photodetectors", Pallabi Pramanik, Sayantani Sen, Chirantan Singha, Abhra Shankar Roy, Alakananda Das, Susanta Sen and A. Bhattacharyya, **J. Appl. Phys.** 120, 144502 (2016), Impact Factor 2.06, ISSN 0021-8979
12. "Mg and Al co-doping of ZnO thin films: Effect on ultraviolet photoconductivity" Arpita Das, Pushan Guha Roy, Amartya Dutta, Sayantani Sen, Pallabi Pramanik, Diptasikha Das, Aritra Banerjee, Anirban Bhattacharyya, **Materials Science in Semiconductor Processing**, 54, 36 (2016), Impact Factor 2.35, ISSN 1369-8001

13. "Correlation between defect and magnetism of low energy Ar⁺ 9 implanted and un-implanted Zn_{0.95} Mn_{0.05} O thin films suitable for electronic application", SK Neogi, N Midya, P Pramanik, A Banerjee, A Bhattacharyya, GS Taki, JBM Krishna, S Bandyopadhyay, **Journal of Magnetism and Magnetic Materials**, **408**, 217 (2016). Impact factor 2.60
14. "Wavelength-Specific Ultraviolet Photo-detectors based on AlGa_nN Multiple Quantum Wells" Pallabi Pramanik, Sayantani Sen, Chirantan Singha, Abhra Shankar Roy, Alakananda Das, Susanta Sen, , D. V. Sridhara Rao, Anirban Bhattacharyya, **IEEE Journal of Quantum Electronics** **53(3)**, 1-6, (2016), Impact factor 1.88
15. "Controlling the compositional inhomogeneities in Al_xGa_{1-x}N/Al_yGa_{1-y}N MQWs grown by PA-MBE: Effect on luminescence properties", Pallabi Pramanik, Sayantani Sen, Chirantan Singha, Abhra Shankar Roy, Alakananda Das, Susanta Sen, Deepak Kumar, D. V. Sridhara Rao Anirban Bhattacharyya, **Journal of Crystal Growth** **439**, 60–65, (2016), Impact factor 1.75, ISSN 0022-0248
16. "Anomalous red emission with competition and coexistence of defect and band edge emission in photo-electrochemically active (Zn_{0.97} Ga_{0.03})(O_{0.95} N_{0.05}) solid solution", Sumithra Sivadas Menon, Sayantani Sen, Pallabi Pramanik, Anirban Bhattacharyya, Bhavana Gupta, Brajesh Tiwari, K Baskar, Shubra Singh, **RSC Advances**, **6** (103081-103087), 2016
17. "Interface phonon modes in the [AlN/GaN]₂₀ and [Al_{0.35}Ga_{0.65}N/Al_{0.55}Ga_{0.45}N]₂₀ 2D multi quantum well structure", A. K. Sivadasan, Chirantan Singha, Anirban Bhattacharyya and Sandip Dhara **Phys. Chem. Chem. Phys.**, **18**, 29864 (2016),

2015

18. "VLS-grown diffusion doped ZnO nanowires and their luminescence properties", Pushan Guha Roy, Amartya Dutta, Arpita Das, Sayantani Sen, Pallabi Pramanik and Anirban Bhattacharyya, **Materials Research Express** **2**, 075007, (2015)
19. "Optical Properties of Monodispersed AlGa_nN Nanowires in the Single-Prong Growth Mechanism", A. K. Sivadasan, Avinash Patsha, S. Polaki, S. Amirthapandian, Sandip Dhara, Anirban Bhattacharyya, B. K. Panigrahi, and A. K. Tyagi, **Crystal Growth & Design** **15**, 1311 (2015) DOI: 10.1021/cg501723n

2014

20. "Direct Evidence of Mg Incorporation Pathway in Vapor–Liquid–Solid Grown p-type Nonpolar GaN Nanowires", Avinash Patsha, S. Amirthapandian, Ramanathaswamy Pandian, Santanu Bera, Anirban Bhattacharyya, and Sandip Dhara **The Journal of Physical Chemistry C** **118**, 24165 (2014), DOI: 10.1021/jp507216d
21. "Characterization of A-plane GaN templates grown by HVPE and high efficiency deep UV emitting AlGa_nN/AlN MQWs grown by MBE on such templates", A. Moldawer, A Bhattacharyya, L Zhou, D. J. Smith, and T. D Moustakas, **Phys. Status Solidi (C)** (2014), **11**, 585 (2014) Special Issue: 10th International Conference on Nitride Semiconductors (ICNS-10)

2013

22. "Improved photo-detection from annealed SiO_x In_{2-x} O_{3-y} axial Heterostructure Nanocolumns", N. K. Singh and A. Mondal and J. C. Dhar and S. Chakrabartty and K. K. Chattopadhyay and A. Bhattacharyya, **J. Physics D: Applied Physics**, **47**, 105106, (2013)
23. "Effect Of Annealing On Si_{0-x}Ti_{0.2} Axial Heterostructure Nanowires And Improved Photodetection", J. C Dhar, and A. Mondal, and N. K. Singh, and S. Chakrabartty, and A. Bhattacharyya, and K. K Chattopadhyay, **J.**

Appl. Phys., **114**, 244310 (2013), DOI :10.1063/1.4858420

24. "Electrical properties of vertically oriented TiO₂ nanowire arrays synthesized by glancing angle deposition technique", A. Mondal J. C. Dhar, P. Chinnamuthu, N. K. Singh, K. K. Chattopadhyay S. K. Das, S. Ch Das, A. Bhattacharyya, **Electronic Materials Letters**, **9**, 213 (2013)

2012

25. "Sequential Tunneling Transport in GaN/AlGa_N Quantum Cascade Structures", F. F. Sudradjat, W. Zhang, K. Driscoll, Y. Liao, A. Bhattacharyya, C. Thomidis, L. Zhou, D. J. Smith, T. D. Moustakas, and R. Paiella **Phys. Stat. Sol. (c)**, **9**, 588–591, (2012)
26. "A Comparative Study of UV Electroabsorption Modulators Based on Bulk III-Nitride Films and Multiple Quantum Well", C.-K. Kao, A. Bhattacharyya, C. Thomidis, A. Moldawer, R. Paiella, and T. D. Moustakas, **Phys. Stat. Sol. (c)**, **9**, 770–773, (2012)
27. "Deep UV-LEDs with high IQE based on AlGa_N alloys with strong band structure potential fluctuations", Theodore D. Moustakas, Yitao Liao, Chen-kai Kao, Christos Thomidis, Anirban Bhattacharyya, Dipesh Bhattarai, and Adam Moldawer, **Proc. SPIE 8278**, 82780L (2012)
28. "Design and simulation of micro-pump, micro-valve and micro-needle for biomedical applications", Pranay Kanti Podder; Dip Prakash Samajdar; Dhiman Mallick; Anirban Bhattacharyya 5th International Conference on Computers and Devices for Communication (CODEC), pages 1 - 4, 2012, DOI: 10.1109/CODEC.2012.6509359
29. "LPE grown GaAs_{1-x}N_x (x ≤ 0.01) for photoconductive devices" S. K. Das; S. Dhar; A. Bhattacharyya 5th International Conference on Computers and Devices for Communication (CODEC), pages 1 - 4, 2012, DOI: 10.1109/CODEC.2012.6509249
30. "The role of liquid phase epitaxy during growth of AlGa_N by MBE", TD Moustakas, A Bhattacharyya, **physica status solidi (c)** **9** (3-4), 580-583

31. "Deep UV-LEDs with high IQE based on AlGa_N alloys with strong band structure potential fluctuations" TD Moustakas, Y Liao, C Kao, C Thomidis, A Bhattacharyya, D Bhattarai, Adam Moldawer, **SPIE OPTO**, 82780L-82780L-11

2011

32. "Electroabsorption modulators based on bulk Ga_N films and Ga_N/AlGa_N multiple quantum wells", Chen-Kai Kao, Anirban Bhattacharyya, Christos Thomidis, Roberto Paiella, and Theodore D. Moustakas, **J. Appl. Phys.** **109**, 083102 (2011)
33. "Experimental Evidence that the Plasma-Assisted MBE Growth of Nitride Alloys is a Liquid Phase Epitaxy Process" T. D. Moustakas and A. Bhattacharyya, **ECS Trans.** **35**, 63 (2011)
34. "Design and Simulation of MEMS Based Electrothermal Micromirror for 3D Spatial Movement", Dhiman Mallick, Anirban Bhattacharyya, **COMSOL Conference**, Pp 1-9, (2011)
35. "Design, Simulation and Study of MEMS Based Micro-needles and Micro-pump for Biomedical Applications", Pranay Kanti Podder, Dhiman Mallick, Dip Prakash Samajdar, Anirban Bhattacharyya, **COMSOL Conference**, (2011)

2010

36. "Sequential tunneling transport characteristics of Ga_N/AlGa_N coupled-quantum-well structures", Faisal Sudradjat, Wei Zhang, Kristina Driscoll, Yitao Liao, Anirban Bhattacharyya, Christos Thomidis, Lin Zhou, David J. Smith, Theodore D. Moustakas, and Roberto Paiella, **J. Appl. Phys.** **108**, 103704 (2010)
37. "Optical and Structural Characterization of Ga_N/AlGa_N Quantum Wells for Intersubband Device Applications", K. Driscoll, Y. Liao, A. Bhattacharyya, T. D. Moustakas, R. Paiella, L. Zhou, and D. J. Smith **Phys. Stat. Sol. (c)**, vol. **7**, pp. 2394-2397, 2010

38. *Intersubband transitions in GaN-based quantum wells: a new materials platform for infrared device applications*, Roberto Paiella, Kristina Driscoll, Yan Li, Yitao Liao, [Anirban Bhattacharyya](#), Christos Thomidis, Lin Zhou, David J. Smith, and Theodore D. Moustakas **Proc. SPIE 7808**, 780807 (2010)
39. *"Intersubband device applications of nitride quantum structures"* Roberto Paiella, Kristina Driscoll, Yan Li, Yitao Liao, [Anirban Bhattacharyya](#), Christos Thomidis, Lin Zhou, David J. Smith, Enrico Bellotti, and Theodore D. Moustakas, **Proc. SPIE 7608**, 76080N (2010)
40. *"Development of milliwatt power AlGaIn-based deep UV-LEDs by Plasma-assisted MBE"*, Y. Liao, C. Thomidis, [A. Bhattacharyya](#), C-k Kao, A. Moldawer, W. Zhang and T. D. Moustakas, "in III-Nitride Materials for Sensing, Energy Conversion and Controlled Light-Matter Interactions, edited by S. Gwo, J.W. Ager, F. Ren, O. Ambacher, L. Schowalter (**Mater. Res. Soc. Symp. Proc. Volume 1202**, (2010)
41. "Experimental Observation of Sequential Tunneling Transport in GaN /AlGaIn Coupled Quantum Wells grown on Free-Standing GaN", F. Sudradjat, K. Driscoll, Y. Liao, A. Bhattacharyya, C. Thomidis, L. Zhou, D.J. Smith, T. D. Moustakas and R. Paiella, **Mater. Res. Soc. Symp. Proc.** Vol. 1202, paper number 1202-I09-20 (2010).
42. *"Short-Wavelength Intersubband Light Emission from Optically Pumped GaN / AlN Quantum Wells"*, R. Paiella, K. Driscoll, Y. Liao, [A. Bhattacharyya](#), L. Zhou, D. J. Smith and T.D. Moustakas, **Mater. Res. Soc. Symp. Proc.** Vol. 1202, paper number 1202-I10-08 (2010)

2009

43. *"Deep ultraviolet emitting AlGaIn quantum wells with high internal quantum efficiency"* [A. Bhattacharyya](#), T. D. Moustakas, Lin Zhou, David. J. Smith and W. Hug, **Appl. Phys. Lett.** **94**, 181907 (2009)

44. *"Plasmon Enhanced Light Emission from InGaIn Quantum Wells via Coupling to Chemically Synthesized Silver Nanoparticles"*, J. Henson, J. C. Heckel, E. Dimakis, J. Abell, [A. Bhattacharyya](#), G. Chumanov, T. D. Moustakas, and R. Paiella **Appl. Phys. Lett.**, **vol. 95**, 151109, (2009)
45. *"Optically pumped Intersubband emission of short-wave infrared radiation with GaN/AlN quantum wells"* Kristina Driscoll, Yitao Liao, [Anirban Bhattacharyya](#), Lin Zhou, David J. Smith, Theodore D. Moustakas, and Roberto Paiella, **Appl. Phys. Lett.** **94**, 081120 (2009)
46. "Optically pumped intersubband light emission near 2 μm from GaN/AlN quantum wells", K. Driscoll, Y. Liao, A. Bhattacharyya, T. D. Moustakas, R. Paiella, L. Zhou, D. J. Smith LEOS Annual Meeting Conference Proceedings, 2009. **LEOS '09. IEEE**, pp. 664-665. doi: 10.1109/LEOS.2009.5343394

2008

47. *"Nitride based UV detectors improve photodetection"* Mira Misra [Anirban Bhattacharyya](#), Theodore D Moustakas, **LASER FOCUS WORLD** Volume: **44** Issue: 11 Pages: 64-66, (2008)
48. *"Refractive-index nonlinearities of Intersubband transitions in GaN/AlN quantum-well waveguides"* Yan Li, [Anirban Bhattacharyya](#), Christos Thomidis, Yitao Liao, Theodore D. Moustakas, and Roberto Paiella, **J. Appl. Phys.** **104**, 083101 (2008)
49. *"Real-time studies of gallium adsorption and desorption kinetics on sapphire (0001) by grazing incidence small-angle x-ray scattering and x-ray fluorescence"* Yiyi Wang, Ahmet S. Özcan, Karl F. Ludwig, and [Anirban Bhattacharyya](#) **J. Appl. Phys.** **103**, 103538 (2008)
50. *"Controlling the recombination rate of semiconductor active layers via coupling to dispersion-engineered surface plasmons"* John Henson, [Anirban Bhattacharyya](#), Theodore D. Moustakas, Roberto Paiella,

Journal Of The Optical Society Of America B-Optical Physics, **25**, 1328 (2008)

51. "Intersubband Nonlinear Optical Processes in GaN/AlN Quantum-Well Waveguides" Yan Li, Anirban Bhattacharyya, Christos Thomidis, Theodore D. Moustakas, Roberto Paiella, 2008 Conference On Lasers and Electro-Optics / Quantum Electronics and Laser Science Conference, Vols **1-9** Pages: 1447-1448 (2008)
52. "Tunable Surface-Plasmon Resonances in Strongly Coupled Metallo-Dielectric Multiple Layers", John T Henson, Anirban Bhattacharyya, Theodore D Moustakas, Roberto Paiella, in *Frontiers in Optics 2008/Laser Science XXIV/Plasmonics and Metamaterials/Optical Fabrication and Testing*, OSA Technical Digest (CD) (Optical Society of America, 2008), paper MThC1.

2007

53. "Ultrafast All-Optical Switching with Low Saturation Energy via Intersubband Transitions in GaN/AlN Quantum-Well Waveguides," Y. Li, A. Bhattacharyya, C. Thomidis, T. D. Moustakas, and R. Paiella, **Opt. Express**, **15**, 17922 (2007)
54. "Non-linear Optical Waveguides based on near-infrared intersubband transitions in GaN/AlN Quantum Wells" Yan Li, Anirban Bhattacharyya, Christos Thomidis, Theodore D. Moustakas and Roberto Paiella **Optics Express**, **15**, 5860-5865 (2007)
55. "Intersubband absorption in AlN / GaN / AlGaN coupled quantum wells", Kristina Driscoll, Anirban Bhattacharyya, Theodore D. Moustakas and Roberto Paiella, Lin Zhou, David J. Smith, **Appl. Phys. Lett.** **91**, 141104 (2007)
56. "Real-Time X-Ray Studies of Gallium Nitride Nanodot Formation by Droplet Heteroepitaxy" Yiyi Wang, Ahmet Ozcan, Christopher Sanborn, Karl Ludwig, Anirban

Bhattacharyya, Ramya Chandrasekaran, Theodore Moustakas, Lin Zhou, and David Smith, **J. of Appl. Phys.** **102**, 073522 (2007).

57. "GaN/AlN nonlinear optical waveguides for ultrafast Intersubband all-optical switching" Yan Li, Anirban Bhattacharyya, Christos Thomidis, Theodore D. Moustakas, Roberto Paiella, 2007 IEEE LEOS annual meeting conference proceedings, vols **1** and **2**, Pages: 894-895 (2007)
58. "AlN/GaN/AlGaIn coupled quantum wells for short-wavelength Intersubband devices" Kristina Driscoll, Anirban Bhattacharyya, Christos Thomidis, Theodore D. Moustakas, Roberto Paiella, 2007 **IEEE LEOS** annual meeting conference proceedings, vols **1** and **2**, Pages: 900-901 (2007)
59. "Ultraviolet light emitting diodes using non-polar a-plane AlGaIn MQWs" R. Chandrasekaran, A. Bhattacharyya, R. France, C. Thomidis, A. Williams and T. D. Moustakas, *In advances of III-V Nitride Semiconductor Material and Devices* edited by C.R. Abernathy, H. Jiang, J.M. Zavada (**Mater. Res. Soc. Symp. Proc.** **955E**, Warrendale, PA, 2007), Paper No. 0955-104-08.
- ## 2006
60. "Real-time x-ray studies of gallium adsorption and desorption" Ahmet S. Özcan, Yiyi Wang, Gozde Ozaydin, Karl F. Ludwig, Anirban Bhattacharyya, Theodore D. Moustakas, and D. Peter Siddons **J. Appl. Phys.** **100**, 084307 (2006)
61. "High power ultraviolet light emitting diodes based on GaN/AlGaIn quantum wells produced by molecular beam epitaxy" J. S. Cabalu, A. Bhattacharyya, C. Thomidis, I. Friel, T. D. Moustakas, C. J. Collins, and Ph. Komninou **J. Appl. Phys.** **100**, 104506 (2006)
62. "Real-time synchrotron x-ray studies of low- and high-temperature nitridation of c-plane sapphire" Yiyi Wang, Ahmet S. Özcan, Gözde Özaydin, Karl F. Ludwig, Jr., Anirban Bhattacharyya, Theodore D. Moustakas, Hua

Zhou, Randall L. Headrick, and D. Peter Siddons **Phys. Rev. B** **74**, 235304 (2006)

63. "Complex and incommensurate ordering in $Al_{0.72}Ga_{0.28}N$ thin films grown by plasma-assisted molecular beam epitaxy" Yiyi Wang, Ahmet S. Özcan, Karl F. Ludwig, Jr., Anirban Bhattacharyya, T. D. Moustakas, Lin Zhou, and David J. Smith **Appl. Phys. Lett.** **88**, 181915 (2006)

64. MBE grown 340 nm UV-LED structures based on GaN/AlGa_N MQWs", A. Bhattacharyya, J. Cabalu, C.Thomidis, C. J. Collins and T. D. Moustakas, **22nd North American Molecular Beam Epitaxy Conference**. (Conference book, p.110).

2004

65. "Efficient P-type Doping of GaN films by Plasma- assisted Molecular Beam Epitaxy" A. Bhattacharyya, W. Li, J. Cabalu, T. D. Moustakas, David J. Smith and R. L. Hervig, **Appl. Phys. Lett.** **85**, 4956 (2004)
66. "Design and Fabrication of GaN -based Permeable-base Transistor" Jasper S. Cabalu, Liberty L. Gunter, Ian Friel, A. Bhattacharyya, Y. Fedyunin, K. Chu, E. Bellotti, C. Eddy and T. D. Moustakas **Mat. Res. Soc. Symp. Proc. Vol. 798**, 85 (2004).
67. "MBE Grown AlN Films on SiC for Piezoelectric MEMS Sensors", Doppalapudi, R. Mlcak, J. Chan, H. Tuller, A. Bhattacharyya, and T. Moustakas, **Mat. Res. Soc. Proc. Vol 798**, 403 (2004).
68. "GaN Devices for High-Efficiency High Power X-Band Radar Performance", William Stacey, Phillip Lamarre, J. Murguia, V. Tassev, T. Moustakas, C. Thomidis, W. Li, J. Cabalu, A. Bhattacharyya, T. Xu, I. Friel, J. Lorenzo, and D. Weyburne., **2nd International Energy Conversion Engineering Conference, International Energy Conversion Engineering Conference** <https://doi.org/10.2514/6.2004-5751>

2003

69. "Comparative study of GaN/AlGa_N MQWs grown homoepitaxially on (1-100) and (0001) GaN" A. Bhattacharyya, I. Friel, S. Iyer, T. C. Chen, W. Li, J. Cabalu, Y. Fedyunin, K. F. Ludwig Jr, T. D. Moustakas, H. P. Maruska, D.W. Hill, J. J. Gallagher, M. M. Chou, B. Chai, **Journal of Crystal Growth**, Vol.**251**, 487 (2003).

70. "Development of 50 mm diameter non-polar gallium nitride substrates for device applications" H. P. Maruska, D. W. Hill, M. M. C. Chou, J. J. Gallagher, BH Chai, R Vanfleet, J Simmons, A. Bhattacharyya, I Friel, TC Chen, W Li, J Cabalu, Y Fedyunin, KF Ludwig, TD Moustakas, Conference **Proceedings: 2003 International Conference Indium Phosphide And Related Materials**, Pg 567-570 (2003)

71. "Growth and Fabrication of high Reverse Breakdown Heterojunctions n-GaN: p-6H-SiC Diodes", A. V. Sampath, A. Bhattacharyya, R. Singh, C. R. Eddy, P. Lamarre, W.F. Stacey, R. S. Morris and T.D. Moustakas **Mater. Res. Soc. Symp. Proc.**, Vol. **743**, pp .L6.34 (2003).

72. "Growth and Characterization of non-polar (11-20)Ga_N and AlGa_N/Ga_N MQWs on R-plane (10-12) sapphire" S. Iyer, D. J. Smith A. Bhattacharyya, K. Ludwig Jr. and T. D. Moustakas" **Mater. Res. Soc. Symp. Proc.**, Vol. **743**, pp. L3.20 (2003)

2002

73. "High Reflectivity and Crack-free AlGa_N/AlN UV Distributed Bragg Reflectors" A. Bhattacharyya, I. Friel, Sandeep Iyer, E. Iliopoulos, A.V. Sampath, J. Cabalu, T. D. Moustakas, **J. Vac. Sci. and Technol. B** **20**, 1229 (2002)

74. "Homoepitaxial growth of GaN/(In, Ga, Al) N MQWs on M-GaN (non-polar) and C-GaN (polar) substrates" A Bhattacharyya, I Friel, TD Moustakas, H-P Maruska, DW Hill, JJ Gallagher, MMC Chou, B Chai, **International Conference on Molecular Beam Epitaxy**, San Francisco, CA, USA, 2002, pp. 227-228. doi: 10.1109/MBE.2002.1037842

75. "Growth of III Nitrides by MBE" A.V. Sampath, E. Iliopoulos, A. Bhattacharyya, I. Friel, Sandeep Iyer, J. Cabalu, T.D. Moustakas, *Wide bandgap Semiconductors for Photonic and Electronic Devices and Sensors*, **Electrochem. Soc Proc.** **2002-3**, **46** (2002).

1999

77. "Measurements and modelling of the barrier heights and ideality factors in the metal/conducting polymer composite Schottky device", S. Bandyopadhyay, A. Bhattacharyya, and S. K. Sen **J. Appl. Phys.** **85**, 3671 (1999)

78. "Electrically Conducting Polyaniline and Polyaniline/Polycarbonate Composite Films: Preparation, Characterization and Electrical Conductivity Measurements", Rita Roy, A. Bhattacharyya, S. K. Sen, Suchitra Sen,

2001

76. "MBE Growth of GaN using NH₃ and Plasma sources" A. Sampath, A. Bhattacharyya, I. Sandeep, H. M. Ng, E. Iliopoulos, T. D. Moustakas, *Mat. Res. Soc. Symp. Vol.* **639**, G6.56 (2001)

physica status solidi (a), Volume**165**, Issue 1, pages 245–253, (1999)

1998

79. "X-ray photoelectron spectroscopic studies of conducting polyaniline, poly bisphenol A carbonate and electrochemically synthesized composite of the two" A. Bhattacharyya, Rita Roy, SK Sen, Suchitra Sen, A. K. Chakraborty, T. K. Bhattacharyya, *Vacuum*, Volume **49**, 253–256 (1998)

Selected Conference Presentations

• 2009- present (Invited Lectures)

1. Anirban Bhattacharyya: "Deep UV emission from AlGa_N MQWs grown by MBE:Effect of growth kinetics", Intl' Conf. On Emerging Electronics (ICEE) December, 17-19, 2018 in Bangalore, organized by IISc and IEEE EDS.
2. Anirban Bhattacharyya: "AlGa_N MQWs grown by Plasma Assisted Molecular Beam Epitaxy for Deep UV Emission", International Workshop on Crystalline Materials and Applications (IWCMA-2019)" Crystal Growth Centre, Anna University, Chennai. 03rd - 05th January 2019.
3. Anirban Bhattacharyya "Growth of III-Nitride materials on to A-plane Sapphire", International Workshop on Physics of Semiconductor Devices, (IWPSD 2017)
4. Anirban Bhattacharyya, **Tutorial talk on Gallium Nitride**, 3rd International Conference on Emerging Electronics (ICEE), at IIT Bombay, Mumbai, 2016
5. Anirban Bhattacharyya, "AlGa_N Alloys by plasma assisted molecular beam epitaxy: A new growth model", Materials Research Society of India (MRSI) Symposium "Advanced Materials For Sustainable Applications" & 27th Annual General Meeting of MRSI- held at CSIR North East Institute of Science & Technology, Jorhat, 18-21 February, 2016 (MRSI Medal Lecture)
6. Anirban Bhattacharyya, "Ultraviolet Photodetectors based on AlGa_N alloys grown by Molecular Beam Epitaxy", National Conference on Semiconductor Materials and Devices, IIT Jodhpur, 2016
7. Anirban Bhattacharyya, "AlGa_N alloys grown by Molecular Beam Epitaxy and their applications in Ultraviolet Emitters and Detectors", 2nd National Workshop on III-Nitride Materials and Devices, Solid State Physics Laboratory, Delhi, 9-10th February 2015
8. Anirban Bhattacharyya, "AlGa_N alloys grown by Molecular Beam Epitaxy and their applications in Ultraviolet Emitters and Detectors", The International Symposium on Semiconductor Materials and Devices (ISSMD), Crystal Growth Centre, Anna University, Chennai, February 2015

9. Anirban Bhattacharyya, **"AlGa_N Based Multiple Quantum Wells and their applications in Ultraviolet Emitters and Detectors"**, IEEE International Conference on Emerging Electronics (ICEE-2014), Indian Institute of Science, Bangalore, December 2014
 10. Anirban Bhattacharyya, **"Molecular Beam Epitaxy and its use in Development of Ultraviolet Emitters and Detectors"**, Emerging Materials and Devices (EMD-14), NIT Durgapur, September (2014)
 11. Anirban Bhattacharyya, **"Growth of AlGa_N alloys by Molecular Beam Epitaxy and their use in Development of Ultraviolet Emitters and Detectors"**, Materials Research Society of India, Kalpakkam Chapter (MRSI-KC), Kalpakkam, March 2014
 12. Anirban Bhattacharyya, **"Effect of Growth Kinetics on AlGa_N alloys grown by Plasma assisted Molecular Epitaxy"**, IUMRS-ICA, Indian Institute of Science, Bangalore, December 2013
 13. Anirban Bhattacharyya, **"Molecular Beam Epitaxy of Quantum Wells and Quantum Dots"**, Short Term Course on: Modern Methods in Materials Processing and Characterization, Durgapur, September 2013
 14. Pallabi Pramanik, Sayantani Sen, Anirban Bhattacharyya, **"Molecular Beam Epitaxy of AlGa_N Quantum Wells and Quantum Dots for Ultraviolet Light Emitting Diodes"**, National Workshop on Photonics, SGSIT, Indore, September 2013
 15. Anirban Bhattacharyya, T. D. Moustakas, **"AlGa_N based quantum wells and quantum dots for ultraviolet emission"**, International Workshop on Physics of Semiconductor Devices (IWPSD-2011), Indian Institute of Technology (IIT) Kanpur, December 2011
 16. Anirban Bhattacharyya, **"Nanotechnology and Solid-state Lighting"**, Symposium on Transport Phenomena and its impact on Advanced Material Processing Technologies, Central Mechanical Engineering Research Institute (CMERI), Durgapur, December 2009
- **1999 – 2009 (under Boston University affiliation)**
 1. Anirban. Bhattacharyya, R. Chandrasekaran and Theodore D Moustakas **"MBE Growth of III-Nitride based Deep UV-emitters on A-plane Sapphire Substrates"**, Materials Research Society Fall Meeting, Boston, 2006.
 2. Bhattacharyya, R. Chandrasekaran, T. D. Moustakas Y. Wang, A. Ozcan K.F. Ludwig, Z. Lin and D. Smith, **"Investigation of the structure and optical properties of high Al content AlGa_N films grown by MBE"** Materials Research Society Fall Meeting, Boston, 2004.
 3. Bhattacharyya, W. Li, J. Cabalu, T. D. Moustakas, David J. Smith and R. L. Hervig, **"Efficient P-type Doping of GaN films by Plasma- assisted Molecular Beam Epitaxy"** Materials Research Society Fall Meeting, Boston, 2003
 4. Bhattacharyya, J. Cabalu, Tai-Chou Chen, Y. Fedyunin, T.D. Moustakas I. Friel, H.-P. Maruska, D.W. Hill, J.J. Gallagher, M.M. Chou, B. Chai. **"A Comparative Study of Growth and Luminescence Properties of InGaAlN Alloys and GaN/InGaAlN MQWs Grown By MBE on M-Plane GaN Substrates (Non-Polar) and C-Plane GaN Quasi-Substrates (Polar)"**. Materials Research Society Fall Meeting, Boston, 2002
 5. Bhattacharyya, I. Friel, S. Iyer, T .C. Chen, W. Li, J. Cabalu, Y. Fedyunin, K. F. Ludwig Jr , T. D. Moustakas, H. P. Maruska, D.W. Hill ,J. J. Gallagher, M. M. Chou, B. Chai **"Comparative study of GaN/AlGa_N MQWs grown homoepitaxially on (1-100) and (0001) GaN"**, International Molecular Beam Epitaxy Conference, San Francisco, California, 2002.
 6. Bhattacharyya, I. Friel, E. Iliopoulos, I. Sandeep, A.V. Sampath, T.D. Moustakas, **"High Reflectivity and Crack-free AlGa_N/AlN UV Distributed Bragg Reflectors"**, 20th North American Molecular Beam Epitaxy Conference. Providence, Rhode Island, 2001