

APARNA DAS, Ph.D.

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APPOINTMENTS AND RESEARCH EXPERTISE:

Assistant Professor: 2016- Present
Department of Mathematics and Natural Sciences
Prince Mohammad Bin Fahd University, KSA

Research Scientist: 2014 - 2016
Electrical Engineering (EE) Department and California NanoSystems Institute (CNSI),
University of California, Los Angeles, USA
Research facilitator: Prof. Dr. Diana L Huffaker/ Dr. Baolai Liang

Visiting Scientist (University of California, Los Angeles): 2013 - 2014
Electrical Engineering (EE) Department and California NanoSystems Institute (CNSI),
University of California, Los Angeles, USA
Research facilitator: Prof. Dr. Diana L Huffaker/ Dr. Baolai Liang

Post-Doctoral Scientist (Experienced researcher): 2012 - 2013
Physical Institute of Semiconductor Physics,
Georg-August-Universität Göttingen, Germany
Project coordinator: Prof. Dr. Angela Rizzi

Doctoral Student: 2009 - 2012
French Alternative Energies and Atomic Energy Commission, France
Advisor: Dr. Eva Monroy

Scientific Research Assistant: 2008 - 2009
SNDL, Sungkyunkwan University, Korea.
Advisor: Dr. Sanjeev Kumar

Project Associate: 2007 - 2008
International School of Photonics, CUSAT, India.
Advisor: Prof. V.P.N. Nampoori

EDUCATION:

Ph.D. in Nanophysics/Material Science 2009 - 2012
Title: « Quantum dots for opto-chemical sensor application »
French Alternative Energies and Atomic Energy Commission
University of Grenoble, France

Master of Science (5 Year Integrated) in Photonics 2002 - 2007

Centre of Excellence in Lasers and Optoelectronic Sciences,
Cochin University of Science and Technology, India

RESEARCH INTERESTS:

- Quantum Mechanical calculations
- Density-functional theory
- Computer-assisted physico-chemical methods
- Microwaves in Chemistry and Engineering applications
- Interdisciplinary science (biology, chemistry and physics) for drug development
- Computer aided drug design
- Theoretical physics
- III-Nitride based chemical sensor
- Optoelectronic devices (Lasers, LED and solar cells)
- Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD) and Spectroscopy
- Thin layers and nanostructures (Quantum wells, quantum dots, nanowires)

AWARDS AND PROFESSIONAL ACTIVITIES:

- Guest Editor, Current Organocatalysis for a Special Issue on “Sustainable Reactions in the Synthesis of Heterocycles”, 2021.
- Guest Editor, “Life” journal for a Special Issue on “Cancer Chemotherapeutic Agents”, 2022 (Under progress)
- Editorial Board Member: Journal of Modern Medicinal Chemistry
- Editorial Board Member: Journal of Applied Solution Chemistry and Modeling
- Recognized by Bentham publisher (Press release at the AAAS Site, February 2022)
- Recognized by Bentham publisher (Press release at the AAAS Site, September 2020)
- Obtained Outstanding Researcher Award (2021)
- Obtained Young Women Researcher Award (2021)
- Member of American Chemical Society
- European microscopy society (EMS) outstanding paper awards (Materials Sciences) 2017
- Member of the Marie Curie Alumni Association (MCAA)
- Marie-Curie fellowship
- CEA-CNRS research fellowship
- Brain Korea 21 fellowship
- ISP-student fellowship
- Recognized by Heidelberg University, Germany (Press release, November 2014)
- Recognized by PMU (Newsletter Fall 2019)
- Invited speaker conference CONIAPS, December 2020
- Section chair conference CONIAPS, December 2020
- Invited by ASIA International Conference, AIC 2020 (Keynote Speaker)
- Invited by Conference Microbiology 2021 (Invited Speaker)
- Invited for Webinar on Medicinal Chemistry 2021 (Plenary speech)
- Reviewer of International journals
- Organizing committee member of various National/International conferences

- Course Coordinator: Serving as a course coordinator for Introductory Physics, Physics for Engineers I and Physics for Engineers II course.
- Member in Faculty Promotion committee
- Member in Student's grade appeal committee
- Leader of the Nanoscience research group in university
- One of the active members in the Energy research group in university
- Bentham Science Ambassador of Bentham Science Journal (In process)
- Bentham Open Ambassador of Bentham Science Journal (In process)
- Nominated for the Life Member and Fellow of Indian Chemical Society (In process)

TECHING:

- Physics for Engineers I (Mechanics, Oscillations and Waves, Thermodynamics)
- Physics for Engineers II (Electricity and Magnetism, Light, Modern Physics: Quantum Mechanics, Relativity, and The Structure of Matter)
- Introductory Physics
- Semiconductor Physics
- Optoelectronics
- Solid State Physics
- Intermediate Algebra
- Introductory Algebra

(The average student feedback on teaching score over last three Years is ~ 4.4/5)

GRANTS:

1. **Aparna Das** (PI), Ranjan Singh (Co-PI), Micro-Nanophotonic Metamaterial for sensing applications, PMU Internal Grant Phase III, 2019.
2. **Aparna Das** (Co-PI), Bimal K. Banik (PI), Dipole Moment and Anticancer Activity of β -Lactams, PMU Internal Grant Phase III, 2019.
3. **Aparna Das** (Co-PI), Bimal K. Banik (PI), Versatile Chemical and Biochemical Pathways with Female Students: Development of Their Research Career, PMU Grant, 2020.

PATENTS:

1. Dipole moment and anticancer activity of lactams (Submitted)

Adviser of the following Students:

- Ms. Rahaf Nasser F Almutairi
- Ms. Danah Yacoub Y Aldossary
- Ms. Deemah Fahad A Al Saud
- Ms. Sara Ali A Aldawood
- Ms. Renad Mohammed M Alotaibi

LIST OF PUBLICATIONS:

BOOKS:

1. **Aparna Das** and Bimal K. Banik, “Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends”, *Elsevier (UK)*, 2021. (Das and Banik are the authors of 10 chapters).
 - 1.1 **A. Das** and B. K. Banik, “Foundational principles of microwave chemistry”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.2 **A. Das** and B. K. Banik, “Microwave equipment for chemistry”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.3 **A. Das** and B. K. Banik, “Modelling and interpreting microwave effects”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.4 **A. Das** and B. K. Banik, “Microwave-assisted synthesis of oxygen and sulfur heterocycles”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.5 **A. Das** and B. K. Banik, “Microwave-assisted synthesis of nitrogen heterocycles”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.6 **A. Das** and B. K. Banik, “Reductions and oxidations using microwave chemistry”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.7 **A. Das** and B. K. Banik, “Enzymes-mediated reactions using microwave chemistry”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.8 **A. Das** and B. K. Banik, “Sterilization method in chemistry, biology and medicine”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.9 **A. Das** and B. K. Banik, “Microwave-enhanced CVD processes for diamond synthesis”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
 - 1.10 **A. Das** and B. K. Banik, “Future trends in microwave chemistry and biology”, In *Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends, Elsevier (UK)*, 2020.
2. **Aparna Das**, Muhammad Waqar Ashraf, and Bimal K. Banik, “Molecules and Medicine: The Cause of Medicinal Effects”, *Prince Mohammad Bin Fahd University Press (KSA)*, 2020. (Das, Ashraf and Banik are the authors of 6 chapters).

Book release video: <https://www.youtube.com/watch?v=yVm7TmsdQZI&feature=youtu.be>

Newsletter: PMU Press Fall 2019.

 - 2.1 **A. Das**, Muhammad Waqar Ashraf, and B. K. Banik, “Fundamentals of Enzyme”, In

Molecules and Medicine: The Cause of Medicinal Effects, *PMU Press (KSA)*, 2020.

- 2.2 **A. Das**, Muhammad Waqar Ashraf, and B. K. Banik, “Medicinally Important Enzyme”, In Molecules and Medicine: The Cause of Medicinal Effects, *PMU Press (KSA)*, 2020.
 - 2.3 **A. Das**, Muhammad Waqar Ashraf, and B. K. Banik, “Application of Enzymes as Diagnostic Tools”, In Molecules and Medicine: The Cause of Medicinal Effects, *PMU Press (KSA)*, 2020.
 - 2.4 **A. Das**, Muhammad Waqar Ashraf, and B. K. Banik, “Application of Enzymes as Diagnostic Tools”, In Molecules and Medicine: The Cause of Medicinal Effects, *PMU Press (KSA)*, 2020.
 - 2.5 **A. Das**, Muhammad Waqar Ashraf, and B. K. Banik, “Overview of Antibacterial Drugs”, In Molecules and Medicine: The Cause of Medicinal Effects, *PMU Press (KSA)*, 2020.
 - 2.6 **A. Das**, Muhammad Waqar Ashraf, and B. K. Banik, “Macrolides, Lincosamides, Glycopeptides, Oxazolidinones, and Polypeptides Antibiotics”, In Molecules and Medicine: The Cause of Medicinal Effects, *PMU Press (KSA)*, 2020.
3. **Aparna Das** and Bimal K. Banik, “Natural Products as Anticancer Agents”, *Elsevier (UK)*, 2022, Submission date: May 1, 2022. (Das and Banik are the authors of 10 chapters).
 4. Bimal K. Banik, Ram Naresh Yadav and **Aparna Das**, “Chemistry and Biology of Beta Lactams”, *Taylor & Francis, CRC Press (UK)*, 2022, Submission date: August 30, 2022. (Banik, Yadav and Das are the authors of 10 chapters).

BOOK Chapters

1. **A. Das** and B. K. Banik, “Tellurium based solar cell”, In Tellurium Chemistry, *De Gruyter (Germany)*, 2022.
2. **A. Das** and B. K. Banik, “Semiconductor properties of Tellurium and its applications”, In Tellurium Chemistry, *De Gruyter (Germany)*, 2022.
3. A. Das, **A. Das** and B. K. Banik, “Tellurium based chemical sensors”, In Tellurium Chemistry, *De Gruyter (Germany)*, 2022.
4. **A. Das** and B. K. Banik, “Tellurium in Carbohydrate synthesis”, In Tellurium Chemistry, *De Gruyter (Germany)*, 2022.
5. S. Aldawood, **A. Das** and B. K. Banik, “Tellurium in cyclization reaction”, In Tellurium Chemistry, *De Gruyter (Germany)*, 2022.
6. **A. Das** and B. K. Banik, “Dipole Moment of Medicinally Active Compounds: A Sustainable Approach”, In Green Approaches in Medicinal Chemistry for Sustainable Drug Design, *Elsevier (UK)*, 2020, 921-964.
7. **A. Das** and B. K. Banik, “Versatile thiosugars in medicinal chemistry”, In Green Approaches in Medicinal Chemistry for Sustainable Drug Design, *Elsevier (UK)*, 2020, 549-574.
8. **A. Das** and B. K. Banik, “Microwave-Induced Biocatalytic Reactions Toward Medicinally Important Compounds”, In Organocatalysis: A Green Tool for Sustainable Developments, *De Gruyter (Germany)*, 2021.

9. **A. Das** and B. K. Banik, "Advances in Heterocycles as DNA Intercalating Cancer Drugs", In Heterocyclic anticancer agents, *De Gruyter (Germany)*, 2021.
10. **A. Das** and B. K. Banik, "Conceptual Design and Cost-Efficient Environmentally Benign Synthesis of Beta Lactams", In Green Bond Forming Reactions: Carbon-Carbon and Carbon-Heteroatom, *De Gruyter (Germany)*, 2021.
11. Devalina Ray, **Aparna Das**, Suman Mazumdar and Bimal K. Banik, "Tellurium-induced Functional Group Activation", In Tellurium Chemistry, *De Gruyter (Germany)*, 2022.

JOURNAL PUBLICATIONS:

1. **Aparna Das**, "A Systematic Exploration of InGaN/GaN Quantum Well-Based Light Emitting Diodes on Semipolar Orientations", *Optics and spectroscopy*, 130(3), 376, 2022.
<https://doi.org/10.21883/os.2022.03.52165.1549-21>
2. **Aparna Das**, LED Light Sources in Organic Synthesis: An Entry to A Novel Approach, *Letters in Organic Chemistry*, 19(4), 283-292, 2022.
DOI: [10.2174/1570178618666210916164132](https://doi.org/10.2174/1570178618666210916164132)
3. Ram Naresh Yadav, **Aparna Das**, and Bimal Krishna Banik, "Organocatalysis: A Comprehensive Overview in Synthesis of Novel Glycosides", *Catalysis Reviews*, 1-118, 2022.
4. **Aparna Das** and Bimal Krishna Banik, "Microwave-induced conversion of electromagnetic energy into heat energy in different solvents: synthesis of β -lactams", *Chemistry Journal of Moldova*, 17(1), 62-66, 2022. DOI: <https://doi.org/10.19261/cjm.2021.864>
5. **Aparna Das**, Ram Naresh Yadav, and Bimal Krishna Banik, "A Novel Baker's Yeast-Mediated Microwave-Induced Reduction of Racemic 3-Keto-2-Azetidinones: Facile Entry to Optically Active Hydroxy β -Lactam Derivatives", *Current Organocatalysis*, 9 (2), 195-198, 2022. DOI: [10.2174/2213337209666220126123630](https://doi.org/10.2174/2213337209666220126123630)
6. **Aparna Das** and B. K. Banik, "Advances in Heterocycles as DNA Intercalating Cancer Drugs", In Heterocyclic anticancer agents, *Physical Sciences Reviews*, 2021.
DOI: [10.1515/psr-2021-0065](https://doi.org/10.1515/psr-2021-0065)
7. **Aparna Das** and B. K. Banik, "Microwave-Induced Biocatalytic Reactions Toward Medicinally Important Compounds", *Physical Sciences Reviews*, 2021.
DOI: [10.1515/psr-2021-0064](https://doi.org/10.1515/psr-2021-0064)
8. **Aparna Das**, "Recent Developments in Semipolar InGaN Laser Diodes", *Semiconductor*, 55 (2), 272-282, 2021.
9. **Aparna Das**, M.W. Ashraf and Bimal Krishna Banik, "Thione Derivatives as Medicinally Important Compounds", *ChemistrySelect*, 6 (34), 9069-9100, 2021.
10. **Aparna Das** and Bimal Krishna Banik, "Microwave-Induced Surface-Mediated Highly Efficient Regioselective Nitration of Aromatic Compounds: Effects of Penetration Depth", *Asian Journal of Chemistry*, 33 (9), 2203-2206, 2021.
11. **Aparna Das** and Bimal Krishna Banik, "Versatile Synthesis of Organic Compounds Derived from Ascorbic Acid", *Current Organocatalysis*, 9(1), 14-33, 2022.

DOI: [10.2174/2213337208666210719102301](https://doi.org/10.2174/2213337208666210719102301)

12. **Aparna Das** and Bimal Krishna Banik, "Life's molecule cholesterol" *Education in Chemical Science and Technology*, 7and 8, 107-131, 2020.
13. **Aparna Das** and Bimal Krishna Banik, "Procreation of penicillin from Penicillium fungi by diverse stimulants", *Education in Chemical Science and Technology*, 9, 37-54, 2021.
14. **Aparna Das** and Bimal Krishna Banik, "Dipole Moment and Anticancer Activity of β -Lactams", *Indian Journal of Pharmaceutical Sciences*, 83(5),1071-1074, 2021.
15. Anjaly Das, **Aparna Das**, and Bimal Krishna Banik, "Influence of Dipole Moments on the Medicinal Activities of Diverse Organic Compounds" *Journal of Indian chemical society*, 98 (2), 100005, 2021.
16. **Aparna Das** and Bimal Krishna Banik, " β -Lactams: Geometry, Dipole moment and Anticancer activity", *Journal of Indian chemical society*, 97(11b), 2461-2467, 2020.
17. **Aparna Das**, "Quantitative structure-property relationships of Taxol, Taxotere and their epimers", *Journal of Indian chemical society*, 97(11b), 2468-2476, 2020.
18. **Aparna Das**, Amirah Abdulrahim Alqashqari and Bimal Krishna Banik, "Quantum Mechanical Calculations of Dipole Moment of Diverse Imines", *Journal of Indian chemical society*, 97(9b), 1563-1566, 2020.
19. **Aparna Das** and Bimal Krishna Banik, "Dipole Moment Studies on α -Hydroxy β -Lactam Derivatives", *Journal of Indian chemical society*, 97(9b), 1567-1571, 2020.
20. **Aparna Das** and Bimal Krishna Banik, "Quantum Mechanical Studies of Physicochemical Properties on Estradiol and Isomer", *Authorea Preprints*, 2020.
21. **Aparna Das** and Bimal Krishna Banik, Dipole Moment, Encyclopedia (MDPI, Switzerland), 2020. (<https://encyclopedia.pub/1604>).
22. **Aparna Das** and Bimal Krishna Banik, Synthesis of β -Lactams, Encyclopedia (MDPI, Switzerland), 2020. (<https://encyclopedia.pub/1575>).
23. **Aparna Das** and Bimal Krishna Banik, Thiosugars of Biological Significance, Encyclopedia (MDPI, Switzerland), 2020. (<https://encyclopedia.pub/1552>).
24. **Aparna Das**, Ram Naresh Yadav, and Bimal Krishna Banik, Ascorbic Acid-Mediated Reactions, Encyclopedia (MDPI, Switzerland), 2020. (<https://encyclopedia.pub/2341>).
25. **Aparna Das**, Ram Naresh Yadav, and Bimal Krishna Banik, Ascorbic Acid-Induced Reactions, Encyclopedia (MDPI, Switzerland), 2020. (<https://encyclopedia.pub/2300>).
26. **Aparna Das**, and Bimal Krishna Banik, "Studies on Dipole Moment of Penicillin Isomers and Related Antibiotics", *Journal of Indian Chemical Society*, 97(6), 911-915, 2020.
27. **Aparna Das**, Ajay K. Bose and Bimal Krishna Banik, "Stereoselective Synthesis of β -Lactams Under Diverse Conditions: Unprecedented Observations", *Journal of Indian Chemical Society*, 97(6), 917-925, 2020.
28. **Aparna Das**, Ram Naresh Yadav, and Bimal Krishna Banik, "Ascorbic Acid-mediated Reactions In Organic Synthesis", *Current Organocatalysis*, 7(3), 212-241, 2020.
29. Lorenzo Mancini, Florian Moyon, David Hernández-Maldonado, Ivan Blum, Jonathan Houard, Williams Lefebvre, François Vurpillot, **Aparna Das**, Eva Monroy, and Lorenzo

- Rigutti, “Carrier Localization in GaN/AlN Quantum Dots As Revealed by Three-Dimensional Multimicroscopy”, *Nano Letters* 17 (7), pp 4261–4269 (2017).
30. L. Mancini, F. Moyon, J. Houard, I. Blum, W. Lefebvre, F. Vurpillot, **A. Das**, E. Monroy, and L. Rigutti, “Multi-excitonic emission from Stranski-Krastanov GaN/AlN quantum dots inside a nanoscale tip”, *Applied Physics Letters* 111, 243102 (2017).
 31. Mukul C. Debnatha, Baolai Liang, Ramesh B. Laghumavarapu, Guodong Wang, **Aparna Das**, Bor-Chau Juang, and Diana L. Huffaker, “Optical properties of bimodally distributed InAs quantum dots grown on digital AlAs_{0.56}Sb_{0.44} matrix for use in intermediate band solar cells”, *Journal of Applied Physics* 121, 214304 (2017)
 32. Wang, Guodong; Liang, Baolai; Juang, Bor-Chau; **Das, Aparna**; Debnath, Mukul; Huffaker, Diana; Mazur, Yuriy; Ware, Morgan; Salamo, Gregory, “Comparative study of photoluminescence from In_{0.3}Ga_{0.7}As/GaAs surface and buried quantum dots”, *Nanotechnology* 27, 465701 (2016).
 33. Nataliya Frenkel, Jens Wallys, Sara Lippert, Jörg Teubert, Stefan Kaufmann, **Aparna Das**, Eva Monroy, Martin Eickhoff, and Motomu Tanaka, “High Precision, Electrochemical Detection of Reversible Binding of Recombinant Proteins on Wide Bandgap GaN Electrodes Functionalized with Biomembrane Models”, *Advanced Functional Materials* 24, 4927-4934 (2014)
 34. S. Paul, K. Maier, **A. Das**, F. Furtmayer, A. Helwig, J. Teubert, E. Monroy, G. Müller, and M. Eickhoff, “III-N nanostructures for optical gas detection and pH sensing in liquids”, *Proc. SPIE* 8725, 87250K (2013)
 35. Frank Bertram, Gordon Schmidt, Marcus Mueller, Silke Petzold, Peter Veit, Juergen Christen, **Aparna Das**, Eva Monroy, “Cathodoluminescence spectroscopy of single GaN/AlN quantum dots directly performed in a scanning transmission electron microscope”, *Verhandlungen der Deutschen Physikalischen Gesellschaft;(German Physical Society)* 2013
 36. J. Teubert, S. Koslowski, S. Lippert, M. Schafer, J. Wallys, G. Dimitrakopulos, Th. Kehagias, Ph. Komninou, **A. Das**, E. Monroy, and M. Eickhoff, “InGaN/GaN quantum dots as optical probes for the electric field at the GaN/electrolyte interface”, *J. Appl. Phys.* 114, 074313 (2013).
 37. Schmidt, G., Müller, M., Bertram, F., Veit, P., Petzold, S., Das, A., Monroy, E., Christen, J., Highly spatially resolved Cathodoluminescence of Single GaN Quantum Dots directly performed in a Scanning Transmission Electron Microscope, *Microscopy and Microanalysis* 18(S2), pp. 1878-1879 (2012).
 38. A. Lotsari, **A. Das**, Th. Kehagias, Y. Kotsar, E. Monroy, Th. Karakostas, P. Gladkov, Ph. Komninou, G.P. Dimitrakopulos, “Morphology and origin of V-pits in semipolar (11-22) InGaN”, *J. Cryst. Growth* 339, pp. 1-7 (2012)
 39. A. Lotsari, G.P. Dimitrakopulos, Th. Kehagias, **A. Das**, E. Monroy, Ph. Komninou, “Structural properties of semipolar InGaN/GaN quantum dot superlattices grown by plasma-assisted MBE”, *Microelectronic Engineering* 90, pp. 108-111 (2012)
 40. T. Koukoulia, A. Lotsari, Th. Kehagias, G. P. Dimitrakopulos, I. Häusler, **A. Das**, E. Monroy,

- Th. Karakostas, and Ph. Komninou, “Structure and Strain State of Polar and Semipolar InGa_N Quantum Dots”, *Appl. Surf. Sci.* 260, pp 7-12(2012)
41. **A. Das**, G. P. Dimitrakopoulos, Y. Kotsar, A. Lotsari, Th. Kehagias, Ph. Komninou, and E. Monroy, “Improved luminescence and thermal stability of semipolar (11-22) InGa_N quantum dots”, *Appl. Phys. Lett.* 98, 201911 (2011)
 42. **A. Das**, P. Sinha, Y. Kotsar, P. K. Kandaswamy, G. P. Dimitrakopoulos, Th. Kehagias, Ph. Komninou, G. Nataf, P. De Mierry, and E. Monroy, “Growth and characterization of polar (0001) and semipolar (11-22) InGa_N/Ga_N quantum dots”, *J. Crystal Growth* 323, 161 (2011)
 43. Ž. Gačević, **A. Das**, J. Teubert, Y. Kotsar, P. K. Kandaswamy, Th. Kehagias, T. Koukoulas, Ph. Komninou, and E. Monroy, “Internal Quantum Efficiency of III-nitride Quantum Dot Superlattices Grown by Plasma-Assisted Molecular-Beam Epitaxy”, *J. Appl. Phys.* 109, 103501 (2011)
 44. Y. Kotsar, B. Doisneau, E. Bellet-Amalric, **A. Das**, E. Sarigiannidou, and E. Monroy, “Strain relaxation in Ga_N/Al_xGa_{1-x}N superlattices grown by plasma-assisted molecular-beam epitaxy”, *J. Appl. Phys.* 110, 033501 (2011)
 45. Y. Kotsar, P. K. Kandaswamy, **A. Das**, E. Sarigiannidou, and E. Monroy, “Strain relaxation in Ga_N/Al_{0.1}Ga_{0.9}N superlattices for mid-infrared intersubband absorption”, *J. Crystal Growth* 323, 64 (2011)
 46. **A. Das**, S. Magalhaes, Y. Kotsar, P. K. Kandaswamy, B. Gayral, K. Lorenz, E. J. C. Alves, P. Ruterana, and E. Monroy, “Indium kinetics during the plasma-assisted molecular-beam epitaxy of semipolar (11-22) InGa_N layers”, *Appl. Phys. Lett.* 96, 181907 (2010)
 47. **A. Das**, L. Lahourcade, J. Pernot, S. Valdueza-Felip, P. Ruterana, A. Laufer, M. Eickhoff, and E. Monroy, “P-type doping of semipolar Ga_N (1122) by plasma-assisted molecular-beam epitaxy”, *Phys. Stat. Sol. (c)* 7, pp. 1913-1915 (2010)
 48. D. Hofstetter, J. Di Francesco, P. K. Kandaswamy, **A. Das**, S. Valdueza-Felip, and E. Monroy, “Performance Improvement of AlN–Ga_N-Based Intersubband Detectors by Using Quantum Dots”, *IEEE Photon. Technol. Lett.* 15, pp. 1087-1089 (2010)
 49. P. K. Kandaswamy, H. Machhadani, Y. Kotsar, S. Sakr, **A. Das**, M. Tchernycheva, L. Rapenne, E. Sarigiannidou, F. H. Julien, and E. Monroy, “Effect of doping on the mid-infrared intersubband absorption in Ga_N/AlGa_N superlattices grown on Si(111) templates”, *Appl. Phys. Lett.* 96, 141903 (2010)
 50. D. Hofstetter, J. Di Francesco, E. Baumann, F. R. Giorgetta, P. K. Kandaswamy, **A. Das**, S. Valdueza-Felip, and E. Monroy, “Performance improvement of AlN/Ga_N-based intersubband detectors thanks to quantum dot active regions”, *Proc. SPIE* 7808, 78080A (2010)
 51. E. Monroy, P. K. Kandaswamy, H. Machhadani, A. Wirthmüller, S. Sakr, L. Lahourcade, **A. Das**, M. Tchernycheva, P. Ruterana, and F. H. Julien, “Polar and Semipolar III-Nitrides for long wavelength intersubband devices”, *Proc. SPIE* 7608, 76081G (2010).
 52. **Aparna Das** and B. K. Banik, “Tellurium based solar cell”, *Physical Sciences Reviews*, 2021 (Accepted/In press).

53. **Aparna Das** and B. K. Banik, "Semiconductor properties of Tellurium and its applications", *Physical Sciences Reviews*, 2021 (Accepted/In press).
54. Anjaly Das, **Aparna Das** and B. K. Banik, "Tellurium based chemical sensors", *Physical Sciences Reviews*, 2021 (Accepted/In press).
55. **Aparna Das** and B. K. Banik, "Tellurium in Carbohydrate synthesis", *Physical Sciences Reviews*, 2021 (Accepted/In press).
56. S. Aldawood, **Aparna Das** and B. K. Banik, "Tellurium in cyclization reaction", *Physical Sciences Reviews*, 2021 (Accepted/In press).
57. Devalina Ray, **Aparna Das**, Suman Mazumdar and Bimal K. Banik, "Tellurium-induced Functional Group Activation", *Physical Sciences Reviews*, 2021 (Accepted/In press).
58. **Aparna Das** and B. K. Banik, "Conceptual Design and Cost-Efficient Environmentally Benign Synthesis of Beta Lactams", *Physical Sciences Reviews*, 2021 (Accepted/In press).
59. **Aparna Das** and Bimal Krishna Banik, "A Unique Exploration of Microwave-Induced Stereocontrolled Synthesis of Diverse Beta Lactams", *Current Organic Chemistry*, (Accepted/In press).
60. **Aparna Das** and Bimal Krishna Banik, "Fighting Against Coronavirus Using Natural Cinnamon and a Product Obtained from It", *Journal of Indian chemical society*, 2021 (Submitted).
61. **Aparna Das** and Bimal Krishna Banik, "Microwave-Induced Catalytic Transfer Hydrogenation in Different Solvents Toward Optically Active Hydroxy Beta Lactams: Effects of Penetration Depth", *Zeitschrift für Physikalische Chemie*, 2021 (submitted).
62. **Aparna Das** and Bimal Krishna Banik, "Microwave in Research-More Miracles (Perceptive)", *Tetrahedron*, 2021 (submitted).
63. Ram Naresh Yadav, Aarif L. Shaikh, Aparna Das, Ashok Kumar Srivastava, Devalina Ray, Amrendra Kumar Singh, Bimal K. Banik, Asymmetric synthesis of 3-Pyrrole Substituted β -Lactams Through *p*-Toulenesulphonic Acid-Catalyzed Reaction of azetidine-2,3-diones with Hydroxyprolines, *Current Organocatalysis*, 2022 (submitted).

Press Releases

1. **Das, A.**, and Banik, B. K., "Ascorbic Acid-Catalyzed Organic Reactions", Selected for Press Release by Bentham Publisher and "Eureka Alert" at the **American Association for the Advancement of Science**, 2020, https://www.eurekalert.org/pub_releases/2020-09/bsp-aar092520.php
2. **Das, A.**, Yadav, R. N., and Banik, B. K., "A Novel Baker's Yeast-Mediated Microwave-Induced Reduction of Racemic 3-Keto-2-Azetidinones: Facile Entry to Optically Active Hydroxy β -Lactam Derivatives", Selected for Press Release by Bentham Publisher and "Eureka Alert" at the **American Association for the Advancement of Science**, 2022, <https://www.eurekalert.org/news-releases/945772>

3. **Das, A.**, and Banik, B. K., “Versatile Synthesis of Organic Compounds Derived from Ascorbic Acid”, Selected for Press Release by Bentham Publisher and “Eureka Alert” at the **American Association for the Advancement of Science**, 2022, <https://www.eurekalert.org/news-releases/943319>
4. Frenkel, N., Wallys, J., Lippert, S., Teubert, J., Kaufmann, S., **Das, A.**, Monroy, E., Eickhoff, M., and Tanaka, M.,” On the trail of proteins” Selected for Press Release by Heidelberg University, Germany, Press release No. 207/2014.

Journals and Books Editorial Preface

1. **Aparna Das** and B. K. Banik, “Editorial Preface”, “**Microwaves in Chemistry Applications: Fundamentals, Methods and Future Trends**”, Elsevier (UK), 2021, 15-16.
2. **Aparna Das** and B. K. Banik, “Editorial Preface”, Sustainable Reactions in the Synthesis of Heterocycles”, **Current Organocatalysis (Bentham Publisher)**, 2022, 9, 1.

Invited Presentations

1. **Aparna Das**, Dipole Moment of Biologically Important Compounds, 26th International Conference of the International Academy of Physical and Biological Sciences (IAPS) on Advances in Physics, Chemistry, Mathematics, Computer Sciences & Biological Sciences (CONIAPS 2020), Kerala, India. December 2020
2. B. Doisneau, Y. Kotsar, E. Sarigiannidou, E. Bellet-Amalric, **A. Das**, and E. Monroy, Strain relaxation in GaN/AlGaIn superlattices grown by PAMEB for intersubband applications, Extended Defects in Semiconductors EDS2012. Thessaloniki, Greece. Sept. 2012
3. E. Monroy, Y. Kotsar, **A. Das**, S. Valdueza-Felip, E. Bellet-Amalric, C. Bougerol, R. Songmuang, L. Rapenne, E. Sarigiannidou, S. Sakr, M. Tchernycheva, F. H. Julien, E. Gross, A. Pesach, and G. Bahir, GaN quantum devices for infrared optoelectronics, 4th Int. Symposium on the Growth of III-Nitrides (ISGN4), St. Petersburg, Russia. July 2012
4. E. Monroy, Y. Kotsar, P. K. Kandaswamy, **A. Das**, A. Wirthmüller, H. Machhadani, S. Sakr, M. Tchernycheva, F. H. Julien, A. Vardi, and G. Bahir, III-Nitride semiconductors for intersubband devices, , Photonics West (SPIE), San Francisco, U.S.A. January 2011
5. **A. Das**, A. Lotsari, Y. Kotsar, G. P. Dimitrakopoulos, Th. Kehagias, Ph. Komninou, and E. Monroy Internal Quantum Efficiency of polar and semipolar InGaIn QDs, Tata Institute of Fundamental Research (TIFR), India, September 2011
6. E. Monroy, P. K. Kandaswamy, H. Machhadani, A. Wirthmüller, S. Sakr, L. Lahourcade, **A. Das**, M. Tchernycheva, and F. H. Julien, Polar and Semipolar III-Nitrides for long wavelength intersubband devices, Photonics West (SPIE), San Francisco, U.S.A. January 2010
7. E. Monroy, Y. Kotsar, P. Sinha, **A. Das**, L. Lahourcade, P. K. Kandaswamy, H. Machhadani, S. Sakr, M. Tchernycheva, and F. H. Julien, III-nitride nanostructures for intersubband optoelectronics, 3rd Int. Symposium on the Growth of III-Nitrides (ISGN3). Montpellier, France. July 2010

Contributions to international conferences

8. **A. Das**, and B.K. Banik, Taxol, Taxotere and their epi-isomers: Computational study (Paper ID: 3591267), Fall 2021 American Chemical Society National Meeting, USA, August 22-26, 2021.
9. **A. Das**, and B.K. Banik, Significant Role of Dipole Moment in Medicinally Important Organic Molecules (Paper ID: 3591231), Fall 2021 American Chemical Society National Meeting, USA, August 22-26, 2021.
10. **A. Das**, R.N. Yadav and B.K. Banik, Importance of Thiosugar and Its Synthesis, Spring 2021 American Chemical Society National Meeting, USA, April 5-30, 2021.
11. Ram N Yadav, Armando Paniagua, **Aparna Das**, and Bimal K. Banik, Harnessing the potential of Intramolecular Oxy-Michael reaction in the synthesis of 1,4-Dioxepane, Spring 2021 American Chemical Society National Meeting, USA, April 5-30, 2021.
12. Ram N Yadav, **Aparna Das**, Armando Paniagua, and Bimal K. Banik, Synthetic application of Intramolecular aza-Michael Reaction in the synthesis of 1,4-Diazapane, Spring 2021 American Chemical Society National Meeting, USA, April 5-30, 2021.
13. **A. Das**, R.N. Yadav and B.K. Banik, Significant role of ascorbic acid in organic synthesis (PAPER ID: 3542563), Spring 2021 American Chemical Society National Meeting, USA, April 5-30, 2021.
14. **A. Das**, and B.K. Banik, Dipole Moment of Isomeric Penicillins and Related Antibiotics (PAPER ID: 3399787), Fall 2020 American Chemical Society National Meeting in San Francisco, USA, August 16-20, 2020.
15. **A. Das**, and B.K. Banik, Stereoselective Synthesis of β -Lactams: Unprecedented Observations (PAPER ID: 3399788), Fall 2020 American Chemical Society National Meeting in San Francisco, USA August 16-20, 2020.
16. **A. Das**, and B.K. Banik, Dipole Moment Studies on Diverse α -Hydroxy- β -Lactams (PAPER ID: 3399790), Fall 2020 American Chemical Society National Meeting in San Francisco, USA August 16-20, 2020.
17. **A. Das**, and B.K. Banik, Dipole Moment Studies on Diverse Imines (PAPER ID: 3399791), Fall 2020 American Chemical Society National Meeting in San Francisco, USA August 16-20, 2020.
18. **A. Das**, and B.K. Banik, Digital Technology Application in to Bioactivity of Molecules: An Essential Tool for Modern Drug Discovery and Beyond, First International Conference on Research and Innovation-Oman 2020, Sultan Qaboos University, Oman, October 19-20, 2020.
19. **A. Das**, and B.K. Banik, RELATIONSHIP BETWEEN ANTIBACTERIAL ACTIVITY AND DIPOLE MOMENT OF ORGANIC DRUGS, ICMPH, March 2020, Dubai, United Arab Emirates.
20. Participated in INTERNATIONAL WORKSHOP ON COMPUTATIONAL CHEMISTRY-Application to Odyssey & Spartan Software, Webinar, September 30, 2020.
21. S. Paul, A. Helwig, **A. Das**, J. Teubert, E. Monroy, G. Müller, and M. Eickhoff, Opto-

chemical sensor system based on InGaN/GaN quantum dots for pH detection, Int. Meeting on Chemical Sensors, Nuremberg, Germany. May 2012

22. S. Koslowski, S. Lippert, J. Wallys, F. Furtmayr, J. Teubert, **A. Das**, E. Monroy, G. Dimitrakopulos, P. Komninou, S. Paul, A. Helwig, G. Müller, and M. Eickhoff, III-N nanostructures for optical pH-detection, Int. Meeting on Chemical Sensors, Nuremberg, Germany. May 2012
23. N. Hatui, **A. Das**, E. Monroy, A. Bhattacharya., Anisotropic strain and optical properties of semi-polar (11-22) GaN epilayers grown on m-plane sapphire, International Conference on the Physics of Semiconductors, Zurich, Switzerland. July 2012
24. M. Müller, G. Schmidt, F. Bertram, P. Veit, **A. Das**, E. Monroy, and J. Christen, Direct Imaging of Single GaN Quantum Dots using Helium Temperature Scanning Transmission Electron Microscopy Cathodoluminescence, 9th Intl. Symp. on Semiconductor Light Emitting Diodes (ISSLED 2012), Berlin, Germany. July 2012
25. G. Schmidt, M. Müller, F. Bertram, P. Veit, S. Petzold, **A. Das**, E. Monroy, Highly spatially resolved Cathodoluminescence of Single GaN Quantum Dots directly performed in Scanning Transmission Electron Microscope, Microscopy & Microanalysis 2012 Meeting, Phoenix, US. Aug. 2012
26. N. Hatui, M. Gokhale, **A. Das**, E. Monroy, and A. Bhattacharya, Evaluating anisotropic structural properties of semi-polar III-Nitride epilayers using high-resolution x-ray diffraction, The 11th Biennial Conference on High Resolution X-Ray Diffraction and Imaging. Saint-Petersburg, Russia. Sept. 2012
27. **A. Das**, L. Lahourcade, P. Sinha, G. P. Dimitrakopulos, Th. Kehagias, Ph. Komninou, and E. Monroy, Plasma-assisted MBE growth of semipolar quantum dots, Photonics West (SPIE), San Francisco, U.S.A. January 2011
28. **A. Das**, Y. Kotsar, A. Lotsari, Th. Kehagias, Ph. Komninou, and E. Monroy, Improved luminescence and thermal stability of MBE-grown semipolar (11-22) InGaN quantum dots, 16th European Molecular Beam Epitaxy, Alpe d'Huez, France. March 2011
29. Y. Kotsar, **A. Das**, E. Bellet-Amalric, E. Sarigiannidou, H. Machhadani, S. Sakr, M. Tchernycheva, F. H. Julien, and E. Monroy, GaN/AlGaIn superlattices grown by PAMBE for intersubband applications in the infrared spectral range, 16th European Molecular Beam Epitaxy, Alpe d'Huez, France. March 2011
30. Y. Kotsar, S. Sakr, E. Sarigiannidou, H. Machhadani, E. Bellet-Amalric, M. Tchernycheva, **A. Das**, F. H. Julien, and E. Monroy, Plasma-assisted MBE of GaN/AlGaIn multiple-quantum-well structures for intersubband optoelectronics, E-MRS Spring Meeting, Nice, France. May 2011
31. **A. Das**, A. Lotsari, Y. Kotsar, G. P. Dimitrakopulos, Th. Kehagias, Ph. Komninou, and E. Monroy, Internal Quantum Efficiency of InGaIn quantum dots: Polar vs. Semipolar, E-MRS Spring Meeting, Nice, France. May 2011
32. Y. Kotsar, S. Sakr, E. Bellet-Amalric, H. Machhadani, B. Doisneau, E. Sarigiannidou, M. Tchernycheva, **A. Das**, F. H. Julien, and E. Monroy, Plasma-assisted MBE of

GaN/AlGaN multiple-quantum-well structures for intersubband optoelectronics, 9th International Conference on Nitride Semiconductors (ICNS9), Glasgow, UK. July 2011

33. J. Teubert, S. Koslowski, **A. Das**, E. Monroy, and M. Eickhoff, InGaN quantum dots as optochemical transducers, 9th International Conference on Nitride Semiconductors (ICNS9), Glasgow, UK. July 2011
34. T. Koukoulou, Th. Kehagias, G. P. Dimitrakopoulos, A. Lotsari, **A. Das**, I. Häusler, W. Neumann, E. Monroy, and Ph. Komninou, Nanostructure and Strain State of InGaN Quantum Dot Superlattices Grown by MBE, 9th International Conference on Nitride Semiconductors (ICNS9), Glasgow, UK. July 2011
35. A. Lotsari, G. P. Dimitrakopoulos, Th. Kehagias, T. Koukoulou, **A. Das**, E. Monroy, and Ph. Komninou, Strain and structure of semipolar (11-22) InGaN quantum dots, 9th International Conference on Nitride Semiconductors (ICNS9), Glasgow, UK. July 2011
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37. B. Lacroix, M. P. Chauvat, P. Ruterana, G. Nataf, P. de Mierry, **A. Das**, and E. Monroy, A structural analysis of semipolar (11-22)-GaN layers grown on m-sapphire by MOVPE and MBE, 9th International Conference on Nitride Semiconductors (ICNS9), Glasgow, UK. July 2011
38. G. P. Dimitrakopoulos, A. Lotsari, E. Kalesaki, J. Kioseoglou, Th. Kehagias, L. Lahourcade, **A. Das**, E. Monroy, I. Häusler, H. Kirmse, W. Neumann, G. Jurczak, T. D. Young, P. Duewski, Th. Karakostas and Ph. Komninou, Self-Assembled Quantum Dot Superlattices in Semipolar (11-22) III-Nitrides: Stoichiometry, Strain State and Morphology, E-MRS 2011 Fall Meeting, Warsaw, Poland. Sept. 2011
39. A. Lotsari, G. P. Dimitrakopoulos, Th. Kehagias, **A. Das**, E. Monroy, and Ph. Komninou, Asymmetric V-defects in semipolar InGaN, E-MRS 2011 Fall Meeting, Warsaw, Poland. Sept. 2011
40. T. Koukoulou, Th. Kehagias, G. P. Dimitrakopoulos, A. Lotsari, **A. Das**, I. Häusler, W. Neumann, E. Monroy, and Ph. Komninou, Nanostructure and Strain State of InGaN Quantum Dot Superlattices Grown by MBE, E-MRS 2011 Fall Meeting, Warsaw, Poland. Sept. 2011
41. **A. Das**, Y. Kotsar, P. K. Kandaswamy, B. Gayral, and E. Monroy, Study of Indium incorporation during the MBE growth of polar and semipolar InGaN layers, E-MRS Spring Meeting, Strasbourg, France. May 2010
42. P. K. Kandaswamy, Y. Kotsar, H. Machhadani, S. Sakr, **A. Das**, M. Tchernycheva, F. H. Julien, and E. Monroy, Effect of doping on the mid-infrared intersubband absorption in III-nitride superlattices grown on Si(111) templates, E-MRS Spring Meeting, Strasbourg, France. May 2010
43. **A. Das**, S. Magalhães, Y. Kotsar, P. K. Kandaswamy, B. Gayral, K. Lorenz, E. Alves, and E. Monroy, Different In incorporation in polar and semipolar InGaN layers during MBE

growth, 3rd Int. Symposium on the Growth of III-Nitrides (ISGN3). Montpellier, France. July 2010

44. Y. Kotsar, P. K. Kandaswamy, H. Machhadani, S. Sakr, **A. Das**, M. Tchernycheva, F. H. Julien, and E. Monroy, Effect of doping on the interband and intersubband properties of III-nitride superlattices grown on Si(111) templates, 3rd Int. Symposium on the Growth of III-Nitrides (ISGN3). Montpellier, France. July 2010
45. Y. Kotsar, P. K. Kandaswamy, **A. Das**, L. Rapenne, E. Sarigiannidou, and E. Monroy, Study of strain relaxation in GaN/AlGa_N superlattices for mid-infrared intersubband absorption, 16th Int'l Conference on Molecular Beam Epitaxy (MBE2010). Berlin, Germany. August 2010
46. **A. Das**, P. Sinha, Y. Kotsar, P. K. Kandaswamy, S. Magalhães, K. Lorenz, E. Alves, and E. Monroy, Growth and characterization of polar (0001) and semipolar (11-22) InGa_N/Ga_N quantum dots, 16th Int'l Conference on Molecular Beam Epitaxy (MBE2010). Berlin, Germany. August 2010
47. T. Koukoulou, Th. Kehagias, A. Lotsari, **A. Das**, E. Monroy, G. P. Dimitrakopoulos, and Ph. Komninou, InGa_N quantum dot superlattices grown by plasma assisted MBE, Extended Defects in Semiconductors. Brighton, UK. September 2010
48. **A. Das**, A. Lotsari, S. Magalhães, P. Sinha, G. P. Dimitrakopoulos, Th. Kehagias, Ph. Komninou, K. Lorenz, E. Alves, and E. Monroy, Plasma-assisted MBE growth of semipolar (11-22) InGa_N layers and Ga_N/InGa_N quantum dots, International Workshop on Nitride Semiconductors (IWN-2010), Tampa, USA. Sept. 2010
49. **A. Das**, E. Monroy, and M. Eickhoff, GaIn_N quantum dots as optochemical transducers, J. Teubert, S. Koslowski, 19th European Workshop on Heterostructure Technology (HETECH'10), Crete, Greece. Nov. 2010
50. G. P. Dimitrakopoulos, E. Kalesaki, A. Lotsari, Th. Kehagias, J. Kioseoglou, **A. Das**, L. Lahourcade, E. Monroy, I. Hausler, H. Kirmse, W. Neumann, Ph. Komninou and Th. Karakostas, Structural properties of Semipolar III-Nitride Quantum Dots, 19th European Workshop on Heterostructure Technology (HETECH'10), Crete, Greece. Nov. 2010
51. T. Koukoulou, Th. Kehagias, A. Lotsari, **A. Das**, E. Monroy, G.P. Dimitrakopoulos, and Ph. Komninou, Nanoscale Structure of InGa_N Quantum Dot Superlattices Grown by MBE, 19th European Workshop on Heterostructure Technology (HETECH'10), Crete, Greece. Nov. 2010
52. A. Lotsari, G. P. Dimitrakopoulos, Th. Kehagias, **A. Das**, E. Monroy, and Ph. Komninou, Structure of asymmetric V-defects in semipolar InGa_N grown by MBE, 4th International Conference on Micro-Nanoelectronics, Nanotechnology and MEMS, NCSR-Democritos, Athens, Greece. Dec. 2010
53. A. Lotsari, T. Koukoulou, Th. Kehagias, **A. Das**, E. Monroy, G. P. Dimitrakopoulos, and Ph. Komninou Polar and Semipolar InGa_N Quantum Dots, 4th International Conference on Micro-Nanoelectronics, Nanotechnology and MEMS, NCSR-Democritos, Athens, Greece. Dec. 2010

TECHNICAL SKILLS:

- Molecular-beam epitaxy of two-dimensional layers and nanostructures (Quantum wells, quantum dots, nanowires)
- Experience in MBE maintenance
- Experience in Plasma-enhanced chemical vapor deposition (PECVD) and sputtering
- Experience in structural characterization: Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD)
- Experience in optical characterization: UV and IR photoluminescence, transmission spectroscopy, time-resolved photoluminescence, Raman Spectroscopy
- Experience in electrical characterization: Hall Effect measurements
- Clean room experience: Spin coating, Reactive-ion etching (RIE), Electron beam evaporator, Rapid thermal processing (RTP)
- Experience in Electron-beam lithography, Photolithography, Wire bonding, Profilometer and Wafer saw
- Operation of various laser systems: Spectra Physics Quanta Ray DCR-4 Nd: YAG Q-switched nano second Laser, CW frequency-doubled Ar laser, Opotek VIBRANT tunable nano second Laser, Spectra Physics VSL-337 Nitrogen laser
- Working with Optical Fibers (cleaving, cutting, splicing, launching light, loss measurements and characterization of various parameters)
- Operation of various spectrophotometers, fluorometers, interferometers, photomultiplier tubes, etc

Doctoral Research:

Area of Research: My thesis work was focused on the synthesis of quantum dot structures for application as optical transducers for chemical sensors in aerospace for detection of pH levels, and hydrogen or hydrocarbon concentrations in gas or liquid environments and is funded by European Union (EU) project **“Dotsense” (FP7-ICT-STREP)**. In parallel, I have studied also the growth conditions for the synthesis of semipolar (11-22)-oriented 2D layers (InGaN, AlGaN and InN) and nanostructures (InGaN/GaN and InGaN/InN quantum wells) and the effect of Mg doping on the growth kinetics of semipolar GaN (11-22) layer. I have applied several different characterization tools to investigate the morphological, structural, and optical properties of the grown samples. In particular, I have used RHEED for *in situ* characterization and *ex situ* characterization of samples by XRD, AFM, SEM, TEM and photoluminescence. This work also included the electronic simulation of the structures using the nextnano3 software.

Post-Doctoral research:

1. *Area of Research:* The main technological issues that the joint research programme, **Nanowiring-Marie Curie Initial Training Network**, intends to address within the project are the following: semiconductor nanowires for sensors, opto-electronic, nanoelectronic and energy harvesting applications and the financial support was from European Commission. Aim of my work was to focus on the growth optimization of III-V nanowires with respect to their optical emission properties and their implementation in nanoscale optoelectronic devices. The objective was to demonstrate internal quantum efficiency for the nanowires higher than the value of 70% currently achieved in planar III-V heterostructures. Central to

this task are the complementary growth and characterization methods involved, in particular the correlation between the optical and structural properties and the growth methodologies.

2. *Area of Research:* In the research work at UCLA, I am involved in multiple projects both for the Electrical Engineering department as well as for California NanoSystems Institute. One of the main projects involves developing a single photon emitter using semiconductor nanowires, grown by plasma-assisted molecular beam epitaxy (PAMBE) process. The second projects involves developing deep ultraviolet emitters using Stranski-Krastanov quantum dots and nanowire heterostructures and I have applied several different characterization tools to investigate the morphological, structural, electrical and optical properties of the structures. I am also working towards developing a novel solar cell using semiconductor nanowires. During this time I have gained extensive experience in writing successful project proposals for different funding agencies in USA, including National Science Foundation (NSF), Department of Energy (DoE), Army research laboratory (ARL).

Courses taken in Post Graduate Programs:

- Classical Mechanics, Electromagnetic Theory & Relativistic Phenomena, Material Science, Mechanics & Wave Phenomena, Nuclei, Particles & Beams, Quantum Mechanics - I (Basic), Quantum Mechanics - II (Advanced), Solid State Theory, Statistical Mechanics & Thermodynamics, Structure & Properties of Atoms & Molecules
- Bio Photonics, Fiber Optics, Industrial Photonics, Laser Physics, Laser Spectroscopy, Laser Systems & Laser Applications, Optical Communication, Optical Sensor Technology, Optical Signal Processing & Digital Signal Processing, Optoelectronics, Applied Optics, Geometrical Optics, Nonlinear Optics & Electromagnetic Theory, Optical Instrumentation, Physical Optics, Quantum Optics
- Digital & Analog Electronics, Electricity & Magnetism, Electronic Instrumentation, Microprocessors & Their Applications, Network Analysis & Communication Engineering

References

1. Bimal Krishna Banik, Ph.D., C.Chem., F.R.S.C., F.I.C.S., F.I.S.R.O.S.E.T., F.R.S.C.S.
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