Curriculum Vitae of Debdeep Jena

Contact Information

424 Phillips Hall, School of Electrical and Computer Engineering
228 Bard Hall, Department of Materials Science and Engineering
Cornell University, Ithaca, NY 14853 USA
Email: djena@cornell.edu
Web: https://djena.engineering.cornell.edu

Personal Data

Born:	26 November 1976
Status:	United States Citizen
Spouse:	Grace (Huili) Xing
Child:	Rohan Xing Jena

Summary

Debdeep Jena is the David E. Burr Professor of Engineering at Cornell University. He is in the departments of Electrical and Computer Engineering and Materials Science and Engineering, and is a field member in the department of Applied and Engineering Physics. He joined Cornell in 2015 from the faculty at Notre Dame where he was since August 2003, shortly after earning the Ph.D. in Electrical and Computer Engineering from the University of California, Santa Barbara (UCSB).

His teaching and research are in the quantum physics of semiconductors and electronic and photonic devices based on quantized semiconductor structures (e.g. nitrides, oxides, 2D materials), and their heterostructures with superconductors, ferroelectrics and magnets. The research realizes device applications in energy-efficient transistors, light-emitting diodes and lasers, RF and power electronics, and quantum computation and communications. His research is driven by the goal to enable orders of magnitude increase in the energy efficiency and speed for computation, memory, communications, lighting, and electrical energy management ranging from the chip to the grid.

The research from his group has been published in more than 500 journal papers including in Science, Nature, Physical Review Letters, Applied Physics Letters and Electron Device Letters. A fellow of the APS and the IEEE, he is the winner of the ISCS young scientist award in 2012, MBE young scientist award in 2014, the Art Gossard MBE innovator award 2024, and research awards from the industry such as the IBM faculty award in 2012, and the Intel Outstanding Research award in 2020. He has served in leadership roles in several national centers such as the ME Commons NITRIDER, SRC/DARPA JUMP centers, DOE EFRC, NSF DMREF, and NSF EFRI. His research work has resulted in several patents and two spinoff companies (*Soctera*, *Gallox*). Jena's recorded *lectures* have been viewed more than 250,000 times, and his 2022 textbook *Quantum Physics of Semiconductor Materials and Devices* has been adopted by several universities for undergraduate and graduate courses.

Professional Preparation

2003 **University of California**, Santa Barbara, CA
Ph.D. in Electrical and Computer Engineering
Thesis: "Polarization Induced Electron Populations in III-V Nitride Semiconductors: Growth, Transport, and Device Applications"
Committee: Profs. U. Mishra (Director), H. Kroemer, A. Gossard, and J. Speck.

1998 **Indian Institute of Technology (IIT)**, Kanpur, India
B.S. with major in Electrical Engineering and minor in Physics (Solid State)
Thesis: "Pipelined CMOS analog to digital convertors"

Professional Experience

Academic Appointments

2015 - **Cornell University**, Ithaca, NY
Department of Electrical and Computer Engineering
Department of Materials Science and Engineering
Title: David E. Burr Professor of Engineering

2013- **University of Notre Dame**, Notre Dame, IN
Department of Electrical Engineering
Title: Professor

2012 (Fall) **University of California**, Santa Barbara, CA
Department of Electrical and Computer Engineering
Title: Visiting Associate Professor

2009-2013 **University of Notre Dame**, Notre Dame, IN
Department of Electrical Engineering
Title: Associate Professor

2003-2009 **University of Notre Dame**, Notre Dame, IN
Department of Electrical Engineering
Title: Assistant Professor

1998-2003 **University of California**, Santa Barbara, CA
Department of Electrical and Computer Engineering
Title: Research Assistant

Distinctions, Honors, & Awards

Students:

2024	Advisor of PhD student Wenwen Zhao, winner of the Kavli Graduate Fellowship, 2023-2024.
2023	Advisor of PhD student Len van Deurzen, winner of the best student paper award for ICNS Fukuoka, 2023.
2023	Advisor of PhD student Yu-Hsin (Cindy) Chen, winner of the best student paper award for ICNS Fukuoka, 2023.
2023	Advisor of PhD student Chandrasekhar Savant, winner of the best student paper award for ICNS Fukuoka, 2023.
2023	Advisor of Masters student Brendan Mercado, winner of the best Masters student presentation for Cornell ECE, 2023.
2023	Advisor of PhD student Wenwen Zhao, winner of the best student paper award for CNF annual symposium, 2023.
2022	Advisor of PhD student Len van Deurzen, winner of the best student paper award for IWN Berlin, 2022.
2022	Advisor of PhD student Jon McCandless, winner of the best student paper award for IWGO Nagano, 2022.
2022	Advisor of PhD student Joseph Casamento, winner of the best student paper award for CSW Ann Arbor, 2022.
2022	Advisor of PhD student Reet Chaudhuri, winner of the Springer outstanding thesis award for 2022.
2022	Advisor of PhD student Reet Chaudhuri, winner of the best Cornell ECE PhD dissertation award for 2022.
2021	Advisor of PhD student Jon McCandless, winner of the best student paper award for EMC, 2021.
2021	Advisor of PhD student Austin Hickman, winner of the Cornell Comercialization Fellowship for 2021.
2020	Advisor of Undergraduate student Ms. Rosalyn Koscica, winner of the Dorothy and Fred Chau award for outstanding undergraduate research, 2020.
2020	Advisor of PhD student John Wright, winner of the Ed Nicollian award for IEEE SISC, 2020.
2019	Advisor of visiting PhD student Ms. Riena Jinno, winner of the best student paper award for IWGO Columbus, 2019.
2019	Advisor of PhD student Kevin Lee, winner of the best student paper award for Device Research Conference (DRC), University of Michigan, 2019.
2018	Advisor of PhD student Shyam Bharadwaj, winner of the best student paper award for Compound Semiconductor Week (CSW), Boston, 2018.
2017	Advisor of PhD student Kevin Lee, winner of a best student paper award for the International Workshop on UV Materials and Devices (IWUMD), Fukuoka 2017.
2017	Advisor of Shyam Bharadwaj, winner of the best student paper award for Device Research Conference (DRC), Notre Dame, 2017.
2013	Advisor of PhD student Ms. Faiza Faria, winner of the poster award for ICNS 2013

2009	Advisor of PhD student John Simon, winner of the best student paper for EMC 2009

Prof. Jena:

2024	Art Gossard MBE Innovator Award
2024	Michael Tien ‘72 Teaching Award, Cornell University
2023	Most Valuable Contribution, WOCSEMMAD (Workshop on Compound Semiconductor Materials and Devices)
2020	Intel Outstanding Research award, 2020.
2018	Appointed David E. Burr Chaired Professor of Engineering at Cornell University.
2017	Fellow, American Physical Society
2014	Richard E. Lunquist Sesquicentennial Faculty Fellow, Cornell University
2014	Young Scientist Award, International conference on Molecular Beam Epitaxy (ICMBE), 2014.
2014	Most Valuable Contribution, WOCSEMMAD (Workshop on Compound Semiconductor Materials and Devices)
2012	Young Scientist Award from ISCS (International Symposium of Compound Semiconductors)
2012	IBM Faculty award
2010	Most Valuable Contribution, WOCSEMMAD (Workshop on Compound Semiconductor Materials and Devices)
2010	Joyce award for excellence in undergraduate teaching
2008	Most Valuable Contribution, WOCSEMMAD (Workshop on Compound Semiconductor Materials and Devices)
2006	National Science Foundation (NSF) CAREER Award
2002	Best student paper award at the Electronic Materials Conference (EMC) 2002, Santa Barbara, CA
2000	Young author best paper award from International Union of Pure and Applied Physics (IUPAP) for International Conference on Physics of Semiconductors (ICPS) 2000, Osaka, Japan
1997	Visiting Students Research Program (VSRP) Fellowship from Tata Institute of Fundamental Research (TIFR), India
1994	Scholarship for academic excellence all four years (1994-1998) of undergraduate studies from Coal India Limited, India

Patents Issued

10. *High-voltage p-channel FET based on III-nitride heterostructures.*
Samuel James Bader, Reet Chaudhuri, Huili Grace Xing, and Debdeep Jena
Issued on December 6, 2022, **US Patent Number 11,522,080 B2**.

9. *Platforms enabled by buried tunnel junction for integrated photonic and electronic systems.*
Henryk Turski, Debdeep Jena, Huili Grace Xing, Shyam Bharadwaj, Alexander Austin Chaney, and Kazuki Nomoto
Issued on October 18, 2022, **US Patent Number 11,476,383 B2**.

8. *Light emitting diodes using ultra-thin quantum heterostructures.*
SM Islam, Vladimir Protasenko, Huili Grace Xing, Debdeep Jena, and Jai Verma
Issued on June 22, 2021, **US Patent Number 11,043,612 B2**.

7. *Polarization field assisted heterostructure design for efficient deep ultraviolet light emitting diodes.*
SM Islam, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena
Issued on March 23, 2021, **US Patent Number US10,957,817 B2**.

6. *Polarization-induced 2D hole gases for high-voltage p-channel transistors.*
Reet Chaudhuri, Samuel James Bader, Debdeep Jena, and Huili Grace Xing
Issued on October 26, 2021, **US Patent Number 11,158,709 B2**.

5. *Group III-Nitride compound heterojunction tunnel field-effect transistors and methods for making the same.*
Patrick Fay, Lina Cao, Debdeep Jena, and Wenjun Li
Issued on April 24, 2018, **US Patent Number 9,954,085**.

4. *Polarization Induced Doped Transistor.*
Huili (Grace) Xing, Debdeep Jena, Kazuki Nomoto, Bo Song, Mingda Zhu and Zongyang Hu
Issued on June 7, 2016, **US Patent Number 9,362,389**.

3. *Methods and apparatus for THz wave amplitude modulation.*
Berardi Sensale-Rodriguez, Rusen Yan, Tian Fang, Michelle Kelly, Debdeep Jena, Lei Liu and Huili (Grace) Xing
Issued on September 16, 2014, **US Patent Number 8,836,446**.

2. *Compositionally graded heterojunction semiconductor device and method for making the same.*
John Simon, Huili Xing and Debdeep Jena
Issued on September 16, 2014, **US Patent Number 8,835,998**.

1. *Polarization-Doped Field-Effect Transistors (POLFETs) and Materials and Methods for making the same.*
   Debdeep Jena, Siddharth Rajan, Huili Xing and Umesh Mishra
   Issued on April 28, 2009, **US Patent Number 7,525,130**.

Important research publications of Prof. Debdeep Jena

Wide bandgap nitride semiconductors and superconductors:

1. Discovery [6] [APL 2002] of distributed polarization doping for mobile electrons (n-type doping) in wide bandgap semiconductors in 2002, and its use for the first PolFET in 2002 (chapter 5 of Jena's PhD thesis, and were were granted the following patent: US Patent 7,525,130). This discovery enabled PolFET transistors in the semiconductor industry by companies such as HRL and Qorvo Inc.

2. Discovery [88] [Science 2009] of distributed polarization doping for mobile holes (p-type doping) in wide bandgap semiconductors in 2009 and its use in UV LEDs. We were granted the following patents: US Patent 8,835,998 and US Patent 10,957,817 B2. The p-type doping of GaN with the acceptor Mg that enabled blue LEDs and lasers in 1990s and 2000s was insufficient to realize UV lasers with wider bandgap AlGaN and AlN. Our discovery of distributed polarization doping of holes was used by industry to realize the first ever electrically injected deep-UV semiconductor laser its CW operation in 2022, by the company Asahi Kasei.

3. Discovery [345] [Science 2019] of ultrahigh density 2D hole gases at undoped wide bandgap semiconductor heterojunctions due to polarization discontinuity in 2019. Even though p-type doping of GaN with the acceptor Mg had enabled blue LEDs and lasers in 1990s and 2000s, the hole density remained insufficient for high-performance p-channel transistors. This 2019 discovery enabled us to demonstrate the first ever RF p-channel GaN transistors in IEDM 2020 [416], and we were granted the following patents: US Patent 11,158,709 B2 and US Patent 11,522,080 B2.

4. Realization [339] [Nature 2018] of epitaxial nitride semiconductor-superconductor heterostructures in 2018, and in 2021, subsequent use of such heterostructures for the demonstration of co-existence of the integer quantum Hall effect and superconductivity [429] [Science Advances 2021].

Atomically thin 2D materials:

5. Dielectric effects on scattering and mobility in 2D crystals and nanomembranes [32] [PRL 2007], and scattering and mobility limits in atomically thin semiconductors [214] [PRX 2014], and one of the earliest realization (in collaboration with Samsung) of a 2D material channel FETs to show current saturation and near ideal switching [140] [Nature Communications 2012].

Ultra wide-bandgap oxide semiconductors:

6. Realization [203] [APL 2014] of the first nanomembrane transistors with the wide bandgap oxide semiconductor Ga_2O_3, the evaluation of mobility limits in this semiconductor [278] [APL 2016], and demonstration [446] [Science Advances 2021] of epitaxy of the widest energy bandgap semiconductor heterostructures up to 8.8 eV.

Important review articles of Prof. Debdeep Jena

Wide bandgap nitride semiconductors and superconductors:

1. The earliest review article on the many nuances of controlling and using electronic polarization discontinuities in semiconductor heterostructures as a new engineering tool was outlined in a review article by Jena [103]. His more recent review article on this topic [358] considerably expands the nitride semiconductor family and discusses exciting new possibilities afforded by heterostructures of polar nitride semiconductors with correlated nitrides: ferroelectrics, magnets, and superconductors, to create a "New-nitride eco-system".

Atomically thin 2D materials:

2. Jena wrote an early article [164] on electron tunneling phenomena in atomically thin and 2D materials such as graphene, MoS_2, and related materials, and a commentary [208] on the difficulty and possibilities of making transparent low resistance contacts to their bands. In another review article [263] Jena's contribution is all sections on the future of 2D materials for use in transistor technologies due to their atomically thin nature, and their ultimate quantum mechanical and ballistic limits.

Ultra wide-bandgap oxide semiconductors:

3. In the first book on Gallium Oxide (Springer, 2019), Jena wrote a chapter [400] called *Gallium Oxide Materials and Devices - A Personal Recent History* which gives a deeply personal account of science and physics of this exciting new semiconductor material, but more importantly several anecdotes of its history, and the twisted and connected paths that led to the rapid expansion of this semiconductor family in the last decade.

Important lecturing of Prof. Debdeep Jena

1. Jena's recorded *lectures* have been viewed more than 230,000 times, and his 2022 textbook [475] *Quantum Physics of Semiconductor Materials and Devices* has been adopted by several universities for undergraduate and graduate courses.

2. Jena has co-edited two books: the first on polarization effects in semiconductors [39], and the second on high-frequency gallium nitride transistors [353]. In addition to leading the organization of the books, he has written several chapters of each book. These books have found wide usage in academia and industry because in these fast moving fields of new semiconductor materials, older textbooks are yet to incorporate the novelties of the materials physics and transport phenomena.

3. Since mid 2000s, Jena has regularly offered plenary talks, tutorials, and short courses in several national and international conferences, workshops, and summer schools. Assorted examples over the years include:

[2019] DFG German summer school on Oxide semiconductors in Como (Italy).

[2018] Short course in the 2018 International Workshop on Nitride Semiconductors in Kanazawa (Japan).

[2014] Summer School: Finding Nano summer school in Munich (Germany).

[2013] Short course on 2D materials in the IEEE DRC at Notre Dame (USA).

[2012] Short course on GaN transistors at the CSW in Santa Barbara (USA).

[2011] Short course on: Polarization physics and device applications in III-Nitride Heterostructures in the Jaszowiec School at Krynica (Poland).

Research discoveries that have translated to applications

We delight in every tiny scientific nugget we uncover in our daily research. Some of these unexpectedly lead to practical applications. Here is a list of some that we were fortunate to see go from scratching our heads to understand mysterious data collected in the lab, to projects and products in the industry.

1. Discovery of distributed polarization doping for mobile electrons (n-type doping) in wide bandgap semiconductors in 2002 (link), and its use for the first PolFET in 2002 (chapter 5 of my PhD thesis, and patent). See how our discovery has enabled transistors pursued by industry here.

2. Discovery of distributed polarization doping for mobile holes (p-type doping) in wide bandgap semiconductors in 2009 (link) and its use in UV LEDs (patent). The p-type doping of GaN with the acceptor Mg that enabled blue LEDs and lasers in 1990s and 2000s (see the 2014 Physics Nobel Lectures 1, 2, 3) was insufficient to realize UV lasers with wider bandgap AlGaN and AlN. See how our discovery of distributed polarization doping was used by industry to realize the first ever electrically injected deep-UV semiconductor laser in 2019 (link) and its CW operation in 2022 (link).

3. Discovery of ultrahigh density 2D hole gases at undoped wide bandgap semiconductor heterojunctions due to polarization discontinuity in 2019 (link). Even though p-type doping of GaN with the acceptor Mg had enabled blue LEDs and lasers in 1990s and 2000s (see the 2014 Physics Nobel Lectures 1, 2, 3), the hole density remained insufficient for high-performance p-channel transistors. Our 2019 discovery of the ultrahigh density 2D hole gases (see patent) enabled us to demonstrate the first ever RF p-channel GaN transistors in 2020 (link). Also see our p-FET device patent.

Research inventions with high application potential in the near-future

While some of our group's research have seen applications in industry, theory, modeling, and a bit of leap of faith allow us to conceive devices outside of available materials and processing technology of the time. Here are a few examples. Over time, ingenuity of the research community has brought some of them to fruition.

1. GNRTFETs: 2008 proposal, and a realization. Takes advantage of the unique property of 2D materials for energy-efficient electronic switches.

2. TMDFETs: 2012 realization in collaboration with Samsung of the first 2D material channel FETs to show current saturation and near ideal switching.

3. SymFETs: 2012 theory, proposal, and a realization. Uses interlayer tunneling between 2D materials. Related to BISFETs, and Moire lattices in twisted 2D layers.

4. ThinTFETs: 2014 proposal, and a realization. Uses interlayer tunneling between 2D materials for energy-efficient electronic switches.

5. PiezoFETs: 2014 proposal using active gate barriers in polar semiconductors.

6. GaN TFETs: 2016 proposal, patent, and a 2020 realization. Uses high internal fields in polar semiconductors for energy-efficient electronic switches.

7. LEFETs: 2018 patent, and a realization. LEDs and FETs in the same device for photonic communications and LiFi.

8. GOFETs: 2018 patent and a realization. Gallium oxide power transistors for energy efficient electronics.

9. UV LEDs/Lasers: 2018 patent and realizations using quantum structures and distributed polarization doping with GaN quantum dots in 2014 (link), and ultrathin GaN quantum wells in 2017 (link, link).

10. UV LEDs/Lasers: 2018 patent, and realizations using distributed polarization doping with tunnel junctions in 2017 (link), and distributed polarization p-doping in 2017 (link).

11. SOTFETs: 2020 collaborative proposal of the Spin-orbit torque FET as a logic/memory hybrid device for associative memories (link), and materials to realize them (link).

12. FerroHEMTs: 2022 first realization. Polar semiconductor based ferroelectric transistors for RF/mm-wave electronic communications, digital electronics for logic, and non-volatility for memory - all in one device!

Publication list of Prof. Debdeep Jena (djena@cornell.edu): Books

Books:

3) **Book**
Quantum Physics of Semiconductor Materials and Devices
Oxford University Press (2022), ISBN: 0198856857
Textbook for senior undergraduate and early graduate students.

2) **Book**
High-Frequency GaN Electronic Devices
Springer, Berlin (2020), ISBN: 978-3-030-20207-1
Editor, jointly with P. Fay and P. Maki, contributed 3 chapters.

1) **Book**
Polarization Effects in Semiconductors: From ab-initio Theory to Device Applications
Springer, Berlin (2007), ISBN: 0387368310
Editor, jointly with C. Wood, contributed 2 chapters.

Monographs and Book Chapters:

7) **Book Chapter**
Gallium Oxide Materials and Devices - A Personal Recent History
Debdeep Jena
Gallium Oxide, Springer, 2019.

6) **Book Chapter**
Epitaxy of GaN on Silicon
Yu Cao, Oleg Laboutin, Wayne Johnson, Satyaki Ganguly, Huili (Grace) Xing, and Debdeep Jena
Thin Films on Silicon: Electronic and Photonic Applications (ed: Vijay Narayanan, IBM), WSPC, 2016.

5) **Book Chapter**
Graphene and 2D Crystal Tunnel Transistors
Qin Zhang, Pei Zhao, Nan Ma, Grace (Huili) Xing, and Debdeep Jena
CMOS and Beyond (Ed: Tsu Jae King), Cambridge University Press, 2014.

4) **Book Chapter**
Nitride LEDs based on quantum wells and quantum dots
J. Verma, A. Verma, V. Protasenko, S. M. Islam, and D. Jena
Book on Nitride Semiconductor Light Emitting Diodes (LEDs), Woodhead Publishers, 2012.

3) **Book Chapter**
Graphene
Debdeep Jena
Springer Encyclopedia on Nanotechnology, 2012.

2) **Book Chapter**
Graphene transistors
Kristof Tahy, Tian Fang, Pei Zhao, Aniruddha Konar, Chuanxin Lian, Huili Xing, Michelle Kelly and Debdeep Jena
InTech Web (2010), ISBN: 0387368310

1) **Monograph**
Studies of MBE-Grown Single and Multiple AlN/GaN Heterojunctions
Cao Yu and Debdeep Jena
VDM Verlag (2008), ISBN: 3836475944

Publication list of Prof. Debdeep Jena (djena@cornell.edu): Journals

Electronic copies are available upon request. The most recent list is available at:
`https://djena.engineering.cornell.edu/PaperArchivesDJ.htm`

Journal Articles (>500) Publications, including in Science, Nature Journals, PRL, PRX, PRB, Nano Lett, IEEE Proceedings, EDL, TED, APL, JAP, etc...

Updated list@ `https://djena.engineering.cornell.edu/PaperArchivesDJ.htm`

The **References** section at the end of this document has the extended publication list.

Invited Talks

Note: An updated list is available upon request. The list below is terminated in 2014. I have since then given typically ∼10 invited talks/year. Some of these talks are plenary talks at international conferences.

83. *New features in doping, contacts, transport, and device physics of 2D crystal semiconductors*
SEMATECH workshop on Materials and Technologies for Beyond CMOS, San Francisco (2014).

82. *Electro-thermal properties of Gallium Oxide*
Special oxide workshop, Air Force Research Laboratory, Dayton (2014).

81. *Electron device potential of 2D crystal semiconductors*
ECS Symposium, Cancun, Mexico (2014).

80. *Exploiting polarization in semiconductor heterostructures for steep switching transistors*
Intel, Portland OR (2014).

79. *Eastman's 2nd gen legacy: nitride, oxide, and 2D crystal materials and devices*
Lester Eastman Conference (LEC), Cornell University, Ithaca NY (2014).

78. *Using polarization for novel nitride devices*
International Workshop on Nitrides (IWN), Wroclaw, Poland (2014).

77. *Two-dimensional semiconductor beyond graphene*
International Conference on the Physics of Semiconductors (ICPS), Austin, (2014).

76. *2D crystal semiconductor materials and devices: opportunities and challenges*
Walter Schottky Institute, Munich, Germany (2014).

75. *Electron scattering, mobilities, and tunneling transport in 2D crystal materials for device applications*
CMOS emerging technologies (CMOSET), Grenoble, France (2014).

74. *Low power devices*
Workshop on Compound Semiconductor Devices and Integrated Circuits (WOCSDICE), Delphi, Greece (2014).

73. *Nanoelectronic materials and devices: Current advances and future perspectives*
Taiwan Semiconductor Manufacturing Corporation (TSMC), Tshinchu, Taiwan (2014).

72. *Opportunities for RF electronics with 2D crystal semiconductors*
IEEE MTT-S International Microwave Symposium, Tampa (2014).

71. *Electron transport in 2D crystal semiconductors and their device applications*
IEEE Silicon Nanoelectronics Workshop 2014, Hawaii (2014).

70. *Electronic devices enabled by graphene*
Graphene Week 2014, Gothenburg, Sweden (2014).

69. *Electron transport in graphene based 2D crystals for novel electronic devices*
Graphene 2014, Toulouse, France (2014).

68. *Nanoelectronic materials and devices at the crossroads: Recent advances and future perspectives*
Chinese Academy of Science, Beijing, China (2014).

67. *Nanoelectronic materials and devices at the crossroads: Recent advances and future perspectives*
Physics Department Seminar, Peking University, China (2014).

66. *FETs with 2D crystals for logic: scaling extender, or harbinger of new functionalities?*
Data-abundant system technology, Stanford University (2014).

65. *New results on III-Nitride physics and devices using MBE heterostructures*
SSLEC Seminar, University of California at Santa Barbara (2014).

64. *2D crystal semiconductor physics of novel device applications: Challenges and opportunities*
Condensed Matter Physics and Material Science Seminar, Tata Institute of Fundamental Research (TIFR) Mumbai, India (2014).

63. *Physics and applications of 2D crystal semiconductors; graphene and transition metal dichalcogenides*
Condensed Matter Seminar, Physics Department, University of Notre Dame (2014).

62. *Novel logic devices based on 2D crystal semiconductors: Opportunities and challenges*
International Electron Devices Meeting (IEDM), Washington DC (2013).

61. *SymFET: A novel graphene-insulator-graphene tunneling device*
Semiconductor Interfaces Specialists Conference (SISC), Washington DC (2013).

60. *III-Nitride Heterostructure Electronic and Optical Devices*
Universidad de Chile, Santiago, Chile (2013).

59. *New electronic devices exploiting nanocarbon crystals: Proposals & Experimental Progress*
JSAP/MRS Joint Symposium, Kyoto, Japan (2013).

58. *Recent progress in III-Nitride Heterostructure and 2D crystal devices*
Naval Research Laboratory, Washington, DC (2013).

57. *Novel 2D crystal tunneling devices*
CMOS Emerging Technologies Research, Whistler, Canada (2013).

56. *Charge transport properties and device applications of novel 2D crystals*
Short Course, Device Research Conference (DRC), Notre Dame, IN (2013).

55. *Prospects for 2D crystal semiconductor devices*
International Symposium of Compound Semiconductors (ISCS), Kobe, Japan (2013).

54. *2D crystal semiconductor materials and devices*
International Materials Week, The Ohio State University, OH (2013).

53. *Novel 2D crystal semiconductor devices*
SPIE Conference, Baltimore, MD (2013).

52. *Challenges and prospects for 2D crystal semiconductor devices*
Beyond Graphene workshop, Penn State University, PA (2013).

51. *III-Nitride Transistors and LEDs on AlN substrates*
Global Conference on Excellence in Engineering (GCOE), Kyoto University, Japan (2013).

50. *Polarization-Engineered High-Performance III-Nitride Transistors and LEDs*
University of Michigan, Ann Arbor, MI (2013).

49. *Transistors and Quantum-Dot LEDs on AlN substrates*
HETECH, Barcelona, Spain (2012).

48. *Opportunities and Reliability Challenges in 2D Crystal Electronics*
ESREF, Cagliari, Italy (2012).

47. *2D Crystal based Electronic Devices*
AVS annual meeting, Tampa, FL (2012).

46. *Tunneling Transistors with 2D Crystals*
SRC NRI eWorkshop (2012).

45. *Novel Heterostructures for GaN Power Electronic Devices*
Sandia National Laboratories, Sandia, NM (2012).

44. *Graphene Nanoribbon Electronics and the promise of 2D Crystals*
CNSI seminar, UC Santa Barbara, CA (2012).

43. *The promise of 2D Crystal Semiconductor Electronics*
NSF/AFOSR 2D Crystals workshop, Arlington, VA (2012).

42. *Wafer-Scale Graphene Nanoribbon Electronics*
ECS meeting, Seattle (2012).

41. *Wafer-scale graphene nanoribbon technology*
China Semiconductor Technology International Conference (CSTIC), Shanghai (2012).

40. *Exploiting symmetry in electronic and optical devices*
University of Minnesota, CEMS (2012).

39. *Nitride semiconductors and 2D crystals*
Purdue University, Birck Center (2012).

38. *Using Polarization in III-Nitride Optoelectronic Devices: Not always an Enemy*
KAUST-NSF Workshop on Solid State Lighting, KAUST, KSA (2012).

37. *2D Crystals for Next Generation Electronic Switches.*
National Nanofabrication Infrastructure Network (NNIN) workshop, UCSB, CA (2012).

36. *Graphene and 2D crystals: Physics and Device Applications.*
University of California, Berkeley, CA (2011).

35. *III-Nitride semiconductor heterostructure epitaxy and device applications.*
Army Research Laboratory, Adelphi, MD (2011).

34. *Short course on: Polarization physics and device applications in III-Nitride Heterostructures.*
Jaszowiec School, Krynica, Poland (2011).

33. *Graphene Nanostructures for Digital Applications.*
GOMACTech, Orlando, FL (2011).

32. *Polarization Physics and Novel device applications in wide-bandgap III-V nitrides.*
Peking University, Beijing, China (2010).

31. *Wide and zero-bandgap materials and devices.*
Indian Institute of Technology (IIT), Chennai, India (2010).

30. *Polarization-Engineered Applications in III-Nitride Devices: Tunneling and Doping.*
International Workshop on Nitride Semiconductors (IWN), Tampa, FL (2010).

29. *Polarization induced tunneling and doping in nitride semiconductor devices.*

International Conference on Molecular Beam Epitaxy (ICMBE), Berlin, Germany (2010).

28. *Graphene Physics and Device Applications.*
The Ohio State University, Columbus, OH (March, 2010).

27. *Novel Polarization-Engineered Devices with III-V Nitride Semiconductors.*
Purdue University, West Lafayette, IN (January 2010).

26. *2-D Crystals.*
Naval Research Laboratory, Washington, D.C. (January 2010).

25. *Graphene based Electronics.*
International Workshop on Physics of Semiconductor Devices (IWPSD), New Delhi, India (December 2009).

24. *Graphene Electronics: Fundamentals to Applications.*
Heterostructure Technologies Workshop (HETECH), Ulm, Germany (Nov 2009).

23. *Polarization-engineering for Gallium Nitride Devices.*
Walter Schottky Institute (WSI) Munich, Germany (October 2009).

22. *The role of phonons on electron transport in GaN devices.*
International Conference on Nitride Semiconductors (ICNS), Jeju, South Korea (October 2009).

21. *Graphene Transistors.*
Technical Workshop on Heterostructure Microelectronics (TWHM), Nagano, Japan (August 2009).

20. *Graphene Electronics.*
Army Research Laboratory (ARL), Baltimore, MD (August 2009).

19. *Nitride Nanowires by Molecular Beam Epitaxy.*
Paul Drude Institute (PDI) workshop on nanowires, Berlin, Germany (March 2009).

18. *Adventures across bandgaps: Bandgap Engineering and Device Applications of wide-bandgap III-V Nitrides to zero-bandgap Graphene.*
Cornell University, Ithaca, NY (September 2007).

17. *Polarization engineering in III-V Nitrides and prospects for multifunctional devices.*
United Technologies Research Center (UTRC), East Hartford, Connecticut (Aug 2007).

16. *Graphene-based mm-wave Transistors: New ideas and paradigms.*
DARPA Carbon Electronics workshop (April 2007).

15. *Phonon cavities and engineering of electron-phonon interactions in semiconductor heterostructures.*
Photonics West, San Jose, CA (January, 2007).

14. *Phonon-Engineered III-V Nitride High-electron Mobility Transistors.*
Advanced Heterostructures Workshop, Big Island, Hawaii (Dec 12-15, 2006).

13. *Phonon Engineering in Transistors.*
DARPA Technologies for Heat Removal in Electronics at the Device Scale (THREADS) workshop, Santa Barbara, CA (Dec 2006).

12. *MBE growth and polarization-doping in III-V Nitride Heterostructures: Applications to HBTs and ultrafast HEMTs.*
General Electric Corporate Research and Development (CRD) Niskayuna, New York (August 2006).

11. *Semiconductor Nanowires: Transport and Optical properties, and applications in large-area flexible Transistors and Photodetectors.*
University of California Santa Barbara, CA (March 2006).

10. *Compositionally graded polar semiconductors and ferroelectrics: Analogies and new multifunctional device possibilities..*
International Workshop on Multifunctional Materials III, San Carlos de Bariloche, Argentina (March 5, 2006).

9. *The Hot-Phonon Effect in III-V Nitride Heterostructures: Impact on ultrafast transistors and epitaxial solutions.*
DARPA Nanoscale Optical Phonon Engineering workshop, Washington, D.C. (Dec 2005).

8. *MBE growth of polarization-doped III-V nitride p-n junctions.*
ONR Electronic Materials Review, New Jersey (August 15, 2005).

7. *Polarization Engineered III-V Nitride Heterostructures: Growth, Transport, and Device applications.*
University of Illinois, Chicago (April 14, 2005).

6. *Graded alloy heterojunctions: A possible solution for the hot-phonon effect?*
Workshop on Surface and Interface Electronics (ONR/Iowa), Palm Springs (April 13, 2005).

5. *Compositionally graded polar semiconductors: doping and high-field transport.*
Arizona State University, Tempe (March 11, 2005).

4. *Polarization engineering in III-V Nitride Heterostructures.*

SUNY Buffalo (March 4, 2005).

3. *Distributed Polarization Effects.*
   ONR Electronic Materials Review, Monterey (August 3, 2004).

2. *Electron Transport in AlGaN/GaN Heterostructures.*
   Naval Research Laboratory, Washington D.C. (August 20, 2003).

1. *Polarization-Induced Electron Populations in Nitride Heterostructures: Physics and Device Applications.*
   University of Notre Dame, Notre Dame, IN (March 10, 2003).

Industrial Activities

2023-2024 **Northrup Grumann**, Redondo Beach, CA
Task: Development of AlScN for non linear photonics.

2021-2023 **Asahi Kasei Corporation**, Tokyo, Japan
Task: Development of materials and devices for AlN ultrawide bandgap electronics.

2021-2023 **Northrup Grumann**, Linthicum, MD
Task: Development of AlScN/GaN FETs.

2018-2021 **Intel**, Portland, OR
Task: Development of high-voltage p-channel FETs.

2018-2021 **Crystal-IS**, Albany, NY
Task: Development of deep-UV photonic devices.

2018-2020 **Teledyne**, Thousand Oaks, CA
Task: Development of GaN high-power microwave electronics.

2014-2017 **Qorvo/Triquint Semiconductors**, Richardson, TX
Task: Development of GaN power electronics.

2014-2017 **United Technologies Research Center**, UTRC CT
Task: Development of GaN power electronics.

2014 **Agnitron**, MN
Task: Development of GaN power transistors.

2011-2014 **Samsung**, Samsung Advanced Institute of Technology, Seoul, Korea
Task: Charge transport and device applications of 2D crystals for Thin Film Transistors.

2011-2014 **Teledyne**, Thousand Oaks, CA
Task: Design, fabrication, and demonstration of high-voltage high-speed III-V Nitride GaN HEMTs for microscale power conversion

2011-2014 **Kopin Corporation**, Westboro, MA
Task: Design, fabrication, and demonstration of GaN HEMTs

2010-2012 **Nitek**, Irmo, SC
Task: Design, fabrication, and demonstration of III-V Nitride UV LEDs using polarization-induced p-type doping

2009-2014 **Triquint Semiconductors**, Richardson, TX
Task: Design, fabrication, and demonstration of ultrafast III-V Nitride HEMT technology

2009-2010 **Illinois Applied Research**, Chiacgo, IL
Task: Molecular Beam Epitaxy (MBE) Growth of InGaN for photovoltaic applications

2006-2007 **Dot Metrics**, Raleigh, NC
Task: Molecular Beam Epitaxy (MBE) Growth of GaN on Quantum-Dot Samples for LED applications

2006-2007 **System Creations**, Metairie, LA
Task: MBE Growth of InN/GaN heterojunctions for Solar Cell applications

2008 **4Wave Incorporated**, Sterling, VA
Task: Characterization of Plasma-Deposited GaN and AlGaN thin films

2007 **Traycer Diagnostic Systems**, Columbus, OH
Task: MBE growth of AlN/GaN Heterostructures for enabling terhahertz imaging of biological species

Professional Activities

Note: An updated list is available upon request. The list below is terminated in 2017. I have since then continued to organize and serve on several committees ranging from international conferences, and NSF, SRC, and DARPA panels and workshops.

Editor:
International Conference on Nitride Semiconductors (ICNS) 2007, Conference Proceedings Editor.
Special Issue of the Journal of Electronic Materials on Wide Bandgap Semiconductors (vol. 36, issue 4, 2007), Associate Editor.

Program Committee Chair or Co-Chair:

2017 Device Research Conference (IEEE DRC), General Chair.
2016 Device Research Conference (IEEE DRC), Program Chair.
2015 Device Research Conference (IEEE DRC), Program Vice Chair.
2013 10th Topical Workshop on Heterostructure Microelectronics (TWHM).
2011 9th Topical Workshop on Heterostructure Microelectronics (TWHM).
2011 WOCSEMMAD (Workshop on Compound Semiconductor Materials and Devices), Program Chair.

Program Committee Member:

2016 International Electron Devices Meeting (IEDM).
2015 International Electron Devices Meeting (IEDM).
2015 Device Research Conference (IEEE DRC).
2014 Device Research Conference (IEEE DRC).
2014 International Conference on Molecular Beam Epitaxy (ICMBE).
2014 MRS Symposium Fall Meeting.
2014 Lester Eastman Conference on high-performance devices (LEC).
2013 International Conference on Nitride Semiconductors (ICNS).
2013 Device Research Conference (IEEE DRC).
2012 Device Research Conference (IEEE DRC).
2013 Electronic Materials Conference.
2012 Electronic Materials Conference.
2012 International MBE (Molecular Beam Epitaxy) Conference.
2011 International Conference on Nitride Semiconductors (ICNS).
2009-2015 WOCSEMMAD (Workshop on Compound Semiconductor Materials and Devices) for the period.
2011 Electronic Materials Conference.
2010 Electronic Materials Conference.
2010 International Workshop on Nitrides (IWN).
2009 Electronic Materials Conference.
2008 Electronic Materials Conference.

2007 International Conference on Nitride Semiconductors (ICNS).
2007 Electronic Materials Conference.
2006 Electronic Materials Conference.

Session Organizer and/or Chair:

2014 MRS Symposium Fall Meeting: 2D Crystal Materials and Devices.
2013 American Physical Society (APS) March meeting.
2006-2008 Electronic Materials Conference.
2007 International Conference on Nitride Semiconductors (ICNS).
2006 Device Research Conference (DRC).
2005 International Conference on Hot Carriers in Semiconductors (HCIS).

Reviewer:
Science
Nature Journals
Physical Review Letters
Physical Review B
Nano Letters
Applied Physics Letters
Journal of Applied Physics
Superlattices and Microstructures
IEEE Electron Device Letters
IEEE Transactions on Electron Devices
Solid State Electronics
MRS Bulletins
Journal of Electronic Materials
Journal of Luminescence
Journal of Physical Chemistry
Journal of Computational Electronics
Physica Status Solidi

Funding Proposal Reviewer & Panelist:

National Science Foundation (NSF)
Department of Energy (DOE) National Energy Technology Laboratory (NETL)
Civilian Research and Development Foundation (CRDF)
MIT Deshpande Center Innovation Awards
Ohio State Institute for Materials Research (IMR) Grants
European Science Foundation (ESF)
Swiss National Foundation (SNF)

Member: Institute of Electrical and Electronic Engineers (IEEE)

American Physical Society (APS)
Materials Research Society (MRS)
American Association for the Advancement of Science (AAAS)

References

The number header [N] below represents the N-th output in chronological order authored or co-authored by D. Jena.

Thesis

[10] Debdeep Jena. "Polarization induced electron populations in III-V nitride semiconductors: Transport, growth, and device applications". University of California, Santa Barbara, 2003.

Books

[39] Colin Wood and Debdeep Jena. *Polarization effects in semiconductors: from ab initio theory to device applications*. Springer, 2007.

[353] Patrick Fay, Debdeep Jena, and Paul Maki. *High-Frequency GaN Electronic Devices*. Springer, 2019.

[475] Debdeep Jena. *Quantum Physics of Semiconductor Materials and Devices*. Oxford University Press, 2022.

Book Chapters and Monographs

[47] Debdeep Jena. "Polarization effects on low-field transport & mobility in III-V nitride HEMTs". In: *Polarization effects in semiconductors: from ab initio theory to device applications*. 2008, pp. 161–216.

[48] Debdeep Jena, S Pamir Alpay, and Joseph V Mantese. "Functionally graded polar heterostructures: New materials for multifunctional devices". In: *Polarization effects in semiconductors: from ab initio theory to device applications*. Springer, 2008, p. 307.

[112] Kristóf Tahy, Aniruddha Konar, Chuanxin Lian, Debdeep Jena, Huili (Grace), Michelle Kelly, Pei Zhao, and Tian Fang. In: *Graphene transistors*. INTECH Open Access Publisher, 2011.

[223] J Verma, A Verma, V Protasenko, SM Islam, and D Jena. "Nitride LEDs based on quantum wells and quantum dots". In: *Nitride Semiconductor Light-Emitting Diodes (LEDs)*. Woodhead Publishing, 2014, pp. 368–408.

[257] Qin Zhang, Pei Zhao, Nan Ma, G Xing, and Debdeep Jena. "Graphene and 2D crystal tunnel transistors". In: *CMOS and Beyond: Logic Switches for Terascale Integrated Circuits*. Cambridge University Press, 2015, p. 144.

[261] Yu Cao, Oleg Laboutin, Wayne Johnson, Satyaki Ganguly, Grace Xing, and Debdeep Jena. "Epitaxy of GaN on Silicon". In: *Thin Films on Silicon: Electronic and Photonic Applications*. Vol. 8. 2016, p. 79.

[311] J Verma, SM Islam, A Verma, V Protasenko, and D Jena. "11.1 Light emitting diodes". In: *Nitride Semiconductor Light-Emitting Diodes (LEDs): Materials, Technologies, and Applications*. Woodhead Publishing, 2017, p. 377.

[357] SM Islam, Vladimir Protasenko, Shyam Bharadwaj, Jai Verma, Kevin Lee, Huili Xing, and Debdeep Jena. “Enhancing wall-plug efficiency for deep-UV light-emitting diodes: From crystal growth to devices”. In: *Light-Emitting Diodes: Materials, Processes, Devices and Applications*. Springer International Publishing, 2019, pp. 337–395.

[395] Jimy Encomendero, Debdeep Jena, and Huili Grace Xing. “Resonant tunneling transport in polar III-Nitride heterostructures”. In: *High-Frequency GaN Electronic Devices*. Springer International Publishing, 2020, pp. 215–247.

[400] Debdeep Jena. “Gallium Oxide Materials and Devices: A Personal Recent History”. In: *Gallium Oxide: Materials Properties, Crystal Growth, and Devices*. Springer International Publishing, 2020, pp. 739–754.

[403] J Khurgin and D Jena. “Isotope Engineering of GaN for Boosting Transistor Speeds”. In: *High-Frequency GaN Electronic Devices*. Springer International Publishing, 2020, pp. 43–82.

[450] Wenshen Li, Debdeep Jena, and Huili Grace Xing. “Advanced concepts in Ga_2O_3 power and RF devices”. In: *Semiconductors and Semimetals*. Vol. 107. Elsevier, 2021, pp. 23–47.

Patents

[69] Umesh K Mishra, Huili Xing, Debdeep Jena, and Siddharth Rajan. “Polarization-doped field effect transistors (POLFETS) and materials and methods for making the same”. Pat. US Patent 7,525,130. 2009.

[216] Berardi Sensale-Rodriguez, XING Huili Grace, Rusen Yan, Michelle M Kelly, Tian Fang, Debdeep Jena, and Lei Liu. “Methods and apparatus for terahertz wave amplitude modulation”. Pat. US Patent 8,836,446. 2014.

[217] John Simon, Debdeep Jena, and Huili Xing. “Compositionally graded heterojunction semiconductor device and method of making same”. Pat. US Patent 8,835,998. 2014.

[267] XING Huili Grace, Debdeep Jena, Kazuki Nomoto, Bo Song, Mingda Zhu, and Zongyang Hu. “Polarization induced doped transistor”. Pat. US Patent 9,362,389. 2016.

[300] Mingda Li, David Esseni, Gregory Snider, Debdeep Jena, and Huili Grace Xing. “Two-dimensional heterojunction interlayer tunneling field effect transistors”. Pat. US Patent App. 14/629,222. 2017.

[321] Patrick Fay, Lina Cao, Debdeep Jena, and Wenjun Li. “Group III-Nitride compound heterojunction tunnel field-effect transistors and methods for making the same”. Pat. US Patent 9,954,085. 2018.

[322] Patrick Fay, Wenjun Li, and Debdeep Jena. “Group III-nitride compound heterojunction tunnel field-effect transistors and methods for making the same”. Pat. US Patent 9,905,647. 2018.

[399] Austin Hickman, Reet Chaudhuri, Samuel James Bader, Huili Grace Xing, and Debdeep Jena. “Rf high-electron-mobility transistors including group iii-n stress neutral barrier layers with high breakdown voltages”. Pat. US Patent App. 16/893,074. 2020.

[442] Zongyang Hu, Kazuki Nomoto, Grace Huili Xing, Debdeep Jena, and Wenshen Li. "Vertical gallium oxide (Ga_2O_3) power fets". Pat. US Patent App. 17/042,153. 2021.

[443] SM Islam, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. "Polarization field assisted heterostructure design for efficient deep ultra-violet light emitting diodes". Pat. US Patent 10,957,817. 2021.

[444] SM Islam, Vladimir Protasenko, Huili Grace Xing, Debdeep Jena, and Jai Verma. "Light emitting diodes using ultra-thin quantum heterostructures". Pat. US Patent 11,043,612. 2021.

[449] Wenshen Li, Zongyang Hu, Kazuki Nomoto, Debdeep Jena, and Huili Grace Xing. "High voltage gallium oxide (Ga_2O_3) trench MOS barrier schottky and methods of fabricating same". Pat. US Patent App. 17/291,689. 2021.

[457] Rusen Yan, Guru Bahadur Singh Khalsa, John Wright, H Grace Xing, Debdeep Jena, D Scott Katzer, Neeraj Nepal, Brian P Downey, David J Meyer, et al. "Expitaxial semiconductor/superconductor heterostructures". Pat. US Patent App. 16/978,415. 2021.

[462] Samuel James Bader, Reet Chaudhuri, Huili Grace Xing, and Debdeep Jena. "High-voltage p-channel FET based on III-nitride heterostructures". Pat. US Patent 11,522,080. 2022.

[472] Austin Hickman, Reet Chaudhuri, James CM Hwang, Huili Grace Xing, and Debdeep Jena. "Integrated electronics on the aluminum nitride platform". Pat. US Patent App. 17/554,511. 2022.

[492] Henryk Turski, Grzegorz Muziol, Marcin Siekacz, Czeslaw Skierbiszewski, Debdeep Jena, and Huili Grace Xing. "Monolithically inverted iii-v laser diode realized using buried tunnel junction". Pat. US Patent App. 17/601,058. 2022.

[508] Austin Hickman, Reet Chaudhuri, Samuel James Bader, Huili Grace Xing, and Debdeep Jena. "RF high-electron-mobility transistors including group III-N stress neutral barrier layers with high breakdown voltages". Pat. US Patent 11,710,785. 2023.

[510] Zongyang Hu, Kazuki Nomoto, Grace Huili Xing, Debdeep Jena, and Wenshen Li. "Vertical gallium oxide (GA2O3) power FETs". Pat. US Patent 11,715,774. 2023.

[514] Amit Lal, Shubham Jadhav, Ved Gund, Benyamin Davaji, XING Grace, and Debdeep Jena. "Resistive electrodes on ferroelectric devices for linear piezoelectric programming". Pat. US Patent App. 17/821,789. 2023.

Peer-reviewed Journal Publications

[1] U. K. Mishra D. Jena A. C. Gossard. "Dislocation scattering in a two-dimensional electron gas". In: *Applied Physics Letters* 76 (2000), p. 1707.

[2] Debdeep Jena, Arthur C Gossard, and Umesh K Mishra. "Dipole scattering in polarization induced III–V nitride two-dimensional electron gases". In: *Journal of Applied Physics* 88.8 (2000), pp. 4734–4738.

[3] D Jena, I Smorchkova, AC Gossard, and UK Mishra. "Electron transport in III–V nitride two-dimensional electron gases". In: *physica status solidi (b)* 228.2 (2001), pp. 617–619.

[6] Debdeep Jena, Sten Heikman, Daniel Green, Dario Buttari, Robert Coffie, Huili Xing, Stacia Keller, Steve DenBaars, James S Speck, Umesh K Mishra, et al. “Realization of wide electron slabs by polarization bulk doping in graded III–V nitride semiconductor alloys”. In: *Applied Physics Letters* 81.23 (2002), pp. 4395–4397.

[7] Debdeep Jena and UK Mishra. “Effect of scattering by strain fields surrounding edge dislocations on electron transport in two-dimensional electron gases”. In: *Applied Physics Letters* 80.1 (2002), pp. 64–66.

[8] Debdeep Jena and Umesh K Mishra. “Quantum and classical scattering times due to charged dislocations in an impure electron gas”. In: *Physical Review B* 66.24 (2002), p. 241307.

[9] A Jimnez, D Buttari, D Jena, R Coffie, S Heikman, NQ Zhang, L Shen, E Calleja, E Munoz, J Speck, et al. “Effect of p-doped overlayer thickness on RF-dispersion in GaN junction FETs”. In: *IEEE Electron Device Letters* 23.6 (2002), pp. 306–308.

[11] Debdeep Jena, S Heikman, JS Speck, UK Mishra, A Link, and O Ambacher. “Magneto-transport measurement of effective mass, quantum scattering time, and alloy scattering potential of polarization-doped 3D electron slabs in graded-AlGaN”. In: *physica status solidi (c)* 7 (2003), pp. 2339–2342.

[12] Debdeep Jena, Sten Heikman, James S Speck, Arthur Gossard, Umesh K Mishra, Angela Link, and Oliver Ambacher. “Magnetotransport properties of a polarization-doped three-dimensional electron slab in graded AlGaN”. In: *Physical Review B* 67.15 (2003), p. 153306.

[13] H Xing, D Jena, MJW Rodwell, and UK Mishra. “Explanation of anomalously high current gain observed in GaN based bipolar transistors”. In: *IEEE Electron Device Letters* 24.1 (2003), pp. 4–6.

[14] Debdeep Jena. “Spin scattering by dislocations in III-V semiconductors”. In: *Physical Review B* 70.24 (2004), p. 245203.

[15] Siddharth Rajan, Huili Xing, Steve DenBaars, Umesh K Mishra, and Debdeep Jena. “AlGaN/GaN polarization-doped field-effect transistor for microwave power applications”. In: *Applied Physics Letters* 84.9 (2004), pp. 1591–1593.

[16] Wei Zhao and Debdeep Jena. “Dipole scattering in highly polar semiconductor alloys”. In: *Journal of Applied Physics* 96.4 (2004), pp. 2095–2101.

[17] John Simon, Kejia Wang, Huili Xing, Debdeep Jena, and Siddharth Rajan. “Polarization-Induced 3-Dimensional Electron Slabs in Graded AlGaN Layers”. In: *MRS Online Proceedings Library (OPL)* 892 (2005).

[18] Yu Cao and Debdeep Jena. “Ultrathin AlN/GaN heterojunctions by MBE for THz applications”. In: *MRS Online Proceedings Library (OPL)* 955 (2006).

[19] Min Gao, ST Bradley, Yu Cao, D Jena, Y Lin, SA Ringel, J Hwang, WJ Schaff, and LJ Brillson. “Compositional modulation and optical emission in AlGaN epitaxial films”. In: *Journal of Applied Physics* 100.10 (2006), p. 103512.

[20] Anubhav Khandelwal, Debdeep Jena, James W Grebinski, Katherine Leigh Hull, and Masaru K Kuno. “Ultrathin CdSe nanowire field-effect transistors”. In: *Journal of Electronic Materials* 35 (2006), pp. 170–172.

[21] J Liberis, M Ramonas, O Kiprijanovic, A Matulionis, N Goel, J Simon, K Wang, H Xing, and D Jena. “Hot phonons in Si-doped GaN”. In: *Applied Physics Letters* 89.20 (2006), p. 202117.

[22] Siddharth Rajan, Steven P DenBaars, Umesh K Mishra, Huili Xing, and Debdeep Jena. “Electron mobility in graded AlGaN alloys”. In: *Applied Physics Letters* 88.4 (2006), p. 042103.

[23] John Simon, Albert Wang, Huili Xing, Siddharth Rajan, and Debdeep Jena. “Carrier transport and confinement in polarization-induced three-dimensional electron slabs: Importance of alloy scattering in AlGaN”. In: *Applied Physics Letters* 88.4 (2006), p. 042109.

[25] Kejia Wang, Yu Cao, John Simon, Jing Zhang, Alexander Mintairov, James Merz, Douglas Hall, Thomas Kosel, and Debdeep Jena. “Effect of dislocation scattering on the transport properties of InN grown on GaN substrates by molecular beam epitaxy”. In: *Applied Physics Letters* 89.16 (2006), p. 162110.

[26] Kejia Wang, John Simon, Niti Goel, and Debdeep Jena. “Optical study of hot electron transport in GaN: Signatures of the hot-phonon effect”. In: *Applied Physics Letters* 88.2 (2006), p. 022103.

[27] Williams R Calderón-Muñoz, Mihir Sen, and Debdeep Jena. “Hydrodynamic instability of one-dimensional electron flow in semiconductors”. In: *Journal of Applied Physics* 102.2 (2007), p. 023703.

[29] Yu Cao and Debdeep Jena. “High-mobility window for two-dimensional electron gases at ultrathin AlN/GaN heterojunctions”. In: *Applied Physics Letters* 90.18 (2007), p. 182112.

[30] Tian Fang, Aniruddha Konar, Huili Xing, and Debdeep Jena. “Carrier statistics and quantum capacitance of graphene sheets and ribbons”. In: *Applied Physics Letters* 91.9 (2007), p. 092109.

[32] Debdeep Jena and Aniruddha Konar. “Enhancement of carrier mobility in semiconductor nanostructures by dielectric engineering”. In: *Physical Review Letters* 98.13 (2007), p. 136805.

[33] Wang Kejia, Lian Chuanxin, Su Ning, Debdeep Jena, and John Timler. “Conduction band offset at the InN/GaN heterojunction”. In: *Applied Physics Letters* 91.23 (2007).

[34] Jacob Khurgin, Yujie J Ding, and Debdeep Jena. “Hot phonon effect on electron velocity saturation in GaN: A second look”. In: *Applied Physics Letters* 91.25 (2007), p. 252104.

[35] Aniruddha Konar and Debdeep Jena. “Tailoring the carrier mobility of semiconductor nanowires by remote dielectrics”. In: *Journal of Applied Physics* 102.12 (2007), p. 123705.

[36] Xiaodong Mu, Yujie J Ding, Kejia Wang, Debdeep Jena, and Yuliya B Zotova. “Resonant terahertz generation from InN thin films”. In: *Optics letters* 32.11 (2007), pp. 1423–1425.

[38] Amol Singh, Xiangyang Li, Vladimir Protasenko, Gabor Galantai, Masaru Kuno, Huili Xing, and Debdeep Jena. "Polarization-sensitive nanowire photodetectors based on solution-synthesized CdSe quantum-wire solids". In: *Nano letters* 7.10 (2007), pp. 2999–3006.

[40] Huili G Xing, David Deen, Yu Cao, Tom Zimmermann, Patrick Fay, and Debdeep Jena. "MBE-grown ultra-shallow AlN/GaN HFET technology". In: *ECS Transactions* 11.5 (2007), p. 233.

[41] Ronghui Zhou, Hsueh-Chia Chang, Vladimir Protasenko, Masaru Kuno, Amol Kumar Singh, Debdeep Jena, and Huili Xing. "CdSe nanowires with illumination-enhanced conductivity: Induced dipoles, dielectrophoretic assembly, and field-sensitive emission". In: *Journal of Applied Physics* 101.7 (2007), p. 073704.

[42] Yu Cao, Kejia Wang, and Debdeep Jena. "Electron transport properties of low sheet-resistance two-dimensional electron gases in ultrathin AlN/GaN heterojunctions grown by MBE". In: *physica status solidi c* 5.6 (2008), pp. 1873–1875.

[43] Yu Cao, Kejia Wang, Alexei Orlov, Huili Xing, and Debdeep Jena. "Very low sheet resistance and Shubnikov–de-Haas oscillations in two-dimensional electron gases at ultrathin binary Al N/ Ga N heterojunctions". In: *Applied Physics Letters* 92.15 (2008), p. 152112.

[44] David Deen, Tom Zimmermann, Yu Cao, Debdeep Jena, and Huili Grace Xing. "2.3 nm barrier AlN/GaN HEMTs with insulated gates". In: *physica status solidi c* 5.6 (2008), pp. 2047–2049.

[45] Tian Fang, Aniruddha Konar, Huili Xing, and Debdeep Jena. "Mobility in semiconducting graphene nanoribbons: Phonon, impurity, and edge roughness scattering". In: *Physical Review B* 78.20 (2008), p. 205403.

[46] Kevin Goodman, Kejia Wang, Xiangning Luo, John Simon, Tom Kosel, and Debdeep Jena. "GaN and InGaN nanowires on Si substrates by Ga-droplet molecular beam epitaxy". In: *MRS Online Proceedings Library (OPL)* 1080 (2008).

[49] Debdeep Jena, Tian Fang, Qin Zhang, and Huili Xing. "Zener tunneling in semiconducting nanotube and graphene nanoribbon p- n junctions". In: *Applied Physics Letters* 93.11 (2008), p. 112106.

[50] Jacob B Khurgin, Debdeep Jena, and Yujie J Ding. "Isotope disorder of phonons in GaN and its beneficial effect on high power field effect transistors". In: *Applied Physics Letters* 93.3 (2008), p. 032110.

[52] John Simon and Debdeep Jena. "Effect of growth conditions on the conductivity of Mg doped p-type GaN by Molecular Beam Epitaxy". In: *physica status solidi (a)* 205.5 (2008), pp. 1074–1077.

[54] Suvranta K Tripathy, Guibao Xu, Xiaodong Mu, Yujie J Ding, Kejia Wang, Yu Cao, Debdeep Jena, and Jacob B Khurgin. "Evidence of hot electrons generated from an AlN/GaN high electron mobility transistor". In: *Applied Physics Letters* 92.1 (2008), p. 013513.

[55] Kejia Wang, Thomas Kosel, and Debdeep Jena. "Structural and transport properties of InN grown on GaN by MBE". In: *physica status solidi c* 5.6 (2008), pp. 1811–1814.

[57] Guibao Xu, Suvranta K Tripathy, Xiaodong Mu, Yujie J Ding, Kejia Wang, Yu Cao, Debdeep Jena, and Jacob B Khurgin. “Stokes and anti-Stokes resonant Raman scatterings from biased GaN/AlN heterostructure”. In: *Applied Physics Letters* 93.5 (2008), p. 051912.

[59] Yanghai Yu, Vladimir Protasenko, Debdeep Jena, Huili Xing, and Masaru Kuno. “Photocurrent polarization anisotropy of randomly oriented nanowire networks”. In: *Nano letters* 8.5 (2008), pp. 1352–1357.

[60] Qin Zhang, Tian Fang, Huili Xing, Alan Seabaugh, and Debdeep Jena. “Graphene nanoribbon tunnel transistors”. In: *IEEE Electron Device Letters* 29.12 (2008), pp. 1344–1346.

[61] Tom Zimmermann, David Deen, Yu Cao, Debdeep Jena, and Huili Grace Xing. “Formation of ohmic contacts to ultra-thin channel AlN/GaN HEMTs”. In: *physica status solidi c* 5.6 (2008), pp. 2030–2032.

[62] Tom Zimmermann, David Deen, Yu Cao, John Simon, Patrick Fay, Debdeep Jena, and Huili Grace Xing. “AlN/GaN insulated-gate HEMTs with 2.3 A/mm output current and 480 mS/mm transconductance”. In: *IEEE Electron Device Letters* 29.7 (2008), pp. 661–664.

[63] Williams R Calderón-Muñoz, Debdeep Jena, and Mihir Sen. “Hydrodynamic instability of confined two-dimensional electron flow in semiconductors”. In: *Journal of Applied Physics* 106.1 (2009), p. 014506.

[66] Debdeep Jena. “A theory for the high-field current-carrying capacity of one-dimensional semiconductors”. In: *Journal of Applied Physics* 105.12 (2009), p. 123701.

[67] Yee Kan Koh, Yu Cao, David G Cahill, and Debdeep Jena. “Heat-transport mechanisms in superlattices”. In: *Advanced Functional Materials* 19.4 (2009), pp. 610–615.

[70] John Simon, Ze Zhang, Kevin Goodman, Huili Xing, Thomas Kosel, Patrick Fay, and Debdeep Jena. “Polarization-induced Zener tunnel junctions in wide-band-gap heterostructures”. In: *Physical Review Letters* 103.2 (2009), p. 026801.

[74] G Xu, SK Tripathy, X Mu, YJ Ding, K Wang, Yu Cao, D Jena, and JB Khurgin. “Investigation of hot electrons and hot phonons generated within an AlN/GaN high electron mobility transistor”. In: *Laser physics* 19 (2009), pp. 745–751.

[76] Tom Zimmermann, Yu Cao, Debdeep Jena, Huili Grace Xing, and Paul Saunier. “4-NM AlN BARRIER ALL BINARY HFET WITH SiN x GATE DIELECTRIC”. In: *International Journal of High Speed Electronics and Systems* 19.01 (2009), pp. 153–159.

[77] Williams R Calderon-Munoz, Debdeep Jena, and Mihir Sen. “Temperature influence on hydrodynamic instabilities in a one-dimensional electron flow in semiconductors”. In: *Journal of Applied Physics* 107.7 (2010), p. 074504.

[78] Yu Cao, Huili Xing, and Debdeep Jena. “Polarization-mediated remote surface roughness scattering in ultrathin barrier GaN high-electron mobility transistors”. In: *Applied Physics Letters* 97.22 (2010), p. 222116.

[79] Yu Cao, Tom Zimmermann, Huili Xing, and Debdeep Jena. “Polarization-engineered removal of buffer leakage for GaN transistors”. In: *Applied Physics Letters* 96.4 (2010), p. 042102.

[80] Aniruddha Konar, Tian Fang, and Debdeep Jena. “Effect of high-κ gate dielectrics on charge transport in graphene-based field effect transistors”. In: *Physical Review B* 82.11 (2010), p. 115452.

[81] Aniruddha Konar, Tian Fang, Nan Sun, and Debdeep Jena. “Anisotropic charge transport in nonpolar GaN quantum wells: Polarization induced line charge and interface roughness scattering”. In: *Physical Review B* 82.19 (2010), p. 193301.

[82] Guowang Li, Yu Cao, Huili Grace Xing, and Debdeep Jena. “High mobility two-dimensional electron gases in nitride heterostructures with high Al composition AlGaN alloy barriers”. In: *Applied Physics Letters* 97.22 (2010), p. 222110.

[83] Guowang Li, Tom Zimmermann, Yu Cao, Chuanxin Lian, Xiu Xing, Ronghua Wang, Patrick Fay, Huili Grace Xing, and Debdeep Jena. “Threshold Voltage Control in $Al_{0.72}Ga_{0.28}N$ / AlN / GaN HEMTs by Work-Function Engineering”. In: *IEEE Electron Device Letters* 31.9 (2010), pp. 954–956.

[85] Chuanxin Lian, Yu Cao, Ronghua Wang, Guowang Li, Tom Zimmermann, Debdeep Jena, and Huili Xing. “Molecular beam epitaxy regrowth of ohmics in metal-face AlN/GaN transistors”. In: *CS Mantech Tech. Dig.* (2010), pp. 193–196.

[86] Chuanxin Lian, Kristof Tahy, Tian Fang, Guowang Li, Huili Grace Xing, and Debdeep Jena. “Quantum transport in graphene nanoribbons patterned by metal masks”. In: *Applied Physics Letters* 96.10 (2010), p. 103109.

[87] John Simon, Yu Cao, and Debdeep Jena. “Short-period AlN/GaN p-type superlattices: hole transport use in p-n junctions”. In: *physica status solidi c* 7.10 (2010), pp. 2386–2389.

[88] John Simon, Vladimir Protasenko, Chuanxin Lian, Huili Xing, and Debdeep Jena. “Polarization induced hole doping in wide-band-gap uniaxial semiconductor heterostructures”. In: *Science* 327.5961 (2010), pp. 60–64.

[91] Ronghua Wang, Paul Saunier, Xiu Xing, Chuanxin Lian, Xiang Gao, Shiping Guo, Gregory Snider, Patrick Fay, Debdeep Jena, and Huili Xing. “Gate-recessed enhancement-mode InAlN/AlN/GaN HEMTs with 1.9-A/mm drain current density and 800-mS/mm transconductance”. In: *IEEE Electron Device Letters* 31.12 (2010), pp. 1383–1385.

[93] Yu Cao, Kejia Wang, Guowang Li, Tom Kosel, Huili Xing, and Debdeep Jena. “MBE growth of high conductivity single and multiple AlN/GaN heterojunctions”. In: *Journal of Crystal Growth* 323.1 (2011), pp. 529–533.

[94] Tian Fang, Aniruddha Konar, Huili Xing, and Debdeep Jena. “High-field transport in two-dimensional graphene”. In: *Physical Review B* 84.12 (2011), p. 125450.

[97] Satyaki Ganguly, Jai Verma, Guowang Li, Tom Zimmermann, Huili Xing, and Debdeep Jena. “Presence and origin of interface charges at atomic-layer deposited Al_2O_3/III-nitride heterojunctions”. In: *Applied Physics Letters* 99.19 (2011), p. 193504.

[98] Bo Gao, Gregory Hartland, Tian Fang, Michelle Kelly, Debdeep Jena, Huili Xing, and Libai Huang. “Studies of intrinsic hot phonon dynamics in suspended graphene by transient absorption microscopy”. In: *Nano letters* 11.8 (2011), pp. 3184–3189.

[99] Kevin Goodman, Vladimir Protasenko, Jai Verma, Tom Kosel, Grace Xing, and Debdeep Jena. “Molecular beam epitaxial growth of gallium nitride nanowires on atomic layer deposited aluminum oxide”. In: *Journal of Crystal Growth* 334.1 (2011), pp. 113–117.

[100] Kevin D Goodman, Vladimir V Protasenko, Jai Verma, Thomas H Kosel, Huili G Xing, and Debdeep Jena. “Green luminescence of InGaN nanowires grown on silicon substrates by molecular beam epitaxy”. In: *Journal of Applied Physics* 109.8 (2011), p. 084336.

[101] Jia Guo, Yu Cao, Chuanxin Lian, Tom Zimmermann, Guowang Li, Jai Verma, Xiang Gao, Shiping Guo, Paul Saunier, Mark Wistey, et al. “Metal-face InAlN/AlN/GaN high electron mobility transistors with regrown ohmic contacts by molecular beam epitaxy”. In: *physica status solidi (a)* 208.7 (2011), pp. 1617–1619.

[102] Raj K Jana and Debdeep Jena. “Stark-effect scattering in rough quantum wells”. In: *Applied Physics Letters* 99.1 (2011), p. 012104.

[103] Debdeep Jena, John Simon, Albert Wang, Yu Cao, Kevin Goodman, Jai Verma, Satyaki Ganguly, Guowang Li, Kamal Karda, Vladimir Protasenko, et al. “Polarization-engineering in group III-nitride heterostructures: New opportunities for device design”. In: *physica status solidi (a)* 208.7 (2011), pp. 1511–1516.

[104] Aniruddha Konar, Tian Fang, and Debdeep Jena. “Dielectric-environment mediated renormalization of many-body effects in a one-dimensional electron gas”. In: *Physical Review B* 84.8 (2011), p. 085422.

[105] Aniruddha Konar, Tian Fang, Nan Sun, and Debdeep Jena. “Charged basal stacking fault scattering in nitride semiconductors”. In: *Applied Physics Letters* 98.2 (2011), p. 022109.

[106] Oleg Laboutin, Yu Cao, Ronghua Wang, Guowang Li, Debdeep Jena, H Xing, Chien-Fong Lo, Lu Liu, SJ Pearton, F Ren, et al. “The resurgence of III-N materials development: AlInN HEMTs and GaN-on-Si”. In: *ECS Transactions* 41.8 (2011), p. 301.

[107] Albert D Liao, Justin Z Wu, Xinran Wang, Kristof Tahy, Debdeep Jena, Hongjie Dai, and Eric Pop. “Thermally limited current carrying ability of graphene nanoribbons”. In: *Physical Review Letters* 106.25 (2011), p. 256801.

[108] Berardi Sensale-Rodriguez, Tian Fang, Rusen Yan, Michelle M Kelly, Debdeep Jena, Lei Liu, et al. “Unique prospects for graphene-based terahertz modulators”. In: *Applied Physics Letters* 99.11 (2011).

[110] BERARDI SENSALE-RODRIGUEZ, LEI LIU, RONGHUA WANG, TOM ZIMMERMANN, PATRICK FAY, DEBDEEP JENA, and HUILI GRACE XING. “FET THz detectors operating in the quantum capacitance limited region”. In: *International Journal of High Speed Electronics and Systems* 20.03 (2011), pp. 597–609.

[113] Jai Verma, John Simon, Vladimir Protasenko, Thomas Kosel, Huili Grace Xing, and Debdeep Jena. “N-polar III-nitride quantum well light-emitting diodes with polarization-induced doping”. In: *Applied Physics Letters* 99.17 (2011), p. 171104.

[115] Ronghua Wang, Guowang Li, Oleg Laboutin, Yu Cao, Wayne Johnson, Gregory Snider, Patrick Fay, Debdeep Jena, and Huili Xing. “210-GHz InAlN/GaN HEMTs with dielectric-free passivation”. In: *IEEE Electron Device Letters* 32.7 (2011), pp. 892–894.

[116] Ronghua Wang, Guowang Li, Jai Verma, Berardi Sensale-Rodriguez, Tian Fang, Jia Guo, Zongyang Hu, Oleg Laboutin, Yu Cao, Wayne Johnson, et al. “220-GHz quaternary barrier InAlGaN/AlN/GaN HEMTs”. In: *IEEE Electron Device Letters* 32.9 (2011), pp. 1215–1217.

[117] Ronghua Wang, Guowang Li, Jai Verma, Tom Zimmermann, Zongyang Hu, Oleg Laboutin, Yu Cao, Wayne Johnson, Xiang Gao, Shiping Guo, et al. “Si-containing recessed ohmic contacts and 210 GHz quaternary barrier InAlGaN high-electron-mobility transistors”. In: *Applied physics express* 4.9 (2011), p. 096502.

[118] Ronghua Wang, Paul Saunier, Yong Tang, Tian Fang, Xiang Gao, Shiping Guo, Gregory Snider, Patrick Fay, Debdeep Jena, and Huili Xing. “Enhancement-Mode InAlN/AlN/GaN HEMTs With 10^{-12} A/mm Leakage Current and 10^{12} on/off Current Ratio”. In: *IEEE Electron Device Letters* 32.3 (2011), pp. 309–311.

[120] ZE ZHANG, YU CAO, MICHELLE KELLY, DEBDEEP JENA, PATRICK FAY, RAJESH RAJAVEL, and PETER DEELMAN. “A physics-based tunneling model for Sb-heterostructure backward tunnel diode millimeter-wave detectors”. In: *International Journal of High Speed Electronics and Systems* 20.03 (2011), pp. 589–596.

[122] Pei Zhao, Qin Zhang, Debdeep Jena, and Siyuranga O Koswatta. “Influence of metal–graphene contact on the operation and scalability of graphene field-effect transistors”. In: *IEEE Transactions on electron devices* 58.9 (2011), pp. 3170–3178.

[123] Tom Zimmermann, Yu Cao, Guowang Li, Gregory Snider, Debdeep Jena, and Huili Xing. “Subcritical barrier AlN/GaN E/D-mode HFETs and inverters”. In: *physica status solidi (a)* 208.7 (2011), pp. 1620–1622.

[124] Faiza Afroz Faria, Jia Guo, Pei Zhao, Guowang Li, Prem Kumar Kandaswamy, Mark Wistey, Huili Xing, and Debdeep Jena. “Ultra-low resistance ohmic contacts to GaN with high Si doping concentrations grown by molecular beam epitaxy”. In: *Applied Physics Letters* 101.3 (2012), p. 032109.

[125] Woong Choi, Mi Yeon Cho, Aniruddha Konar, Jong Hak Lee, Gi-Beom Cha, Soon Cheol Hong, Sangsig Kim, Jeongyong Kim, Debdeep Jena, Jinsoo Joo, et al. “High-detectivity multilayer MoS_2 phototransistors with spectral response from ultraviolet to infrared”. In: *Advanced materials* 24.43 (2012), pp. 5832–5836.

[126] Tian Fang, Ronghua Wang, Huili Xing, Siddharth Rajan, and Debdeep Jena. “Effect of optical phonon scattering on the performance of GaN transistors”. In: *IEEE Electron Device Letters* 33.5 (2012), pp. 709–711.

[127] Randall M Feenstra, Debdeep Jena, and Gong Gu. “Single-particle tunneling in doped graphene-insulator-graphene junctions”. In: *Journal of Applied Physics* 111.4 (2012), p. 043711.

[128] Satyaki Ganguly, Aniruddha Konar, Zongyang Hu, Huili Xing, and Debdeep Jena. “Polarization effects on gate leakage in InAlN/AlN/GaN high-electron-mobility transistors”. In: *Applied Physics Letters* 101.25 (2012), p. 253519.

[129] Jia Guo, Guowang Li, Faiza Faria, Yu Cao, Ronghua Wang, Jai Verma, Xiang Gao, Shiping Guo, Edward Beam, Andrew Ketterson, et al. "MBE-Regrown Ohmics in InAlN HEMTs With a Regrowth Interface Resistance of 0.05 $\Omega \cdot$ mm". In: *IEEE Electron Device Letters* 33.4 (2012), pp. 525–527.

[131] Wan Sik Hwang, Kristof Tahy, Xuesong Li, Huili Xing, Alan C Seabaugh, Chun Yung Sung, and Debdeep Jena. "Transport properties of graphene nanoribbon transistors on chemical-vapor-deposition grown wafer-scale graphene". In: *Applied Physics Letters* 100.20 (2012), p. 203107.

[132] Wan Sik Hwang, Kristof Tahy, Luke O Nyakiti, Virginia D Wheeler, Rachael L Myers-Ward, CR Eddy Jr, D Kurt Gaskill, Huili Xing, Alan Seabaugh, and Debdeep Jena. "Fabrication of top-gated epitaxial graphene nanoribbon FETs using hydrogen-silsesquioxane". In: *Journal of Vacuum Science & Technology B, Nanotechnology and Microelectronics: Materials, Processing, Measurement, and Phenomena* 30.3 (2012), p. 03D104.

[135] D Jena. "Graphene". In: *Encyclopedia of Nanotechnology* (2012), pp. 968–978.

[138] Golnaz Karbasian, Patrick J Fay, Huili Xing, Debdeep Jena, Alexei O Orlov, and Gregory L Snider. "High aspect ratio features in poly (methylglutarimide) using electron beam lithography and solvent developers". In: *Journal of Vacuum Science & Technology B, Nanotechnology and Microelectronics: Materials, Processing, Measurement, and Phenomena* 30.6 (2012), 06FI01.

[140] Sunkook Kim, Aniruddha Konar, Wan-Sik Hwang, Jong Hak Lee, Jiyoul Lee, Jaehyun Yang, Changhoon Jung, Hyoungsub Kim, Ji-Beom Yoo, Jae-Young Choi, et al. "High-mobility and low-power thin-film transistors based on multilayer MoS_2 crystals". In: *Nature Communications* 3.1 (2012), p. 1011.

[141] Aniruddha Konar, Amit Verma, Tian Fang, Pei Zhao, Raj Jana, and Debdeep Jena. "Charge transport in non-polar and semi-polar III-V nitride heterostructures". In: *Semiconductor Science and Technology* 27.2 (2012), p. 024018.

[142] O Laboutin, Y Cao, W Johnson, R Wang, G Li, D Jena, and H Xing. "InGaN channel high electron mobility transistor structures grown by metal organic chemical vapor deposition". In: *Applied Physics Letters* 100.12 (2012), p. 121909.

[143] Guowang Li, Ronghua Wang, Jia Guo, Jai Verma, Zongyang Hu, Yuanzheng Yue, Faiza Faria, Yu Cao, Michelle Kelly, Thomas Kosel, et al. "Ultrathin body GaN-on-insulator quantum well FETs with regrown ohmic contacts". In: *IEEE Electron Device Letters* 33.5 (2012), pp. 661–663.

[145] C Pietzka, G Li, M Alomari, H Xing, D Jena, and E Kohn. "Surface potential analysis of AlN/GaN heterostructures by electrochemical capacitance-voltage measurements". In: *Journal of Applied Physics* 112.7 (2012), p. 074508.

[147] B Sensale-Rodriguez, P Fay, L Liu, D Jena, and HG Xing. "Enhanced Terahertz detection in resonant tunnel diode-gated HEMTs". In: *ECS Transactions* 49.1 (2012), p. 93.

[148] Berardi Sensale-Rodriguez, Rusen Yan, Michelle M Kelly, Tian Fang, Kristof Tahy, Wan Sik Hwang, Debdeep Jena, Lei Liu, and Huili Grace Xing. "Broadband graphene terahertz modulators enabled by intraband transitions". In: *Nature Communications* 3.1 (2012), p. 780.

[150] Berardi Sensale-Rodriguez, Rusen Yan, Subrina Rafique, Mingda Zhu, Wei Li, Xuelei Liang, David Gundlach, Vladimir Protasenko, Michelle M Kelly, Debdeep Jena, et al. "Extraordinary control of terahertz beam reflectance in graphene electro-absorption modulators". In: *Nano letters* 12.9 (2012), pp. 4518–4522.

[151] Berardi Sensale-Rodriguez, Rusen Yan, Mingda Zhu, Debdeep Jena, Lei Liu, and Huili Grace Xing. "Efficient terahertz electro-absorption modulation employing graphene plasmonic structures". In: *Applied Physics Letters* 101.26 (2012), p. 261115.

[152] Wan Sik Hwang, Maja Remskar, Rusen Yan, Vladimir Protasenko, Kristof Tahy, Soo Doo Chae, Pei Zhao, Aniruddha Konar, Huili Xing, Alan Seabaugh, et al. "Transistors with chemically synthesized layered semiconductor WS_2 exhibiting 10^5 room temperature modulation and ambipolar behavior". In: *Applied Physics Letters* 101.1 (2012), p. 013107.

[153] Prasanna Sivasubramani, Tae Joo Park, Brian E Coss, Antonio Lucero, Jie Huang, Barry Brennan, Yu Cao, Debdeep Jena, Huili Xing, Robert M Wallace, et al. "In-situ X-ray photoelectron spectroscopy of trimethyl aluminum and water half-cycle treatments on HF-treated and O3-oxidized GaN substrates". In: *physica status solidi (RRL)–Rapid Research Letters* 6.1 (2012), pp. 22–24.

[156] Rusen Yan, Berardi Sensale-Rodriguez, Lei Liu, Debdeep Jena, and Huili Grace Xing. "A new class of electrically tunable metamaterial terahertz modulators". In: *Optics express* 20.27 (2012), pp. 28664–28671.

[157] Rusen Yan, Qin Zhang, Wei Li, Irene Calizo, Tian Shen, Curt A Richter, Angela R Hight-Walker, Xuelei Liang, Alan Seabaugh, Debdeep Jena, et al. "Determination of graphene work function and graphene-insulator-semiconductor band alignment by internal photoemission spectroscopy". In: *Applied Physics Letters* 101.2 (2012), p. 022105.

[158] Yuanzheng Yue, Zongyang Hu, Jia Guo, Berardi Sensale-Rodriguez, Guowang Li, Ronghua Wang, Faiza Faria, Tian Fang, Bo Song, Xiang Gao, et al. "InAlN/AlN/GaN HEMTs with regrown ohmic contacts and f_T of 370 GHz". In: *IEEE Electron Device Letters* 33.7 (2012), pp. 988–990.

[160] Hsiao-Yu Chang, Shixuan Yang, Jongho Lee, Li Tao, Wan-Sik Hwang, Debdeep Jena, Nanshu Lu, and Deji Akinwande. "High-performance, highly bendable MoS_2 transistors with high-k dielectrics for flexible low-power systems". In: *ACS Nano* 7.6 (2013), pp. 5446–5452.

[163] Raj K Jana, Gregory L Snider, and Debdeep Jena. "On the possibility of sub 60 mV/decade subthreshold switching in piezoelectric gate barrier transistors". In: *physica status solidi (c)* 10.11 (2013), pp. 1469–1472.

[164] Debdeep Jena. "Tunneling transistors based on graphene and 2-D crystals". In: *Proceedings of the IEEE* 101.7 (2013), pp. 1585–1602.

[165] Guowang Li, Ronghua Wang, Bo Song, Jai Verma, Yu Cao, Satyaki Ganguly, Amit Verma, Jia Guo, Huili Grace Xing, and Debdeep Jena. "Polarization-induced GaN-on-insulator E/D mode p-channel heterostructure FETs". In: *IEEE Electron Device Letters* 34.7 (2013), pp. 852–854.

[167] Wei Liu, Jiahao Kang, Deblina Sarkar, Yasin Khatami, Debdeep Jena, and Kaustav Banerjee. "Role of metal contacts in designing high-performance monolayer n-type WSe_2 field effect transistors". In: *Nano letters* 13.5 (2013), pp. 1983–1990.

[168] Nan Ma and Debdeep Jena. "Interband tunneling in two-dimensional crystal semiconductors". In: *Applied Physics Letters* 102.13 (2013), p. 132102.

[170] Siddharth Rajan and Debdeep Jena. "Gallium nitride electronics". In: *Semicond. Sci. Technol* 28.7 (2013).

[171] Berardi Sensale-Rodriguez, Jia Guo, Ronghua Wang, Jai Verma, Guowang Li, Tian Fang, Edward Beam, Andrew Ketterson, Michael Schuette, Paul Saunier, et al. "Time delay analysis in high speed gate-recessed E-mode InAlN HEMTs". In: *Solid-state electronics* 80 (2013), pp. 67–71.

[172] Berardi Sensale-Rodríguez, Lei Liu, Patrick Fay, Debdeep Jena, and Huili Grace Xing. "Power amplification at THz via plasma wave excitation in RTD-gated HEMTs". In: *IEEE Transactions on Terahertz Science and Technology* 3.2 (2013), pp. 200–206.

[173] Berardi Sensale-Rodriguez, Subrina Rafique, Rusen Yan, Mingda Zhu, Vladimir Protasenko, Debdeep Jena, Lei Liu, and Huili Grace Xing. "Terahertz imaging employing graphene modulator arrays". In: *Optics express* 21.2 (2013), pp. 2324–2330.

[174] Berardi Sensale-Rodriguez, Rusen Yan, Lei Liu, Debdeep Jena, and Huili Grace Xing. "Graphene for reconfigurable terahertz optoelectronics". In: *Proceedings of the IEEE* 101.7 (2013), pp. 1705–1716.

[176] Hongyan Shi, Rusen Yan, Simone Bertolazzi, Jacopo Brivio, Bo Gao, Andras Kis, Debdeep Jena, Huili Grace Xing, and Libai Huang. "Exciton dynamics in suspended monolayer and few-layer MoS_2 2D crystals". In: *ACS Nano* 7.2 (2013), pp. 1072–1080.

[177] Wan Sik Hwang, Maja Remskar, Rusen Yan, Tom Kosel, Jong Kyung Park, Byung Jin Cho, Wilfried Haensch, Huili Xing, Alan Seabaugh, and Debdeep Jena. "Comparative study of chemically synthesized and exfoliated multilayer MoS_2 field-effect transistors". In: *Applied Physics Letters* 102.4 (2013), p. 043116.

[178] Nan Sun, Kristof Tahy, Huili Xing, Debdeep Jena, Gerald Arnold, and Steven T Ruggiero. "Electrical noise and transport properties of graphene". In: *Journal of Low Temperature Physics* 172 (2013), pp. 202–211.

[179] Kristof Tahy, Huili Xing, and Debdeep Jena. "Graphene nanoribbon FETs for digital electronics: experiment and modeling". In: *International Journal of Circuit Theory and Applications* 41.6 (2013), pp. 603–607.

[180] Jai Verma, Prem Kumar Kandaswamy, Vladimir Protasenko, Amit Verma, Huili Grace Xing, and Debdeep Jena. "Tunnel-injection GaN quantum dot ultraviolet light-emitting diodes". In: *Applied Physics Letters* 102.4 (2013), p. 041103.

[181] Jai Verma, Vladimir Protasenko, A Verma, M Islam, G Xing, and Debdeep Jena. “Deep Ultra-Violet Emission from GaN/AlN matrix grown by Plasma-Assisted Molecular Beam Epitaxy”. In: *Microscopy and Microanalysis* 19.S2 (2013), pp. 1998–1999.

[183] Ronghua Wang, Guowang Li, Golnaz Karbasian, Jia Guo, Faiza Faria, Zongyang Hu, Yuanzheng Yue, Jai Verma, Oleg Laboutin, Yu Cao, et al. “InGaN channel high-electron-mobility transistors with InAlGaN barrier and fT/fmax of 260/220 GHz”. In: *Applied Physics Express* 6.1 (2013), p. 016503.

[184] Ronghua Wang, Guowang Li, Golnaz Karbasian, Jia Guo, Bo Song, Yuanzheng Yue, Zongyang Hu, Oleg Laboutin, Yu Cao, Wayne Johnson, et al. “Quaternary Barrier InAlGaN HEMTs With $f_T/f_{\max}$ of 230/300 GHz”. In: *IEEE Electron Device Letters* 34.3 (2013), pp. 378–380.

[186] Rusen Yan, Qin Zhang, Oleg A Kirillov, Wei Li, James Basham, Alex Boosalis, Xuelei Liang, Debdeep Jena, Curt A Richter, Alan C Seabaugh, et al. “Graphene as transparent electrode for direct observation of hole photoemission from silicon to oxide”. In: *Applied Physics Letters* 102.12 (2013), p. 123106.

[187] Yuanzheng Yue, Zongyang Hu, Jia Guo, Berardi Sensale-Rodriguez, Guowang Li, Ronghua Wang, Faiza Faria, Bo Song, Xiang Gao, Shiping Guo, et al. “Ultrascaled InAlN/GaN high electron mobility transistors with cutoff frequency of 400 GHz”. In: *Japanese Journal of Applied Physics* 52.8S (2013), 08JN14.

[188] Pei Zhao, Randall M Feenstra, Gong Gu, and Debdeep Jena. “SymFET: A proposed symmetric graphene tunneling field-effect transistor”. In: *IEEE Transactions on Electron Devices* 60.3 (2013), pp. 951–957.

[192] David Esseni, Marco G Pala, Alberto Revelant, Pierpaolo Palestri, Luca Selmi, Mingda Oscar Li, Gregory Snider, Debdeep Jena, and Huili Grace Xing. “Challenges and Opportunities in the Design of Tunnel FETs: Materials, Device Architectures, and Defects”. In: *ECS Transactions* 64.6 (2014), p. 581.

[193] S Fathipour, N Ma, WS Hwang, V Protasenko, S Vishwanath, HG Xing, H Xu, D Jena, J Appenzeller, and A Seabaugh. “Exfoliated multilayer $MoTe_2$ field-effect transistors”. In: *Applied Physics Letters* 105.19 (2014), p. 192101.

[194] Jorge A Ferrer-Perez, Bruce Claflin, Debdeep Jena, Mihir Sen, Ramakrishna Vetury, and Donald Dorsey. “Photoluminescence-based electron and lattice temperature measurements in GaN-based HEMTs”. In: *Journal of Electronic Materials* 43 (2014), pp. 341–347.

[195] Satyaki Ganguly, Bo Song, Wan Sik Hwang, Zongyang Hu, Mingda Zhu, Jai Verma, Huili Xing, and Debdeep Jena. “AlGaN/GaN HEMTs on Si by MBE with regrown contacts and f_T= 153 GHz”. In: *physica status solidi (c)* 11.3-4 (2014), pp. 887–889.

[196] Satyaki Ganguly, Jai Verma, Zongyang Hu, Huili Grace Xing, and Debdeep Jena. “Performance enhancement of InAlN/GaN HEMTs by KOH surface treatment”. In: *Applied Physics Express* 7.3 (2014), p. 034102.

[197] Satyaki Ganguly, Jai Verma, Huili Grace Xing, and Debdeep Jena. “Plasma MBE growth conditions of AlGaN/GaN high-electron-mobility transistors on silicon and their device characteristics with epitaxially regrown ohmic contacts”. In: *Applied Physics Express* 7.10 (2014), p. 105501.

[199] Zongyang Hu, Yuanzheng Yue, Mingda Zhu, Bo Song, Satyaki Ganguly, Josh Bergman, Debdeep Jena, and Huili Grace Xing. “Impact of CF4 plasma treatment on threshold voltage and mobility in Al_2O_3/InAlN/GaN MOSHEMTs”. In: *Applied Physics Express* 7.3 (2014), p. 031002.

[200] Cheng-Ying Huang, Jeremy JM Law, Mark JW Rodwell, Hong Lu, Arthur C Gossard, Debdeep Jena, et al. “Two dimensional electron transport in modulation-doped $In_{0.53}Ga_{0.47}As$ / $AlAs_{0.56}Sb_{0.44}$ ultrathin quantum wells”. In: *Journal of Applied Physics* 115.12 (2014).

[201] Seung Hwan Lee, Daeyeong Lee, Wan Sik Hwang, Euyheon Hwang, Debdeep Jena, and Won Jong Yoo. “High-performance photocurrent generation from two-dimensional WS_2 field-effect transistors”. In: *Applied Physics Letters* 104.19 (2014), p. 193113.

[202] Wan Sik Hwang, Kristof Tahy, Pei Zhao, Luke O Nyakiti, Virginia D Wheeler, Rachael L Myers-Ward, Charles R Eddy Jr, D Kurt Gaskill, Huili Xing, Alan Seabaugh, et al. “Electronic transport properties of top-gated epitaxial-graphene nanoribbon field-effect transistors on SiC wafers”. In: *Journal of Vacuum Science & Technology B, Nanotechnology and Microelectronics: Materials, Processing, Measurement, and Phenomena* 32.1 (2014), p. 012202.

[203] Wan Sik Hwang, Amit Verma, Hartwin Peelaers, Vladimir Protasenko, Sergei Rouvimov, Huili Xing, Alan Seabaugh, Wilfried Haensch, Chris Van de Walle, Zbigniew Galazka, et al. “High-voltage field effect transistors with wide-bandgap β-Ga_2O_3 nanomembranes”. In: *Applied Physics Letters* 104.20 (2014), p. 203111.

[206] Raj K Jana, Gregory L Snider, and Debdeep Jena. “Energy-efficient clocking based on resonant switching for low-power computation”. In: *IEEE Transactions on Circuits and Systems I: Regular Papers* 61.5 (2014), pp. 1400–1408.

[208] Debdeep Jena, Kaustav Banerjee, and Grace Huili Xing. “Intimate contacts”. In: *Nature materials* 13.12 (2014), pp. 1076–1078.

[210] Jiahao Kang, Wei Liu, Deblina Sarkar, Debdeep Jena, and Kaustav Banerjee. “Computational study of metal contacts to monolayer transition-metal dichalcogenide semiconductors”. In: *Physical Review X* 4.3 (2014), p. 031005.

[211] Guowang Li, Bo Song, Satyaki Ganguly, Mingda Zhu, Ronghua Wang, Xiaodong Yan, Jai Verma, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. “Two-dimensional electron gases in strained quantum wells for AlN/GaN/AlN double heterostructure field-effect transistors on AlN”. In: *Applied Physics Letters* 104.19 (2014), p. 193506.

[212] Mingda Li, David Esseni, Gregory Snider, Debdeep Jena, and Huili Grace Xing. “Single particle transport in two-dimensional heterojunction interlayer tunneling field effect transistor”. In: *Journal of Applied Physics* 115.7 (2014), p. 074508.

[214] Nan Ma and Debdeep Jena. “Charge scattering and mobility in atomically thin semiconductors”. In: *Physical Review X* 4.1 (2014), p. 011043.

[215] Andrew Ritchie, Shaylin Eger, Chelsey Wright, Daniel Chelladurai, Cuyler Borrowman, Weine Olovsson, Martin Magnuson, Jai Verma, Debdeep Jena, Huili Grace Xing, et al. "Strain sensitivity in the nitrogen 1s NEXAFS spectra of gallium nitride". In: *Applied surface science* 316 (2014), pp. 232–236.

[218] Bo Song, Berardi Sensale-Rodriguez, Ronghua Wang, Jia Guo, Zongyang Hu, Yuanzheng Yue, Faiza Faria, Michael Schuette, Andrew Ketterson, Edward Beam, et al. "Effect of fringing capacitances on the RF performance of GaN HEMTs with T-gates". In: *IEEE Transactions on Electron Devices* 61.3 (2014), pp. 747–754.

[221] Amit Verma, Adam P Kajdos, Tyler A Cain, Susanne Stemmer, and Debdeep Jena. "Intrinsic mobility limiting mechanisms in lanthanum-doped strontium titanate". In: *Physical Review Letters* 112.21 (2014), p. 216601.

[222] Amit Verma, Santosh Raghavan, Susanne Stemmer, and Debdeep Jena. "Au-gated SrTiO3 field-effect transistors with large electron concentration and current modulation". In: *Applied Physics Letters* 105.11 (2014), p. 113512.

[224] Jai Verma, SM Islam, Vladimir Protasenko, Prem Kumar Kandaswamy, Debdeep Jena, et al. "Tunnel-injection quantum dot deep-ultraviolet light-emitting diodes with polarization-induced doping in III-nitride heterostructures". In: *Applied Physics Letters* 104.2 (2014).

[226] Suresh Vishwanath, Sergei Rouvimov, Tatyana Orlova, Xinyu Liu, Jacek K Furdyna, Debdeep Jena, and Huili Grace Xing. "Atomic structure of thin $MoSe_2$ films grown by molecular beam epitaxy". In: *Microscopy and Microanalysis* 20.S3 (2014), pp. 164–165.

[228] Qimin Yan, Emmanouil Kioupakis, Debdeep Jena, and Chris G Van de Walle. "First-principles study of high-field-related electronic behavior of group-III nitrides". In: *Physical Review B* 90.12 (2014), p. 121201.

[229] Yuanzheng Yue, Xiaodong Yan, Wenjun Li, Huili Grace Xing, Debdeep Jena, and Patrick Fay. "Faceted sidewall etching of n-GaN on sapphire by photoelectrochemical wet processing". In: *Journal of Vacuum Science & Technology B, Nanotechnology and Microelectronics: Materials, Processing, Measurement, and Phenomena* 32.6 (2014), p. 061201.

[230] Qin Zhang, Yeqing Lu, Curt A Richter, Debdeep Jena, and Alan Seabaugh. "Optimum bandgap and supply voltage in tunnel FETs". In: *IEEE Transactions on Electron Devices* 61.8 (2014), pp. 2719–2724.

[231] Pei Zhao, Amit Verma, Jai Verma, Huili Grace Xing, Patrick Fay, and Debdeep Jena. "GaN Heterostructure Barrier Diodes Exploiting Polarization-Induced δ-Doping". In: *IEEE Electron Device Letters* 35.6 (2014), pp. 615–617.

[232] Lars Bjaalie, Amit Verma, Burak Himmetoglu, Anderson Janotti, Santosh Raghavan, Vladimir Protasenko, EH Steenbergen, Debdeep Jena, Susanne Stemmer, and Chris G Van de Walle. "Determination of the Mott-Hubbard gap in GdTiO 3". In: *Physical Review B* 92.8 (2015), p. 085111.

[233] Faiza Afroz Faria, Kazuki Nomoto, Zongyang Hu, Sergei Rouvimov, Huili Grace Xing, and Debdeep Jena. "Low temperature AlN growth by MBE and its application in HEMTs". In: *Journal of Crystal Growth* 425 (2015), pp. 133–137.

[234] Sara Fathipour, Maja Remskar, Ana Varlec, Arvind Ajoy, Rusen Yan, Suresh Vishwanath, S Rouvimov, WS Hwang, HG Xing, D Jena, et al. "Synthesized multiwall MoS_2 nanotube and nanoribbon field-effect transistors". In: *Applied Physics Letters* 106.2 (2015), p. 022114.

[236] Kaijun Feng, William Streyer, SM Islam, Jai Verma, Debdeep Jena, Daniel Wasserman, and Anthony J Hoffman. "Localized surface phonon polariton resonances in polar gallium nitride". In: *Applied Physics Letters* 107.8 (2015), p. 081108.

[237] Zhi Guo, Amit Verma, Xufei Wu, Fangyuan Sun, Austin Hickman, Takekazu Masui, Akito Kuramata, Masataka Higashiwaki, Debdeep Jena, and Tengfei Luo. "Anisotropic thermal conductivity in single crystal β-gallium oxide". In: *Applied Physics Letters* 106.11 (2015), p. 111909.

[238] Zongyang Hu, Kazuki Nomoto, Bo Song, Mingda Zhu, Meng Qi, Ming Pan, Xiang Gao, Vladimir Protasenko, Debdeep Jena, and Huili Grace Xing. "Near unity ideality factor and Shockley-Read-Hall lifetime in GaN-on-GaN pn diodes with avalanche breakdown". In: *Applied Physics Letters* 107.24 (2015), p. 243501.

[239] Wan Sik Hwang, Pei Zhao, Kristof Tahy, Luke O Nyakiti, Virginia D Wheeler, Rachael L Myers-Ward, Charles R Eddy, D Kurt Gaskill, Joshua A Robinson, Wilfried Haensch, et al. "Graphene nanoribbon field-effect transistors on wafer-scale epitaxial graphene on SiC substrates". In: *APL Materials* 3.1 (2015).

[241] Raj K Jana, Arvind Ajoy, Gregory Snider, and Debdeep Jena. "Transistor switches using active piezoelectric gate barriers". In: *IEEE Journal on Exploratory Solid-State Computational Devices and Circuits* 1 (2015), pp. 35–42.

[242] Mingda Oscar Li, David Esseni, Joseph J Nahas, Debdeep Jena, and Huili Grace Xing. "Two-dimensional heterojunction interlayer tunneling field effect transistors (thin-TFETs)". In: *IEEE Journal of the Electron Devices Society* 3.3 (2015), pp. 200–207.

[243] Wenjun Li, Saima Sharmin, Hesameddin Ilatikhameneh, Rajib Rahman, Yeqing Lu, Jingshan Wang, Xiaodong Yan, Alan Seabaugh, Gerhard Klimeck, Debdeep Jena, et al. "Polarization-engineered III-nitride heterojunction tunnel field-effect transistors". In: *IEEE Journal on Exploratory Solid-State Computational Devices and Circuits* 1 (2015), pp. 28–34.

[245] Nan Ma and Debdeep Jena. "Carrier statistics and quantum capacitance effects on mobility extraction in two-dimensional crystal semiconductor field-effect transistors". In: *2D Materials* 2.1 (2015), p. 015003.

[247] Meng Qi, Guowang Li, Vladimir Protasenko, Pei Zhao, Jai Verma, Bo Song, Satyaki Ganguly, Mingda Zhu, Zongyang Hu, Xiaodong Yan, et al. "Dual optical marker Raman characterization of strained GaN-channels on AlN using AlN/GaN/AlN quantum wells and 15N isotopes". In: *Applied Physics Letters* 106.4 (2015), p. 041906.

[249] Meng Qi, Kazuki Nomoto, Mingda Zhu, Zongyang Hu, Yuning Zhao, Vladimir Protasenko, Bo Song, Xiaodong Yan, Guowang Li, Jai Verma, et al. "High breakdown single-crystal GaN pn diodes by molecular beam epitaxy". In: *Applied Physics Letters* 107.23 (2015), p. 232101.

[252] Amit Verma, Santosh Raghavan, Susanne Stemmer, and Debdeep Jena. “Ferroelectric transition in compressively strained SrTiO3 thin films”. In: *Applied Physics Letters* 107.19 (2015), p. 192908.

[253] Suresh Vishwanath, Xinyu Liu, Sergei Rouvimov, Patrick C Mende, Angelica Azcatl, Stephen McDonnell, Robert M Wallace, Randall M Feenstra, Jacek K Furdyna, Debdeep Jena, et al. “Comprehensive structural and optical characterization of MBE grown $MoSe_2$ on graphite, CaF2 and graphene”. In: *2D Materials* 2.2 (2015), p. 024007.

[255] Rusen Yan, Sara Fathipour, Yimo Han, Bo Song, Shudong Xiao, Mingda Li, Nan Ma, Vladimir Protasenko, David A Muller, Debdeep Jena, et al. “Esaki diodes in van der Waals heterojunctions with broken-gap energy band alignment”. In: *Nano letters* 15.9 (2015), pp. 5791–5798.

[256] Xiaodong Yan, Wenjun Li, SM Islam, Kasra Pourang, Huili Grace Xing, Patrick Fay, and Debdeep Jena. “Polarization-induced Zener tunnel diodes in GaN/InGaN/GaN heterojunctions”. In: *Applied Physics Letters* 107.16 (2015).

[258] Mingda Zhu, Bo Song, Meng Qi, Zongyang Hu, Kazuki Nomoto, Xiaodong Yan, Yu Cao, Wayne Johnson, Erhard Kohn, Debdeep Jena, et al. “1.9-kV AlGaN/GaN lateral Schottky barrier diodes on silicon”. In: *IEEE Electron Device Letters* 36.4 (2015), pp. 375–377.

[260] Dylan Bayerl, SM Islam, Christina M Jones, Vladimir Protasenko, Debdeep Jena, and Emmanouil Kioupakis. “Deep ultraviolet emission from ultra-thin GaN/AlN heterostructures”. In: *Applied Physics Letters* 109.24 (2016), p. 241102.

[263] Manish Chhowalla, Debdeep Jena, and Hua Zhang. “Two-dimensional semiconductors for transistors”. In: *Nature Reviews Materials* 1.11 (2016), pp. 1–15.

[264] Sining Dong, Xinyu Liu, Xiang Li, Vasily Kanzyuba, Taehee Yoo, Sergei Rouvimov, Suresh Vishwanath, Huili G Xing, Debdeep Jena, Margaret Dobrowolska, et al. “Room temperature weak ferromagnetism in $Sn_{1-x}Mn_xSe_2$ 2D films grown by molecular beam epitaxy”. In: *APL Materials* 4.3 (2016), p. 032601.

[266] Priti Gupta, AA Rahman, Shruti Subramanian, Shalini Gupta, Arumugam Thamizhavel, Tatyana Orlova, Sergei Rouvimov, Suresh Vishwanath, Vladimir Protasenko, Masihhur R Laskar, et al. “Layered transition metal dichalcogenides: promising near-lattice-matched substrates for GaN growth”. In: *Scientific reports* 6.1 (2016), pp. 1–8.

[268] SM Islam, Vladimir Protasenko, Sergei Rouvimov, Huili Grace Xing, and Debdeep Jena. “High-quality InN films on GaN using graded InGaN buffers by MBE”. In: *Japanese Journal of Applied Physics* 55.5S (2016), 05FD12.

[269] SM Islam, Vladimir Protasenko, Sergei Rouvimov, Huili Grace Xing, and Debdeep Jena. “Sub-230 nm deep-UV emission from GaN quantum disks in AlN grown by a modified Stranski–Krastanov mode”. In: *Japanese Journal of Applied Physics* 55.5S (2016), 05FF06.

[274] V Kanzyuba, S Dong, X Li, T Yoo, X Liu, S Rouvimov, S Vishwanath, D Jena, HG Xing, M Dobrowolska, et al. “Structural Properties of (Sn, Mn)Se_2-a New 2D Magnetic Semiconductor with Potential for Spintronic Applications”. In: *Microscopy and Microanalysis* 22.S3 (2016), pp. 1512–1513.

[278] Nan Ma, Nicholas Tanen, Amit Verma, Zhi Guo, Tengfei Luo, Huili Grace Xing, and Debdeep Jena. “Intrinsic electron mobility limits in β-Ga_2O_3”. In: *Applied Physics Letters* 109.21 (2016).

[279] Kazuki Nomoto, Bo Song, Zongyang Hu, Mingda Zhu, Meng Qi, Naoki Kaneda, Tomoyoshi Mishima, Tohru Nakamura, Debdeep Jena, and Huili Grace Xing. “1.7-kV and 0.55-m$\Omega \cdot cm^2$ GaN pn Diodes on Bulk GaN Substrates With Avalanche Capability”. In: *IEEE Electron Device Letters* 37.2 (2016), pp. 161–164.

[280] Jun Hong Park, Suresh Vishwanath, Xinyu Liu, Huawei Zhou, Sarah M Eichfeld, Susan K Fullerton-Shirey, Joshua A Robinson, Randall M Feenstra, Jacek Furdyna, Debdeep Jena, et al. “Scanning tunneling microscopy and spectroscopy of air exposure effects on molecular beam epitaxy grown WSe_2 monolayers and bilayers”. In: *ACS Nano* 10.4 (2016), pp. 4258–4267.

[282] Bo Song, Mingda Zhu, Zongyang Hu, Meng Qi, Kazuki Nomoto, Xiaodong Yan, Yu Cao, Debdeep Jena, and Huili Grace Xing. “Ultralow-leakage AlGaN/GaN high electron mobility transistors on Si with non-alloyed regrown ohmic contacts”. In: *IEEE Electron Device Letters* 37.1 (2016), pp. 16–19.

[283] Amit Verma, Kazuki Nomoto, Wan Sik Hwang, Santosh Raghavan, Susanne Stemmer, and Debdeep Jena. “Large electron concentration modulation using capacitance enhancement in SrTiO3/SmTiO3 Fin-field effect transistors”. In: *Applied Physics Letters* 108.18 (2016), p. 183509.

[285] Suresh Vishwanath, Xinyu Liu, Sergei Rouvimov, Leonardo Basile, Ning Lu, Angelica Azcatl, Katrina Magno, Robert M Wallace, Moon Kim, Juan-Carlos Idrobo, et al. “Controllable growth of layered selenide and telluride heterostructures and superlattices using molecular beam epitaxy”. In: *Journal of Materials Research* 31.7 (2016), pp. 900–910.

[290] YongJin Cho, Zongyang Hu, Kazuki Nomoto, Huili Grace Xing, and Debdeep Jena. “Single-crystal N-polar GaN p-n diodes by plasma-assisted molecular beam epitaxy”. In: *Applied Physics Letters* 110.25 (2017), p. 253506.

[291] H Condori Quispe, SM Islam, S Bader, A Chanana, K Lee, R Chaudhuri, A Nahata, HG Xing, D Jena, and B Sensale-Rodriguez. “Terahertz spectroscopy of an electron-hole bilayer system in AlN/GaN/AlN quantum wells”. In: *Applied Physics Letters* 111.7 (2017), p. 073102.

[292] Jimy Encomendero, Faiza Afroz Faria, SM Islam, Vladimir Protasenko, Sergei Rouvimov, Berardi Sensale-Rodriguez, Patrick Fay, Debdeep Jena, and Huili Grace Xing. “New tunneling features in polar III-nitride resonant tunneling diodes”. In: *Physical Review X* 7.4 (2017), p. 041017.

[293] Aaron D Franklin, Debdeep Jena, and Deji Akinwande. “75 Years of the Device Research ConferenceÑA History Worth Repeating”. In: *IEEE Journal of the Electron Devices Society* 6 (2017), pp. 116–120.

[296] Zongyang Hu, Kazuki Nomoto, Meng Qi, Wenshen Li, Mingda Zhu, Xiang Gao, Debdeep Jena, and Huili Grace Xing. “1.1-kV vertical GaN pn diodes with p-GaN regrown by molecular beam epitaxy”. In: *IEEE Electron Device Letters* 38.8 (2017), pp. 1071–1074.

[297] SM Islam, Kevin Lee, Jai Verma, Vladimir Protasenko, Sergei Rouvimov, Shyam Bharadwaj, Debdeep Jena, et al. "MBE-grown 232–270 nm deep-UV LEDs using monolayer thin binary GaN/AlN quantum heterostructures". In: *Applied Physics Letters* 110.4 (2017).

[298] SM Islam, Vladimir Protasenko, Kevin Lee, Sergei Rouvimov, Jai Verma, Huili Grace Xing, and Debdeep Jena. "Deep-UV emission at 219 nm from ultrathin MBE GaN/AlN quantum heterostructures". In: *Applied Physics Letters* 111.9 (2017).

[302] Wenshen Li, Kazuki Nomoto, Manyam Pilla, Ming Pan, Xiang Gao, Debdeep Jena, and Huili Grace Xing. "Design and realization of GaN trench junction-barrier-Schottky-diodes". In: *IEEE Transactions on Electron Devices* 64.4 (2017), pp. 1635–1641.

[303] Cheng Liu, Yu Kee Ooi, SM Islam, Jai Verma, Huili Xing, Debdeep Jena, and Jing Zhang. "Physics and polarization characteristics of 298 nm AlN-delta-GaN quantum well ultraviolet light-emitting diodes". In: *Applied Physics Letters* 110.7 (2017), p. 071103.

[307] Hanjong Paik, Zhen Chen, Edward Lochocki, Ariel Seidner H, Amit Verma, Nicholas Tanen, Jisung Park, Masaki Uchida, ShunLi Shang, Bi-Cheng Zhou, et al. "Adsorption-controlled growth of La-doped BaSnO3 by molecular-beam epitaxy". In: *APL Materials* 5.11 (2017).

[308] Meng Qi, Guowang Li, Satyaki Ganguly, Pei Zhao, Xiaodong Yan, Jai Verma, Bo Song, Mingda Zhu, Kazuki Nomoto, Huili Xing, et al. "Strained GaN quantum-well FETs on single crystal bulk AlN substrates". In: *Applied Physics Letters* 110.6 (2017), p. 063501.

[312] Liheng Zhang, Amit Verma, Huili Grace Xing, and Debdeep Jena. "Inductively-coupled-plasma reactive ion etching of single-crystal β-Ga_2O_3". In: *Japanese Journal of Applied Physics* 56.3 (2017), p. 030304.

[313] Mingda Zhu, Meng Qi, Kazuki Nomoto, Zongyang Hu, Bo Song, Ming Pan, Xiang Gao, Debdeep Jena, and Huili Grace Xing. "Electron mobility in polarization-doped $Al_{0-0.2}GaN$ with a low concentration near 10^{17} cm^{-3}". In: *Applied Physics Letters* 110.18 (2017), p. 182102.

[314] Ahmad Zubair, Amirhasan Nourbakhsh, Jin-Yong Hong, Meng Qi, Yi Song, Debdeep Jena, Jing Kong, Mildred Dresselhaus, and Tomás Palacios. "Hot electron transistor with van der Waals base-collector heterojunction and high-performance GaN emitter". In: *Nano letters* 17.5 (2017), pp. 3089–3096.

[315] Samuel James Bader, Reet Chaudhuri, Kazuki Nomoto, Austin Hickman, Zhen Chen, Han Wui Then, David A Muller, Huili Grace Xing, and Debdeep Jena. "Gate-recessed E-mode p-channel HFET with high on-current based on GaN/AlN 2D hole gas". In: *IEEE Electron Device Letters* 39.12 (2018), pp. 1848–1851.

[317] Hugo O Condori Quispe, Ashish Chanana, Jimy Encomendero, Mingda Zhu, Nicole Trometer, Ajay Nahata, Debdeep Jena, Huili Grace Xing, and Berardi Sensale-Rodriguez. "Comparison of unit cell coupling for grating-gate and high electron mobility transistor array THz resonant absorbers". In: *Journal of Applied Physics* 124.9 (2018), p. 093101.

[319] Jimy Encomendero, Rusen Yan, Amit Verma, SM Islam, Vladimir Protasenko, Sergei Rouvimov, Patrick Fay, Debdeep Jena, and Huili Grace Xing. “Room temperature microwave oscillations in GaN/AlN resonant tunneling diodes with peak current densities up to 220 kA/cm2”. In: *Applied Physics Letters* 112.10 (2018), p. 103101.

[320] E Fabris, Matteo Meneghini, Carlo De Santi, Zongyang Hu, Wenshen Li, Kazuki Nomoto, X Gao, D Jena, HG Xing, Gaudenzio Meneghesso, et al. “Degradation of GaN-on-GaN vertical diodes submitted to high current stress”. In: *Microelectronics Reliability* 88 (2018), pp. 568–571.

[323] Zongyang Hu, Kazuki Nomoto, Wenshen Li, Nicholas Tanen, Kohei Sasaki, Akito Kuramata, Tohru Nakamura, Debdeep Jena, and Huili Grace Xing. “Enhancement-mode Ga_2O_3 vertical transistors with breakdown voltage¿ 1 kV”. In: *IEEE Electron Device Letters* 39.6 (2018), pp. 869–872.

[324] Zongyang Hu, Kazuki Nomoto, Wenshen Li, Zexuan Zhang, Nicholas Tanen, Quang Tu Thieu, Kohei Sasaki, Akito Kuramata, Tohru Nakamura, Debdeep Jena, et al. “Breakdown mechanism in 1 kA/cm2 and 960 V E-mode β-Ga_2O_3 vertical transistors”. In: *Applied Physics Letters* 113.12 (2018), p. 122103.

[325] Okan Koksal, Nicholas Tanen, Debdeep Jena, Huili Xing, and Farhan Rana. “Measurement of ultrafast dynamics of photoexcited carriers in β-Ga_2O_3 by two-color optical pump-probe spectroscopy”. In: *Applied Physics Letters* 113.25 (2018), p. 252102.

[327] Wenshen Li, Zongyang Hu, Kazuki Nomoto, Zexuan Zhang, Jui-Yuan Hsu, Quang Tu Thieu, Kohei Sasaki, Akito Kuramata, Debdeep Jena, and Huili Grace Xing. “1230 V β-Ga_2O_3 trench Schottky barrier diodes with an ultra-low leakage current of¡ 1 μ A/cm2”. In: *Applied Physics Letters* 113.20 (2018), p. 202101.

[329] Wenshen Li, Kazuki Nomoto, Kevin Lee, SM Islam, Zongyang Hu, Mingda Zhu, Xiang Gao, Manyam Pilla, Debdeep Jena, and Huili Grace Xing. “Development of GaN vertical trench-MOSFET with MBE regrown channel”. In: *IEEE Transactions on Electron Devices* 65.6 (2018), pp. 2558–2564.

[330] Wenshen Li, Kazuki Nomoto, Kevin Lee, SM Islam, Zongyang Hu, Mingda Zhu, Xiang Gao, Jinqiao Xie, Manyam Pilla, Debdeep Jena, et al. “Activation of buried p-GaN in MOCVD-regrown vertical structures”. In: *Applied Physics Letters* 113.6 (2018), p. 062105.

[333] Cheng Liu, Yu Kee Ooi, SM Islam, Huili Xing, Debdeep Jena, and Jing Zhang. “234 nm and 246 nm AlN-Delta-GaN quantum well deep ultraviolet light-emitting diodes”. In: *Applied Physics Letters* 112.1 (2018), p. 011101.

[334] Enrique G Marin, Samuel James Bader, and Debdeep Jena. “A new holistic model of 2-D semiconductor FETs”. In: *IEEE Transactions on Electron Devices* 65.3 (2018), pp. 1239–1245.

[336] JY Tsao, Sakibuddin Chowdhury, MA Hollis, D Jena, NM Johnson, KA Jones, RJ Kaplar, S Rajan, CG Van de Walle, E Bellotti, et al. “Ultrawide-bandgap semiconductors: research opportunities and challenges”. In: *Advanced Electronic Materials* 4.1 (2018), p. 1600501.

[337] Amit Verma, Bo Song, Brian Downey, Virginia D Wheeler, David J Meyer, Huili Grace Xing, and Debdeep Jena. "Steep sub-Boltzmann switching in AlGaN/GaN phase-FETs with ALD VO 2". In: *IEEE Transactions on Electron Devices* 65.3 (2018), pp. 945–949.

[338] Suresh Vishwanath, Aditya Sundar, Xinyu Liu, Angelica Azcatl, Edward Lochocki, Arthur R Woll, Sergei Rouvimov, Wan Sik Hwang, Ning Lu, Xin Peng, et al. "MBE growth of few-layer 2H-$MoTe_2$ on 3D substrates". In: *Journal of Crystal Growth* 482 (2018), pp. 61–69.

[339] Rusen Yan, Guru Khalsa, Suresh Vishwanath, Yimo Han, John Wright, Sergei Rouvimov, D Scott Katzer, Neeraj Nepal, Brian P Downey, David A Muller, et al. "GaN/NbN epitaxial semiconductor/superconductor heterostructures". In: *Nature* 555.7695 (2018), pp. 183–189.

[340] Olalekan Afuye, Xiang Li, Felicia Guo, Debdeep Jena, Daniel C Ralph, Alyosha Molnar, Huili Grace Xing, and Alyssa Apsel. "Modeling and circuit design of associative memories with spin–orbit torque FETs". In: *IEEE Journal on Exploratory Solid-State Computational Devices and Circuits* 5.2 (2019), pp. 197–205.

[341] Samuel James Bader, Reet Chaudhuri, Martin F Schubert, Han Wui Then, Huili Grace Xing, and Debdeep Jena. "Wurtzite phonons and the mobility of a GaN/AlN 2D hole gas". In: *Applied Physics Letters* 114.25 (2019), p. 253501.

[343] Shyam Bharadwaj, SM Islam, Kazuki Nomoto, Vladimir Protasenko, Alexander Chaney, Huili Xing, and Debdeep Jena. "Bandgap narrowing and Mott transition in Si-doped $Al_{0.7}Ga_{0.3}N$". In: *Applied Physics Letters* 114.11 (2019), p. 113501.

[344] Joseph Casamento, John Wright, Reet Chaudhuri, Huili Xing, and Debdeep Jena. "Molecular beam epitaxial growth of scandium nitride on hexagonal SiC, GaN, and AlN". In: *Applied Physics Letters* 115.17 (2019), p. 172101.

[345] Reet Chaudhuri, Samuel James Bader, Zhen Chen, David A Muller, Huili Grace Xing, and Debdeep Jena. "A polarization-induced 2D hole gas in undoped gallium nitride quantum wells". In: *Science* 365.6460 (2019), pp. 1454–1457.

[346] Zhe Cheng, Nicholas Tanen, Celesta Chang, Jingjing Shi, Jonathan McCandless, David Muller, Debdeep Jena, Huili Grace Xing, and Samuel Graham. "Significantly reduced thermal conductivity in β-$(Al_{0.1}Ga_{0.9})_2O_3$/Ga_2O_3 superlattices". In: *Applied Physics Letters* 115.9 (2019), p. 092105.

[347] YongJin Cho, Shyam Bharadwaj, Zongyang Hu, Kazuki Nomoto, Uwe Jahn, Huili Grace Xing, and Debdeep Jena. "Blue (In, Ga) N light-emitting diodes with buried n+–p+ tunnel junctions by plasma-assisted molecular beam epitaxy". In: *Japanese Journal of Applied Physics* 58.6 (2019), p. 060914.

[348] YongJin Cho, Yuxing Ren, Huili Grace Xing, and Debdeep Jena. "High-mobility two-dimensional electron gases at AlGaN/GaN heterostructures grown on GaN bulk wafers and GaN template substrates". In: *Applied Physics Express* 12.12 (2019), p. 121003.

[349] Phillip Dang, Sergei Rouvimov, Huili Grace Xing, and Debdeep Jena. "Magnetotransport and superconductivity in InBi films grown on Si (111) by molecular beam epitaxy". In: *Journal of Applied Physics* 126.10 (2019), p. 103901.

[350] Phillip Dang, Zexuan Zhang, Joseph Casamento, Xiang Li, Jashan Singhal, Darrell G Schlom, Daniel C Ralph, Huili Grace Xing, and Debdeep Jena. “Materials Relevant to Realizing a Field-Effect Transistor Based on Spin–Orbit Torques”. In: *IEEE Journal on Exploratory Solid-State Computational Devices and Circuits* 5.2 (2019), pp. 158–165.

[351] Jimy Encomendero, Vladimir Protasenko, Berardi Sensale-Rodriguez, Patrick Fay, Farhan Rana, Debdeep Jena, and Huili Grace Xing. “Broken symmetry effects due to polarization on resonant tunneling transport in double-barrier nitride heterostructures”. In: *Physical Review Applied* 11.3 (2019), p. 034032.

[352] Elena Fabris, Carlo De Santi, Alessandro Caria, Kazuki Nomoto, Zongyang Hu, Wenshen Li, Xiang Gao, Debdeep Jena, Huili Grace Xing, Gaudenzio Meneghesso, et al. “Breakdown walkout in polarization-doped vertical GaN diodes”. In: *IEEE Transactions on Electron Devices* 66.11 (2019), pp. 4597–4603.

[354] Austin Hickman, Reet Chaudhuri, Samuel James Bader, Kazuki Nomoto, Kevin Lee, Huili Grace Xing, and Debdeep Jena. “High breakdown voltage in RF AlN/GaN/AlN quantum well HEMTs”. In: *IEEE Electron Device Letters* 40.8 (2019), pp. 1293–1296.

[356] Wan Sik Hwang, Pei Zhao, Sung Geun Kim, Rusen Yan, Gerhard Klimeck, Alan Seabaugh, Susan K Fullerton-Shirey, Huili Grace Xing, and Debdeep Jena. “Room-temperature graphene-nanoribbon tunneling field-effect transistors”. In: *npj 2D Materials and Applications* 3.1 (2019), p. 43.

[358] Debdeep Jena, Ryan Page, Joseph Casamento, Phillip Dang, Jashan Singhal, Zexuan Zhang, John Wright, Guru Khalsa, Yongjin Cho, and Huili Grace Xing. “The new nitrides: Layered, ferroelectric, magnetic, metallic and superconducting nitrides to boost the GaN photonics and electronics eco-system”. In: *Japanese Journal of Applied Physics* 58.SC (2019), SC0801.

[362] Wenshen Li, Kazuki Nomoto, Zongyang Hu, Debdeep Jena, and Huili Grace Xing. “Field-Plated Ga_2O_3 Trench Schottky Barrier Diodes With a $BV^2/(2R_{\text{on}})$ of up to 0.95 GW/cm^2”. In: *IEEE Electron Device Letters* 41.1 (2019), pp. 107–110.

[364] Wenshen Li, Kazuki Nomoto, Zongyang Hu, Debdeep Jena, and Huili Grace Xing. “Fin-channel orientation dependence of forward conduction in kV-class Ga_2O_3 trench Schottky barrier diodes”. In: *Applied Physics Express* 12.6 (2019), p. 061007.

[365] Wenshen Li, Kazuki Nomoto, Aditya Sundar, Kevin Lee, Mingda Zhu, Zongyang Hu, Edward Beam, Jinqiao Xie, Manyam Pilla, Xiang Gao, et al. “Realization of GaN PolarMOS using selective-area regrowth by MBE and its breakdown mechanisms”. In: *Japanese Journal of Applied Physics* 58.SC (2019), SCCD15.

[368] Antonio B Mei, Yongjian Tang, Jürgen Schubert, Debdeep Jena, Huili Xing, Daniel C Ralph, and Darrell G Schlom. “Self-assembly and properties of domain walls in BiFeO3 layers grown via molecular-beam epitaxy”. In: *APL Materials* 7.7 (2019), p. 071101.

[370] Ryan Page, Joseph Casamento, Yongjin Cho, Sergei Rouvimov, Huili Grace Xing, and Debdeep Jena. “Rotationally aligned hexagonal boron nitride on sapphire by high-temperature molecular beam epitaxy”. In: *Physical Review Materials* 3.6 (2019), p. 064001.

[371] Samuel Poncé, Debdeep Jena, and Feliciano Giustino. “Hole mobility of strained GaN from first principles”. In: *Physical Review B* 100.8 (2019), p. 085204.

[372] Samuel Poncé, Debdeep Jena, and Feliciano Giustino. “Route to high hole mobility in GaN via reversal of crystal-field splitting”. In: *Physical Review Letters* 123.9 (2019), p. 096602.

[374] Keisuke Shinohara, Casey King, Eric Regan, MP Gomez, Joshua Bergman, Andrew Carter, Andrea Arias, Miguel Urteaga, Berinder Brar, Ryan Page, et al. “GaN-based multiple 2DEG channel BRIDGE (buried dual gate) HEMT technology for high power and linearity”. In: *ECS Transactions* 92.4 (2019), p. 103.

[375] Henryk Turski, Shyam Bharadwaj, Huili Grace Xing, and Debdeep Jena. “Polarization control in nitride quantum well light emitters enabled by bottom tunnel-junctions”. In: *Journal of Applied Physics* 125.20 (2019).

[376] Henryk Turski, Filip Krzyżewski, Anna Feduniewicz-Żmuda, Pawel Wolny, Marcin Siekacz, Grzegorz Muziol, Caroline Cheze, Krzesimir Nowakowski-Szukudlarek, Huili Grace Xing, Debdeep Jena, et al. “Unusual step meandering due to Ehrlich-Schwoebel barrier in GaN epitaxy on the N-polar surface”. In: *Applied Surface Science* 484 (2019), pp. 771–780.

[377] Henryk Turski, Marcin Siekacz, Grzegorz Muzioł, Mateusz Hajdel, Szymon Stańczyk, Mikołaj Żak, Mikołaj Chlipała, Czeslaw Skierbiszewski, Shyam Bharadwaj, Huili Grace Xing, and Debdeep Jena. “Nitride LEDs and lasers with buried tunnel junctions”. In: *ECS Journal of Solid State Science and Technology* 9.1 (2019), p. 015018.

[380] Runjie Lily Xu, Miguel Muñoz Rojo, SM Islam, Aditya Sood, Bozo Vareskic, Ankita Katre, Natalio Mingo, Kenneth E Goodson, Huili Grace Xing, Debdeep Jena, et al. “Thermal conductivity of crystalline AlN and the influence of atomic-scale defects”. In: *Journal of Applied Physics* 126.18 (2019), p. 185105.

[381] Rusen Yan, Guru Khalsa, Brian T Schaefer, Alexander Jarjour, Sergei Rouvimov, Katja C Nowack, Huili G Xing, and Debdeep Jena. “Thickness dependence of superconductivity in ultrathin NbS_2”. In: *Applied Physics Express* 12.2 (2019), p. 023008.

[382] Samuel James Bader, Hyunjea Lee, Reet Chaudhuri, Shimin Huang, Austin Hickman, Alyosha Molnar, Huili Grace Xing, Debdeep Jena, Han Wui Then, Nadim Chowdhury, et al. “Prospects for wide bandgap and ultrawide bandgap CMOS devices”. In: *IEEE Transactions on Electron Devices* 67.10 (2020), pp. 4010–4020.

[383] Krishna Balasubramanian, John Wright, Orr Zohar, Boaz Taitler, Shlomi Bouscher, Huili Grace Xing, Debdeep Jena, and Alex Hayat. “Epitaxial superconducting tunnel diodes for light detection applications”. In: *Optical Materials Express* 10.7 (2020), pp. 1724–1732.

[384] Shyam Bharadwaj, Kevin Lee, Kazuki Nomoto, Austin Hickman, Len van Deurzen, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. “Bottom tunnel junction blue light-emitting field-effect transistors”. In: *Applied Physics Letters* 117.3 (2020).

[385] Shyam Bharadwaj, Jeffrey Miller, Kevin Lee, Joshua Lederman, Marcin Siekacz, Huili Grace Xing, Debdeep Jena, Czesław Skierbiszewski, and Henryk Turski. “Enhanced injection efficiency and light output in bottom tunnel-junction light-emitting diodes”. In: *Optics Express* 28.4 (2020), pp. 4489–4500.

[386] Joseph Casamento, Celesta S Chang, Yu-Tsun Shao, John Wright, David A Muller, Huili Xing, and Debdeep Jena. "Structural and piezoelectric properties of ultra-thin $Sc_xAl_{1-x}N$ films grown on GaN by molecular beam epitaxy". In: *Applied Physics Letters* 117.11 (2020), p. 112101.

[387] Joseph Casamento, Megan E Holtz, Hanjong Paik, Phillip Dang, Rachel Steinhardt, Huili Grace Xing, Darrell G Schlom, and Debdeep Jena. "Multiferroic $LuFeO_3$ on GaN by molecular-beam epitaxy". In: *Applied Physics Letters* 116.10 (2020).

[388] Joseph Casamento, Huili Grace Xing, and Debdeep Jena. "Oxygen incorporation in the molecular beam epitaxy growth of $Sc_xGa_{1-x}N$ and $Sc_xAl_{1-x}N$". In: *physica status solidi (b)* 257.4 (2020), p. 1900612.

[389] Alexander Chaney, Henryk Turski, Kazuki Nomoto, Zongyang Hu, Jimy Encomendero, Sergei Rouvimov, Tatyana Orlova, Patrick Fay, Alan Seabaugh, Huili Grace Xing, et al. "Gallium nitride tunneling field-effect transistors exploiting polarization fields". In: *Applied Physics Letters* 116.7 (2020), p. 073502.

[390] Reet Chaudhuri, Samuel James Bader, Zhen Chen, David Muller, Huili Grace Xing, and Debdeep Jena. "Molecular Beam Epitaxy Growth of Large-Area GaN/AlN 2D Hole Gas Heterostructures". In: *physica status solidi (b)* 257.4 (2020), p. 1900567.

[391] Risheng Cheng, John Wright, Huili G Xing, Debdeep Jena, and Hong X Tang. "Epitaxial niobium nitride superconducting nanowire single-photon detectors". In: *Applied Physics Letters* 117.13 (2020), p. 132601.

[392] YongJin Cho, Celesta S Chang, Kevin Lee, Mingli Gong, Kazuki Nomoto, Masato Toita, Leo J Schowalter, David A Muller, Debdeep Jena, and Huili Grace Xing. "Molecular beam homoepitaxy on bulk AlN enabled by aluminum-assisted surface cleaning". In: *Applied Physics Letters* 116.17 (2020), p. 172106.

[393] YongJin Cho, Jimy Encomendero, Shao-Ting Ho, Huili Grace Xing, and Debdeep Jena. "N-polar GaN/AlN resonant tunneling diodes". In: *Applied Physics Letters* 117.14 (2020), p. 143501.

[394] Scott A Crooker, Menyoung Lee, Ross David McDonald, Jon L Doorn, Ingrid Zimmermann, Y Lai, LE Winter, Y Ren, Y-J Cho, BJ Ramshaw, et al. "GaN/AlGaN 2DEGs in the quantum regime: Magneto-transport and photoluminescence to 60 tesla". In: *Applied Physics Letters* 117.26 (2020), p. 262105.

[396] Jimy Encomendero, Vladimir Protasenko, Farhan Rana, Debdeep Jena, and Huili Grace Xing. "Fighting broken symmetry with doping: Toward polar resonant tunneling diodes with symmetric characteristics". In: *Physical Review Applied* 13.3 (2020), p. 034048.

[397] Elena Fabris, Carlo De Santi, Alessandro Caria, Wenshen Li, Kazuki Nomoto, Zongyang Hu, Debdeep Jena, Huili Grace Xing, Gaudenzio Meneghesso, Enrico Zanoni, et al. "Trapping and detrapping mechanisms in β-Ga?O? vertical FinFETs investigated by electro-optical measurements". In: *IEEE Transactions on Electron Devices* 67.10 (2020), pp. 3954–3959.

[398] Elena Fabris, Carlo De Santi, Alessandro Caria, Kalparupa Mukherjee, Kazuki Nomoto, Zongyang Hu, Wenshen Li, Xiang Gao, Hugues Marchand, Debdeep Jena, et al. "Impact of residual carbon on avalanche voltage and stability of polarization-induced vertical GaN pn junction". In: *IEEE Transactions on Electron Devices* 67.10 (2020), pp. 3978–3982.

[401] D Scott Katzer, Neeraj Nepal, Matthew T Hardy, Brian P Downey, David F Storm, Eric N Jin, Rusen Yan, Guru Khalsa, John Wright, Andrew C Lang, et al. "Molecular beam epitaxy of transition metal nitrides for superconducting device applications". In: *physica status solidi (a)* 217.3 (2020), p. 1900675.

[402] Irfan Khan, Zhaoyuan Fang, Milan Palei, Junchi Lu, Leland Nordin, Evan L Simmons, Owen Dominguez, SM Islam, Huili Grace Xing, Debdeep Jena, et al. "Engineering the Berreman mode in mid-infrared polar materials". In: *Optics Express* 28.19 (2020), pp. 28590–28599.

[404] Kevin Lee, Shyam Bharadwaj, Yu-Tsun Shao, Len van Deurzen, Vladimir Protasenko, David A Muller, Huili Grace Xing, and Debdeep Jena. "Light-emitting diodes with AlN polarization-induced buried tunnel junctions: A second look". In: *Applied Physics Letters* 117.6 (2020), p. 061104.

[405] Kevin Lee, YongJin Cho, Leo J Schowalter, Masato Toita, Huili Grace Xing, and Debdeep Jena. "Surface control and MBE growth diagram for homoepitaxy on single-crystal AlN substrates". In: *Applied Physics Letters* 116.26 (2020), p. 262102.

[406] Lei Li, Kazuki Nomoto, Ming Pan, Wenshen Li, Austin Hickman, Jeffrey Miller, Kevin Lee, Zongyang Hu, Samuel James Bader, Soo Min Lee, et al. "GaN HEMTs on Si with regrown contacts and cutoff/maximum oscillation frequencies of 250/204 GHz". In: *IEEE Electron Device Letters* 41.5 (2020), pp. 689–692.

[407] Wenshen Li, Kazuki Nomoto, Zongyang Hu, Debdeep Jena, and Huili Grace Xing. "Guiding principles for trench Schottky barrier diodes based on ultrawide bandgap semiconductors: a case study in Ga_2O_3". In: *IEEE Transactions on Electron Devices* 67.10 (2020), pp. 3938–3947.

[408] Wenshen Li, Kazuki Nomoto, Debdeep Jena, and Huili Grace Xing. "Thermionic emission or tunneling? The universal transition electric field for ideal Schottky reverse leakage current: A case study in β-Ga_2O_3". In: *Applied Physics Letters* 117.22 (2020), p. 222104.

[409] Wenshen Li, Devansh Saraswat, Yaoyao Long, Kazuki Nomoto, Debdeep Jena, and Huili Grace Xing. "Near-ideal reverse leakage current and practical maximum electric field in β-Ga_2O_3 Schottky barrier diodes". In: *Applied Physics Letters* 116.19 (2020), p. 192101.

[410] Xiang Li, Joseph Casamento, Phillip Dang, Zexuan Zhang, Olalekan Afuye, Antonio B Mei, Alyssa B Apsel, Darrell G Schlom, Debdeep Jena, Daniel C Ralph, et al. "Spin–orbit torque field-effect transistor (SOTFET): Proposal for a magnetoelectric memory". In: *Applied Physics Letters* 116.24 (2020), p. 242405.

[413] Matteo Meneghini, Elena Fabris, Maria Ruzzarin, Carlo De Santi, Kazuki Nomoto, Zhenqi Hu, Wenshen Li, Xingya Gao, Debdeep Jena, Huili Grace Xing, et al. "Degradation Mechanisms of GaN-Based Vertical Devices: A Review". In: *physica status solidi (a)* 217.7 (2020), p. 1900750.

[414] Jeffrey Miller, John Wright, Huili Grace Xing, and Debdeep Jena. “All-Epitaxial Bulk Acoustic Wave Resonators”. In: *physica status solidi (a)* 217.7 (2020), p. 1900786.

[415] G Muziol, M Hajdel, H Turski, K Nomoto, M Siekacz, K Nowakowski-Szkudlarek, M Żak, D Jena, HG Xing, P Perlin, et al. “Distributed-feedback blue laser diode utilizing a tunnel junction grown by plasma-assisted molecular beam epitaxy”. In: *Optics Express* 28.23 (2020), pp. 35321–35329.

[417] Jisung Park, Hanjong Paik, Kazuki Nomoto, Kiyoung Lee, Bo-Eun Park, Benjamin Grisafe, Li-Chen Wang, Sayeef Salahuddin, Suman Datta, Yongsung Kim, et al. “Fully transparent field-effect transistor with high drain current and on-off ratio”. In: *APL Materials* 8.1 (2020), p. 011110.

[419] Arjan Singh, Okan Koksal, Nicholas Tanen, Jonathan McCandless, Debdeep Jena, Huili Grace Xing, Hartwin Peelaers, and Farhan Rana. “Intra-and inter-conduction band optical absorption processes in β-Ga_2O_3”. In: *Applied Physics Letters* 117.7 (2020).

[420] Jashan Singhal and Debdeep Jena. “Unified ballistic transport relation for anisotropic dispersions and generalized dimensions”. In: *Physical Review Research* 2.4 (2020), p. 043413.

[422] Tongbo Wei, SM Islam, Uwe Jahn, Jianchang Yan, Kevin Lee, Shyam Bharadwaj, Xiaoli Ji, Junxi Wang, Jinmin Li, Vladimir Protasenko, et al. “GaN/AlN quantum-disk nanorod 280 nm deep ultraviolet light emitting diodes by molecular beam epitaxy”. In: *Optics Letters* 45.1 (2020), pp. 121–124.

[424] Zexuan Zhang, Yongjin Cho, Jashan Singhal, Xiang Li, Phillip Dang, Hyunjea Lee, Joseph Casamento, Yongjian Tang, Huili Grace Xing, and Debdeep Jena. “Magnetic properties of MBE grown Mn4N on MgO, SiC, GaN and Al_2O_3 substrates”. In: *AIP Advances* 10.1 (2020), p. 015238.

[426] Joseph Casamento, Hyunjea Lee, Celesta S Chang, Matthew F Besser, Takuya Maeda, David A Muller, Huili Xing, and Debdeep Jena. “Strong effect of scandium source purity on chemical and electronic properties of epitaxial $Sc_xAl_{1-x}N$/GaN heterostructures”. In: *APL Materials* 9.9 (2021), p. 091106.

[427] Celesta S Chang, Nicholas Tanen, Vladimir Protasenko, Thaddeus J Asel, Shin Mou, Huili Grace Xing, Debdeep Jena, and David A Muller. “γ-phase inclusions as common structural defects in alloyed β-$(Al_xGa_{1-x})_2O_3$ and doped β-Ga_2O_3 films”. In: *APL Materials* 9.5 (2021), p. 051119.

[428] Reet Chaudhuri, Zhen Chen, David A Muller, Huili Grace Xing, and Debdeep Jena. “High-conductivity polarization-induced 2D hole gases in undoped GaN/AlN heterojunctions enabled by impurity blocking layers”. In: *Journal of Applied Physics* 130.2 (2021), p. 025703.

[429] Phillip Dang, Guru Khalsa, Celesta S Chang, D Scott Katzer, Neeraj Nepal, Brian P Downey, Virginia D Wheeler, Alexey Suslov, Andy Xie, Edward Beam, et al. “An all-epitaxial nitride heterostructure with concurrent quantum Hall effect and superconductivity”. In: *Science Advances* 7.8 (2021), eabf1388.

[432] Len van Deurzen, Mikel Gómez Ruiz, Kevin Lee, Henryk Turski, Shyam Bharadwaj, Ryan Page, Vladimir Protasenko, Huili Grace Xing, Jonas Lähnemann, and Debdeep Jena. "Dislocation and indium droplet related emission inhomogeneities in InGaN LEDs". In: *Journal of Physics D: Applied Physics* 54.49 (2021), p. 495106.

[433] Jimy Encomendero, SM Islam, Debdeep Jena, and Huili Grace Xing. "Molecular beam epitaxy of polar III-nitride resonant tunneling diodes". In: *Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films* 39.2 (2021), p. 023409.

[434] Jimy Encomendero, Vladimir Protasenko, Debdeep Jena, and Huili Grace Xing. "Influence of collector doping setback in the quantum transport characteristics of GaN/AlN resonant tunneling diodes". In: *Applied Physics Express* 14.12 (2021), p. 122003.

[437] Austin Hickman, Reet Chaudhuri, Lei Li, Kazuki Nomoto, Samuel James Bader, James CM Hwang, Huili Grace Xing, and Debdeep Jena. "First RF power operation of AlN/GaN/AlN HEMTs with¿ 3 A/mm and 3 W/mm at 10 GHz". In: *IEEE Journal of the Electron Devices Society* 9 (2021), pp. 121–124.

[439] Austin Lee Hickman, Reet Chaudhuri, Samuel James Bader, Kazuki Nomoto, Lei Li, James CM Hwang, Huili Grace Xing, and Debdeep Jena. "Next generation electronics on the ultrawide-bandgap aluminum nitride platform". In: *Semiconductor Science and Technology* 36.4 (2021), p. 044001.

[440] Matthew Hilfiker, Ufuk Kilic, Megan Stokey, Riena Jinno, Yongjin Cho, Huili Grace Xing, Debdeep Jena, Rafał Korlacki, and Mathias Schubert. "High-frequency and below bandgap anisotropic dielectric constants in α-$(Al_xGa_{1-x})_2O_3$ ($0 \leq x \leq 1$)". In: *Applied Physics Letters* 119.9 (2021), p. 092103.

[441] Matthew Hilfiker, Rafał Korlacki, Riena Jinno, Yongjin Cho, Huili Grace Xing, Debdeep Jena, Ufuk Kilic, Megan Stokey, and Mathias Schubert. "Anisotropic dielectric functions, band-to-band transitions, and critical points in α-Ga_2O_3". In: *Applied Physics Letters* 118.6 (2021), p. 062103.

[445] Łukasz Janicki, Reet Chaudhuri, Samuel James Bader, Huili Grace Xing, Debdeep Jena, and Robert Kudrawiec. "Electric fields and surface fermi level in undoped GaN/AlN two-dimensional hole gas heterostructures". In: *physica status solidi (RRL)–Rapid Research Letters* 15.4 (2021), p. 2000573.

[446] Riena Jinno, Celesta S Chang, Takeyoshi Onuma, Yongjin Cho, Shao-Ting Ho, Derek Rowe, Michael C Cao, Kevin Lee, Vladimir Protasenko, Darrell G Schlom, et al. "Crystal orientation dictated epitaxy of ultrawide-bandgap 5.4-to 8.6-eV α-$(AlGa)_2O_3$ on m-plane sapphire". In: *Science Advances* 7.2 (2021), eabd5891.

[447] Taehee Kang, Jia Zhang, Achintya Kundu, Klaus Reimann, Michael Woerner, Thomas Elsaesser, Bernard Gil, Guillaume Cassabois, Christos Flytzanis, Giorgia Fugallo, et al. "Ultrafast nonlinear phonon response of few-layer hexagonal boron nitride". In: *Physical Review B* 104.14 (2021), p. L140302.

[448] Kevin Lee, Ryan Page, Vladimir Protasenko, Leo J Schowalter, Masato Toita, Huili Grace Xing, and Debdeep Jena. "MBE growth and donor doping of coherent ultrawide bandgap AlGaN alloy layers on single-crystal AlN substrates". In: *Applied Physics Letters* 118.9 (2021), p. 092101.

[451] Wenshen Li, Kazuki Nomoto, Zongyang Hu, Debdeep Jena, and Huili Grace Xing. "ON-resistance of Ga_2O_3 trench-MOS Schottky barrier diodes: Role of sidewall interface trapping". In: *IEEE Transactions on Electron Devices* 68.5 (2021), pp. 2420–2426.

[452] JP McCandless, CS Chang, K Nomoto, J Casamento, V Protasenko, P Vogt, D Rowe, K Gann, ST Ho, W Li, et al. "Thermal stability of epitaxial α-Ga_2O_3 and $(Al,Ga)_2O_3$ layers on m-plane sapphire". In: *Applied Physics Letters* 119.6 (2021), p. 062102.

[453] Taylor Moule, Stefano Dalcanale, Akhil S Kumar, Michael J Uren, Wenshen Li, Kazuki Nomoto, Debdeep Jena, Huili Grace Xing, and Martin Kuball. "Breakdown Mechanisms in β-Ga_2O_3 Trench-MOS Schottky-Barrier Diodes". In: *IEEE Transactions on Electron Devices* 69.1 (2021), pp. 75–81.

[454] Arjan Singh, Okan Koksal, Nicholas Tanen, Jonathan McCandless, Debdeep Jena, Huili Grace Xing, Hartwin Peelaers, and Farhan Rana. "Ultrafast dynamics of gallium vacancy charge states in β- Ga_2O_3". In: *Physical Review Research* 3.2 (2021), p. 023154.

[455] Patrick Vogt, Felix VE Hensling, Kathy Azizie, Celesta S Chang, David Turner, Jisung Park, Jonathan P McCandless, Hanjong Paik, Brandon J Bocklund, Georg Hoffman, et al. "Adsorption-controlled growth of Ga_2O_3 by suboxide molecular-beam epitaxy". In: *APL Materials* 9.3 (2021), p. 031101.

[456] John Wright, Celesta Chang, Dacen Waters, Felix Lüpke, Randall Feenstra, Lucy Raymond, Rosalyn Koscica, Guru Khalsa, David Muller, Huili G Xing, et al. "Unexplored MBE growth mode reveals new properties of superconducting NbN". In: *Physical Review Materials* 5.2 (2021), p. 024802.

[458] Tianlun Yu, John Wright, Guru Khalsa, Betül Pamuk, Celesta S Chang, Yury Matveyev, Xiaoqiang Wang, Thorsten Schmitt, Donglai Feng, David A Muller, et al. "Momentum-resolved electronic structure and band offsets in an epitaxial NbN/GaN superconductor/semiconductor heterojunction". In: *Science Advances* 7.52 (2021), eabi5833.

[459] Zexuan Zhang, Yongjin Cho, Mingli Gong, Shao-Ting Ho, Jashan Singhal, Jimy Encomendero, Xiang Li, Hyunjea Lee, Huili Grace Xing, and Debdeep Jena. "Epitaxial Ferrimagnetic Mn 4 N Thin Films on GaN by Molecular Beam Epitaxy". In: *IEEE Transactions on Magnetics* 58.2 (2021), pp. 1–6.

[460] Zexuan Zhang, Jimy Encomendero, Reet Chaudhuri, Yongjin Cho, Vladimir Protasenko, Kazuki Nomoto, Kevin Lee, Masato Toita, Huili Grace Xing, and Debdeep Jena. "Polarization-induced 2D hole gases in pseudomorphic undoped GaN/AlN heterostructures on single-crystal AlN substrates". In: *Applied Physics Letters* 119.16 (2021), p. 162104.

[461] Gustavo Alvarez-Escalante, Ryan Page, Renjiu Hu, Huili Grace Xing, Debdeep Jena, and Zhiting Tian. "High thermal conductivity and ultrahigh thermal boundary conductance of homoepitaxial AlN thin films". In: *APL Materials* 10.1 (2022), p. 011115.

[464] Joseph Casamento, Hyunjea Lee, Takuya Maeda, Ved Gund, Kazuki Nomoto, Len van Deurzen, Wesley Turner, Patrick Fay, Sai Mu, Chris G Van de Walle, et al. "Epitaxial $Sc_xAl_{1-x}N$ on GaN exhibits attractive high-K dielectric properties". In: *Applied Physics Letters* 120.15 (2022), p. 152901.

[465] Joseph Casamento, Thai-Son Nguyen, Yongjin Cho, Chandrashekhar Savant, Timothy Vasen, Shamima Afroz, Daniel Hannan, Huili Xing, and Debdeep Jena. "Transport properties of polarization-induced 2D electron gases in epitaxial AlScN/GaN heterojunctions". In: *Applied Physics Letters* 121.19 (2022), p. 192101.

[466] Reet Chaudhuri, Austin Hickman, Jashan Singhal, Joseph Casamento, Huili Grace Xing, and Debdeep Jena. "In Situ Crystalline AlN Passivation for Reduced RF Dispersion in Strained-Channel AlN/GaN/AlN High-Electron-Mobility Transistors". In: *physica status solidi (a)* 219.4 (2022), p. 2100452.

[467] Reet Chaudhuri, Zexuan Zhang, Huili Grace Xing, and Debdeep Jena. "Very High Density ($> 10^{14}$ cm^{-2}) Polarization-Induced 2D Hole Gases Observed in Undoped Pseudomorphic InGaN/AlN Heterostructures". In: *Advanced Electronic Materials* 8.5 (2022), p. 2101120.

[468] Len van Deurzen, Ryan Page, Vladimir Protasenko, Kazuki Nomoto, Huili Xing, and Debdeep Jena. "Optically pumped deep-UV multimode lasing in AlGaN double heterostructure grown by molecular beam homoepitaxy". In: *AIP Advances* 12.3 (2022), p. 035023.

[469] Kevin Goodman, Sam McHenry, Jeff Titus, Robert Cooper, Hemant Ghadi, Steve Ringel, Kazuki Nomoto, Wenshen Li, Dobrin P Bossev, Debdeep Jena, et al. "Photoelectric Generation Coefficient of β-Gallium Oxide during Exposure to High-Energy Ionizing Radiation". In: *physica status solidi (a)* 219.6 (2022), p. 2100700.

[473] Matthew Hilfiker, Ufuk Kilic, Megan Stokey, Riena Jinno, Yongjin Cho, Huili Grace Xing, Debdeep Jena, Rafał Korlacki, and Mathias Schubert. "Anisotropic dielectric function, direction dependent bandgap energy, band order, and indirect to direct gap crossover in α-$(Al_xGa_{1-x})_2O_3$ ($0 \leq x \leq 1$)". In: *Applied Physics Letters* 121.5 (2022), p. 052101.

[474] Shubham Jadhav, Ved Gund, Benyamin Davaji, Debdeep Jena, Huili Xing, and Amit Lal. "HZO-based FerroNEMS MAC for in-memory computing". In: *Applied Physics Letters* 121.19 (2022), p. 193503.

[477] Samreen Khan, Frank Angeles, John Wright, Saurabh Vishwakarma, Victor H Ortiz, Erick Guzman, Fariborz Kargar, Alexander A Balandin, David J Smith, Debdeep Jena, et al. "Properties for thermally conductive interfaces with wide band gap materials". In: *ACS applied materials & interfaces* 14.31 (2022), pp. 36178–36188.

[479] Joongwon Lee, Zexuan Zhang, Huili Grace Xing, Debdeep Jena, and Farhan Rana. "Antiferromagnetic Spin Orientation and Magnetic Domain Structure in Epitaxially Grown Mn N Studied Using Optical Second-Harmonic Generation". In: *Physical Review Applied* 18.3 (2022), p. 034020.

[481] W Li, D Jena, and HG Xing. "A unified thermionic and thermionic-field emission (TE–TFE) model for ideal Schottky reverse-bias leakage current". In: *Journal of Applied Physics* 131.1 (2022), p. 015702.

[483] Takuya Maeda, Ryan Page, Kazuki Nomoto, Masato Toita, Huili Grace Xing, and Debdeep Jena. "AlN quasi-vertical Schottky barrier diode on AlN bulk substrate using $Al_{0.9}Ga_{0.1}N$ current spreading layer". In: *Applied Physics Express* 15.6 (2022), p. 061007.

[484] JP McCandless, V Protasenko, BW Morell, E Steinbrunner, AT Neal, N Tanen, Y Cho, TJ Asel, S Mou, P Vogt, et al. "Controlled Si doping of β-Ga_2O_3 by molecular beam epitaxy". In: *Applied Physics Letters* 121.7 (2022), p. 072108.

[485] Kazuki Nomoto, Wenshen Li, Bo Song, Zongyang Hu, Mingda Zhu, Meng Qi, Vladimir Protasenko, Zexuan Zhang, Ming Pan, Xiang Gao, et al. "Distributed polarization-doped GaN p–n diodes with near-unity ideality factor and avalanche breakdown voltage of 1.25 kV". In: *Applied Physics Letters* 120.12 (2022), p. 122111.

[486] Kazuki Nomoto, Huili Grace Xing, Debdeep Jena, and YongJin Cho. "N-polar GaN pn junction diodes with low ideality factors". In: *Applied Physics Express* 15.6 (2022), p. 064004.

[487] Jashan Singhal, Reet Chaudhuri, Austin Hickman, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. "Toward AlGaN channel HEMTs on AlN: Polarization-induced 2DEGs in AlN/AlGaN/AlN heterostructures". In: *APL Materials* 10.11 (2022), p. 111120.

[488] Jashan Singhal, Jimy Encomendero, Yongjin Cho, Len van Deurzen, Zexuan Zhang, Kazuki Nomoto, Masato Toita, Huili Grace Xing, and Debdeep Jena. "Molecular beam homoepitaxy of N-polar AlN on bulk AlN substrates". In: *AIP Advances* 12.9 (2022), p. 095314.

[489] Megan Stokey, Teresa Gramer, Rafał Korlacki, Sean Knight, Steffen Richter, Riena Jinno, Yongjin Cho, Huili Grace Xing, Debdeep Jena, Matthew Hilfiker, et al. "Infrared-active phonon modes and static dielectric constants in α-$(Al_xGa_{1-x})_2O_3$ ($0.18 \leq x \leq 0.54$) alloys". In: *Applied Physics Letters* 120.11 (2022), p. 112202.

[490] Megan Stokey, Rafał Korlacki, Matthew Hilfiker, Sean Knight, Steffen Richter, Vanya Darakchieva, Riena Jinno, Yongjin Cho, Huili Grace Xing, Debdeep Jena, et al. "Infrared dielectric functions and Brillouin zone center phonons of α- Ga_2O_3 compared to α-Al_2O_3". In: *Physical Review Materials* 6.1 (2022), p. 014601.

[493] Patrick Vogt, Felix VE Hensling, Kathy Azizie, Jonathan P McCandless, Jisung Park, Kursti DeLello, David A Muller, Huili G Xing, Debdeep Jena, and Darrell G Schlom. "Extending the kinetic and thermodynamic limits of molecular-beam epitaxy utilizing suboxide sources or metal-oxide-catalyzed epitaxy". In: *Physical Review Applied* 17.3 (2022), p. 034021.

[494] Xiaopeng Wang, Gianluca Fabi, Reet Chaudhuri, Austin Hickman, Mohammad Javad Asadi, Kazuki Nomoto, Huili Grace Xing, Debdeep Jena, Marco Farina, and James CM Hwang. "Quantitative scanning microwave microscopy of 2D electron and hole gases in AlN/GaN heterostructures". In: *Applied Physics Letters* 120.1 (2022), p. 012103.

[495] John G Wright, Celesta S Chang, David A Muller, Huili G Xing, and Debdeep Jena. "Structural and electronic properties of NbN/GaN junctions grown by molecular beam epitaxy". In: *APL Materials* 10.5 (2022), p. 051103.

[496] Y Zhang, M Liu, D Jena, and G Khalsa. "Tight-binding band structure of β-and α-phase Ga_2O_3 and Al_2O_3". In: *Journal of Applied Physics* 131.17 (2022), p. 175702.

[497] Zexuan Zhang, Jimy Encomendero, Eungkyun Kim, Jashan Singhal, YongJin Cho, Kazuki Nomoto, Masato Toita, Huili Grace Xing, and Debdeep Jena. "High-density polarization-induced 2D electron gases in N-polar pseudomorphic undoped GaN/$Al_{0.85}Ga_{0.15}N$ heterostructures on single-crystal AlN substrates". In: *Applied Physics Letters* 121.8 (2022), p. 082107.

[498] Zexuan Zhang, Yusuke Hayashi, Tetsuya Tohei, Akira Sakai, Vladimir Protasenko, Jashan Singhal, Hideto Miyake, Huili Grace Xing, Debdeep Jena, and YongJin Cho. "Molecular beam homoepitaxy of N-polar AlN: Enabling role of aluminum-assisted surface cleaning". In: *Science Advances* 8.36 (2022), eabo6408.

[499] Wenwen Zhao, Mohammad Javad Asadi, Lei Li, Reet Chaudhuri, Kazuki Nomoto, Huili Grace Xing, James CM Hwang, and Debdeep Jena. "X-band epi-BAW resonators". In: *Journal of Applied Physics* 132.2 (2022), p. 024503.

[500] Gustavo A Alvarez, Joseph Casamento, Len van Deurzen, Md Irfan Khan, Kamruzzaman Khan, Eugene Jeong, Elaheh Ahmadi, Huili Grace Xing, Debdeep Jena, and Zhiting Tian. "Thermal conductivity enhancement of aluminum scandium nitride grown by molecular beam epitaxy". In: *Materials Research Letters* 11.12 (2023), pp. 1048–1054.

[501] Kathy Azizie, Felix VE Hensling, Cameron A Gorsak, Yunjo Kim, Naomi A Pieczulewski, Daniel M Dryden, MK Indika Senevirathna, Selena Coye, Shun-Li Shang, Jacob Steele, et al. "Silicon-doped β-Ga_2O_3 films grown at 1 μm/h by suboxide molecular-beam epitaxy". In: *APL Materials* 11.4 (2023), p. 041102.

[502] Len van Deurzen, Thai-Son Nguyen, Joseph Casamento, Huili Grace Xing, and Debdeep Jena. "Epitaxial lattice-matched Al $_{-}\{0.89\}$ Sc $_{-}\{0.11\}$ N/GaN distributed Bragg reflectors". In: *arXiv preprint arXiv:2309.16551* (2023).

[503] Len van Deurzen, Jashan Singhal, Jimy Encomendero, Naomi Pieczulewski, CS Chang, Y Cho, David Anthony Muller, Huili Grace Xing, Debdeep Jena, Oliver Brandt, et al. "Excitonic and deep-level emission from N-and Al-polar homoepitaxial AlN grown by molecular beam epitaxy". In: *APL Materials* 11.8 (2023).

[504] Jimy Encomendero, Vladimir Protasenko, Debdeep Jena, and Huili Grace Xing. "Defeating broken symmetry with doping: Symmetric resonant tunneling in noncentrosymetric heterostructures". In: *Physical Review B* 107.12 (2023), p. 125301.

[505] Yifei Geng, Debdeep Jena, Gregory D Fuchs, Warren R Zipfel, and Farhan Rana. "Optical dipole structure and orientation of GaN defect single-photon emitters". In: *ACS Photonics* 10.10 (2023), pp. 3723–3729.

[506] Yifei Geng, Jialun Luo, Len van Deurzen, Huili Xing, Debdeep Jena, Gregory David Fuchs, and Farhan Rana. "Dephasing by optical phonons in GaN defect single-photon emitters". In: *Scientific Reports* 13.1 (2023), p. 8678.

[507] Micah S Haseman, Daram N Ramdin, Wenshen Li, Kazuki Nomoto, Debdeep Jena, Huili Grace Xing, and Leonard J Brillson. "Electric field induced migration of native point defects in Ga_2O_3 devices". In: *Journal of Applied Physics* 133.3 (2023), p. 035701.

[509] Austin Hickman, Reet Chaudhuri, Lei Li, Kazuki Nomoto, Neil Moser, Michael Elliott, Matthew Guidry, Keisuke Shinohara, James Hwang, Huili Grace Xing, et al. "2.2 W/mm at 94 GHz in AlN/GaN/AlN High-Electron-Mobility Transistors on SiC". In: *physica status solidi A-APPLICATIONS AND MATERIALS SCIENCE* (2023).

[512] Eungkyun Kim, Jashan Singhal, Austin Hickman, Lei Li, Reet Chaudhuri, Yongjin Cho, James CM Hwang, Debdeep Jena, and Huili Grace Xing. "RF operation of AlN/$Al_{0.25}Ga_{0.75}$N/AlN HEMTs with f_T/f_{max} of 67/166 GHz". In: *Applied Physics Express* 16.11 (2023), p. 111003.

[513] Eungkyun Kim, Zexuan Zhang, Jimy Encomendero, Jashan Singhal, Kazuki Nomoto, Austin Hickman, Cheng Wang, Patrick Fay, Masato Toita, Debdeep Jena, et al. "N-polar GaN/AlGaN/AlN high electron mobility transistors on single-crystal bulk AlN substrates". In: *Applied Physics Letters* 122.9 (2023), p. 092104.

[515] JP McCandless, D Rowe, N Pieczulewski, V Protasenko, M Alonso-Orts, MS Williams, M Eickhoff, HG Xing, DA Muller, D Jena, et al. "Growth of α-Ga_2O_3 on α-Al_2O_3 by conventional molecular-beam epitaxy and metal–oxide-catalyzed epitaxy". In: *Japanese Journal of Applied Physics* 62.SF (2023), SF1013.

[516] Sushma Raghuvansy, Jon P McCandless, Marco Schowalter, Alexander Karg, Manuel Alonso-Orts, Martin S Williams, Christian Tessarek, Stephan Figge, Kazuki Nomoto, Huili Grace Xing, et al. "Growth of β-Ga2O3 and ?/κ-Ga2O3 on AlN (0001) by molecular-beam epitaxy". In: *APL Materials* 11.11 (2023).

[517] Jashan Singhal, Eungkyun Kim, Austin Hickman, Reet Chaudhuri, Yongjin Cho, Huili Grace Xing, and Debdeep Jena. "AlN/AlGaN/AlN quantum well channel HEMTs". In: *Applied Physics Letters* 122.22 (2023).

[518] Thomas J Smart, Felix VE Hensling, Dong Yeong Kim, Lena N Majer, Y Eren Suyolcu, Dominik Dereh, Darrell G Schlom, Debdeep Jena, Jochen Mannhart, and Wolfgang Braun. "Why thermal laser epitaxy aluminum sources yield reproducible fluxes in oxidizing environments". In: *Journal of Vacuum Science & Technology A* 41.4 (2023).

[519] Kathleen T Smith, Cameron A Gorsak, Avijit Kalra, Bennett J Cromer, Kathy Azizie, Daniel M Dryden, Darrell G Schlom, Debdeep Jena, Hari P Nair, and Huili Grace Xing. "Non-alloyed ohmic contacts to (010) β-Ga2O3 with low contact resistance". In: *Applied Physics Letters* 123.24 (2023).

[520] John G Wright, Huili Grace Xing, and Debdeep Jena. "Growth windows of epitaxial NbN x films on c-plane sapphire and their structural and superconducting properties". In: *Physical Review Materials* 7.7 (2023), p. 074803.

[521] Zexuan Zhang, Jashan Singhal, Shivali Agrawal, Eungkyun Kim, Vladimir Protasenko, Masato Toita, Huili Grace Xing, and Debdeep Jena. "Polarization-induced 2D electron gases in N-polar AlGaN/AlN heterostructures on single-crystal AlN substrates". In: *Applied Physics Letters* 122.21 (2023).

[522] Wenwen Zhao, Mohammad Javad Asadi, Lei Li, Reet Chaudhuri, Kazuki Nomoto, Huili Grace Xing, James CM Hwang, and Debdeep Jena. "15-GHz Epitaxial AlN FBARs on SiC Substrates". In: *IEEE Electron Device Letters* (2023).

[523] ME Zvanut, Jackson P Hanle, Subash Paudel, Ryan Page, Chandrashekhar Savant, Yongjin Cho, H Grace Xing, and Debdeep Jena. "An electron paramagnetic resonance study of the electron transport in heavily Si-doped high Al content AlxGa1- xN". In: *AIP Advances* 13.12 (2023).

[524] Shivali Agrawal, Len van Deurzen, Jimy Encomendero, Joseph E Dill, Hsin Wei Sheena Huang, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. "Ultrawide bandgap semiconductor heterojunction p–n diodes with distributed polarization-doped p-type AlGaN layers on bulk AlN substrates". In: *Applied Physics Letters* 124.10 (2024).

[525] Yu-Hsin Chen, Jimy Encomendero, Chandrashekhar Savant, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. "Electron mobility enhancement by electric field engineering of AlN/GaN/AlN quantum-well HEMTs on single-crystal AlN substrates". In: *Applied Physics Letters* 124.15 (2024).

[526] Yu-Hsin Chen, Jimy Encomendero, Chandrashekhar Savant, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. "High conductivity coherently strained quantum well XHEMT heterostructures on AlN substrates with delta doping". In: *Applied Physics Letters* 125.14 (2024).

[527] B Cromer, D Saraswat, N Pieczulewski, W Li, K Nomoto, FVE Hensling, K Azizie, HP Nair, DG Schlom, DA Muller, et al. "Over 6 MV/cm operation in β-Ga2O3 Schottky barrier diodes with IrO2 and RuO2 anodes deposited by molecular beam epitaxy". In: *Journal of Vacuum Science & Technology A* 42.3 (2024).

[528] Len van Deurzen, Eungkyun Kim, Naomi Pieczulewski, Zexuan Zhang, Anna Feduniewicz-Zmuda, Mikolaj Chlipala, Marcin Siekacz, David Muller, Huili Grace Xing, Debdeep Jena, et al. "Using both faces of polar semiconductor wafers for functional devices". In: *Nature* (2024), pp. 1–7.

[529] Cameron A Gorsak, Henry J Bowman, Katie R Gann, Joshua T Buontempo, Kathleen T Smith, Pushpanshu Tripathi, Jacob Steele, Debdeep Jena, Darrell G Schlom, Huili Grace Xing, et al. "In situ etching of β-Ga2O3 using tert-butyl chloride in an MOCVD system". In: *Applied Physics Letters* 125.24 (2024).

[530] Felix VE Hensling, Patrick Vogt, Jisung Park, Shun-Li Shang, Huacheng Ye, Yu-Mi Wu, Kathleen Smith, Veronica Show, Kathy Azizie, Hanjong Paik, et al. "Fully Transparent Epitaxial Oxide Thin-Film Transistor Fabricated at Back-End-of-Line Temperature by Suboxide Molecular-Beam Epitaxy". In: *Advanced Electronic Materials* (2024), p. 2400499.

[532] SJ Levenson, MB Andorf, BD Dickensheets, IV Bazarov, A Galdi, J Encomendero, VV Protasenko, D Jena, HG Xing, and JM Maxson. "Measurement of spin-polarized photoemission from wurtzite and zinc blende gallium nitride photocathodes". In: *Applied Physics Letters* 125.3 (2024).

[534] JP McCandless, CA Gorsak, V Protasenko, DG Schlom, Michael O Thompson, HG Xing, D Jena, and HP Nair. "Accumulation and removal of Si impurities on β-Ga2O3 arising from ambient air exposure". In: *Applied Physics Letters* 124.11 (2024).

[535] Thai-Son Nguyen, Naomi Pieczulewski, Chandrashekhar Savant, Joshua JP Cooper, Joseph Casamento, Rachel S Goldman, David A Muller, Huili G Xing, and Debdeep Jena. "Lattice-matched multiple channel AlScN/GaN heterostructures". In: *APL Materials* 12.10 (2024).

[537] Chandrashekhar Savant, Ved Gund, Kazuki Nomoto, Takuya Maeda, Shubham Jadhav, Joongwon Lee, Madhav Ramesh, Eungkyun Kim, Thai-Son Nguyen, Yu-Hsin Chen, et al. "Ferroelectric AlBN films by molecular beam epitaxy". In: *Applied Physics Letters* 125.7 (2024).

[538] Chandrashekhar Savant, Thai-Son Nguyen, Saurabh Vishwakarma, Joongwon Lee, Anand Ithepalli, Yu-Hsin Chen, Kazuki Nomoto, Farhan Rana, David J Smith, Huili Grace Xing, et al. "Epitaxial AlBN/β-Nb2N Ferroelectric/Superconductor Heterostructures". In: *physica status solidi (RRL)–Rapid Research Letters* (2024), p. 2400157.

[539] Chandrashekhar P Savant, Anita Verma, Thai-Son Nguyen, Len van Deurzen, Yu-Hsin Chen, Zhiren He, Salva S Rezaie, Jakob Gollwitzer, Benjamin Gregory, Suchismita Sarker, et al. "Self-activated epitaxial growth of ScN films from molecular nitrogen at low temperatures". In: *APL Materials* 12.11 (2024).

[540] Kathleen T Smith, Cameron A Gorsak, Joshua T Buontempo, Bennett J Cromer, Takumi Ikenoue, Hemant Gulupalli, Michael O Thompson, Debdeep Jena, Hari P Nair, and Huili Grace Xing. "Chasing Schottky–Mott: Metal-first non-alloyed contacts to β-Ga2O3 for interface quality and minimal surface modification". In: *Journal of Applied Physics* 136.21 (2024).

[541] Jacob Steele, Kathy Azizie, Naomi Pieczulewski, Yunjo Kim, Shin Mou, Thaddeus J Asel, Adam T Neal, Debdeep Jena, Huili G Xing, David A Muller, et al. "Epitaxial growth of α-(AlxGa1- x) 2O3 by suboxide molecular-beam epitaxy at 1 μm/h". In: *APL Materials* 12.4 (2024).

[543] Xiaopeng Wang, Kazuki Nomoto, Gianluca Fabi, Marco Farina, Debdeep Jena, Huili Grace Xing, and James CM Hwang. "Quantitative Scanning Microwave Microscopy for Transfer Characteristics of GaN High-Electron-Mobility Transistors". In: *IEEE Transactions on Microwave Theory and Techniques* (2024).

[544] Martin S Williams, Manuel Alonso-Orts, Marco Schowalter, Alexander Karg, Sushma Raghuvansy, Jon P McCandless, Debdeep Jena, Andreas Rosenauer, Martin Eickhoff, and Patrick Vogt. "Growth, catalysis, and faceting of α-Ga2O3 and α-(InxGa1- x) 2O3 on m-plane α-Al2O3 by molecular beam epitaxy". In: *APL Materials* 12.1 (2024).

[545] Changkai Yu, Zexuan Zhang, Debdeep Jena, Huili Grace Xing, and YongJin Cho. "Polarization-induced two-dimensional hole gases in N-polar AlGaN/GaN heterostructures". In: *Applied Physics Letters* 125.23 (2024).

[546] Wenwen Zhao, Rishabh Singh, Saurabh Vishwakarma, Jimy Encomendero, Kazuki Nomoto, Lei Li, David J Smith, James CM Hwang, Huili G Xing, and Debdeep Jena. "Performance Limiting Factors of 15-GHz Ku-Band FBARs". In: *IEEE Transactions on Electron Devices* (2024).

[547] Joseph E Dill, Chuan FC Chang, Debdeep Jena, and Huili Grace Xing. “Two-carrier model-fitting of Hall effect in semiconductors with dual-band occupation: A case study in GaN two-dimensional hole gas”. In: *Journal of Applied Physics* 137.2 (2025).

[548] Kazuki Nomoto, Joseph Aurelio Casamento, Thai-Son Nguyen, Lei Li, Hyunjea Lee, Chandrashekhar Prakash Savant, Austin Hickman, Takuya Maeda, Jimy Encomendero, Ved Gund, et al. “AlScN/GaN HEMTs with 4 A/mm on-current and maximum oscillation frequency¿ 130 GHz”. In: *Applied Physics Express* (2025).

Unpublished Articles

[4] Debdeep Jena, Yulia Smorchkova, Chris Elsass, Arthur C. Gossard, and Umesh K. Mishra. *Electron transport and intrinsic mobility limits in two-dimensional electron gases of III-V nitride heterostructures*. 2001. arXiv: `cond-mat/0103461 [cond-mat.mtrl-sci]`.

[533] Wenshen Li, Zongyang Hu, Kazuki Nomoto, Debdeep Jena, and Huili Grace Xing. *High voltage gallium oxide (Ga2O3) trench MOS barrier schottky and methods of fabricating same*. US Patent 11,894,468. 2024.

[536] Naomi Pieczulewski, John Wright, Debdeep Jena, and David A Muller. *Polarity Switching and Josephson Junction Interfaces Investigated by Multislice Ptychography*. 2024.

Peer-reviewed Conference Publications

[5] R Coffie, S Heikman, D Buttari, S Keller, Alessandro Chini, L Shen, N Zhang, A Jimenez, D Jena, and UK Mishra. “P-GaN/AlGaN/GaN high electron mobility transistors”. In: *60th DRC. Conference Digest Device Research Conference*. IEEE. 2002, pp. 25–26.

[24] A Singh, A Khandelwal, X Li, H Xing, M Kuno, and D Jena. “Field-effect transistors and photodetectors based on solution-synthesized nanowires”. In: *2006 64th Device Research Conference*. IEEE. 2006, pp. 67–68.

[28] Y Cao, T Zimmermann, D Deen, J Simon, J Bean, N Su, J Zhang, P Fay, H Xing, and D Jena. “Ultrathin MBE-grown AlN/GaN HEMTs with record high current densities”. In: *2007 International Semiconductor Device Research Symposium*. IEEE. 2007, pp. 1–2.

[31] JB Herzog, AM Mintairov, K Sun, Y Cao, D Jena, and JL Merz. “Infrared reflectivity spectroscopy of optical phonons in short-period AlGaN/GaN superlattices [6648-03]”. In: *PROCEEDINGS-SPIE THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING*. Vol. 6648. International Society for Optical Engineering; 1999. 2007, p. 6648.

[37] P Sakalas, M Schroter, H Xing, D Jena, J Simon, J Liberis, A Shimukovitch, and A Matulionis. “Investigation of High Frequency Noise and Power in AlGaN/GaN HEMTs”. In: *AIP Conference Proceedings*. Vol. 922. 1. American Institute of Physics. 2007, pp. 171–176.

[51] Xiangning Luo, Y Lee, A Konar, T Fang, H Xing, G Snider, and D Jena. “Current-carrying capacity of long & short channel 2d graphene transistors”. In: *2008 Device Research Conference*. IEEE. 2008, pp. 29–30.

[53] John Simon, Kejia Wang, Huili Xing, and Debdeep Jena. "Polarization induced graded AlGaN pn junction grown by MBE". In: *2008 Device Research Conference*. IEEE. 2008, pp. 289–290.

[56] H Xing, Tom Zimmermann, David Deen, Yu Cao, Debdeep Jena, and Patrick Fay. "Ultrathin AlN/GaN heterostructure based HEMTs". In: *International Conference on Compound Semiconductor Manufacturing Technology (CS ManTech), Chicago,(April 2008)*. 2008.

[58] Guibao Xu, Suvranta K Tripathy, Xiaodong Mu, Yujie J Ding, Kejia Wang, Cao Yu, Debdeep Jena, and Jacob B Khurgin. "Hot and cold phonons induced by electric field and resonant Raman scattering in GaN/AlN triangular quantum well". In: *2008 Conference on Lasers and Electro-Optics and 2008 Conference on Quantum Electronics and Laser Science*. IEEE. 2008, pp. 1–2.

[64] Yu Cao, Tom Zimmermann, Huili Xing, and Debdeep Jena. "MBE-grown buffer with high breakdown voltage for nitride HEMTs on GaN template". In: *2009 International Semiconductor Device Research Symposium*. IEEE. 2009, pp. 1–2.

[65] Jia Guo, Tom Zimmermann, Debdeep Jena, and Huili Xing. "Ultra-scaled AlN/GaN enhancement-& depletion-mode nanoribbon HEMTs". In: *2009 International Semiconductor Device Research Symposium*. IEEE. 2009, pp. 1–2.

[68] Chuanxin Lian, Kristof Tahy, Tian Fang, Guowang Li, Huili Grace Xing, and Debdeep Jena. "Quantum transport in patterned graphene nanoribbons". In: *2009 International Semiconductor Device Research Symposium*. IEEE. 2009, pp. 1–2.

[71] Kristof Tahy, Siyuranga Koswatta, Tian Fang, Qin Zhang, Huili Xing, and Debdeep Jena. "High field transport properties of 2D and nanoribbon graphene FETs". In: *2009 Device Research Conference*. IEEE. 2009, pp. 207–208.

[72] Kristof Tahy, Chuanxin Lian, Huili Xing, and Debdeep Jena. "Operation regimes of double gated graphene nanoribbon FETs". In: *2009 International Semiconductor Device Research Symposium*. IEEE. 2009, pp. 1–2.

[73] Kristof Tahy, D Shilling, T Zimmermann, H Xing, P Fay, RM Feenstra, D Jena, et al. "Gigahertz operation of epitaxial Graphene transistors". In: *2009 Device Research Conference*. IEEE. 2009, pp. 203–204.

[75] Tom Zimmermann, Yu Cao, Jia Guo, Xiangning Luo, Debdeep Jena, and Huili Xing. "Top-down AlN/GaN enhancement-& depletion-mode nanoribbon HEMTs". In: *2009 Device Research Conference*. IEEE. 2009, pp. 129–130.

[84] Guowang Li, Tom Zimmermann, Yu Cao, Chuanxin Lian, Xiu Xing, Ronghua Wang, Patrick Fay, Huili Grace Xing, and Debdeep Jena. "Work-function engineering in novel high Al composition $Al_{0.72}Ga_{0.28}N$/AlN/GaN HEMTs". In: *68th Device Research Conference*. IEEE. 2010, pp. 21–22.

[89] Kristof Tahy, Margaret Jane Fleming, Barbara Raynal, Vladimir Protasenko, Siyuranga Koswatta, Debdeep Jena, Huili Xing, and Michelle Kelly. "Device characteristics of single-layer graphene FETs grown on copper". In: *68th Device Research Conference*. IEEE. 2010, pp. 77–78.

[90] Yong Tang, Paul Saunier, Ronghua Wang, Andrew Ketterson, Xiang Gao, Shiping Guo, Gregory Snider, Debdeep Jena, Huili Xing, and Patrick Fay. "High-performance monolithically-integrated E/D mode InAlN/AlN/GaN HEMTs for mixed-signal applications". In: *2010 International Electron Devices Meeting*. IEEE. 2010, pp. 30–4.

[92] Ronghua Wang, Xiu Xing, Tian Fang, Tom Zimmermann, Chuanxin Lian, Guowang Li, Paul Saunier, Xiang Gao, Shiping Guo, Gregory Snider, et al. "High performance E-mode InAlN/GaN HEMTs: Interface states from subthreshold slopes". In: *68th Device Research Conference*. IEEE. 2010, pp. 129–130.

[95] Tian Fang, Ronghua Wang, Guowang Li, Huili Xing, Siddharth Rajan, and Debdeep Jena. "Effect of optical phonon scattering on the performance limits of ultrafast GaN transistors". In: *69th Device Research Conference*. IEEE. 2011, pp. 273–274.

[96] Satyaki Ganguly, Jai Verma, Guowang Li, Tom Zimmermann, Huili Xing, and Debdeep Jena. "Barrier height, interface charge & tunneling effective mass in ALD Al 2 O 3/AlN/GaN HEMTs". In: *69th Device Research Conference*. IEEE. 2011, pp. 121–122.

[109] Berardi Sensale-Rodriguez, Jia Guo, Ronghua Wang, Guowang Li, Tian Fang, Paul Saunier, Andrew Ketterson, Michael Schuette, Xiang Gao, Shiping Guo, et al. "Comparative study of E-and D-mode InAlN/AlN/GaN HEMTs with f_T near 200 GHz". In: *2011 International Semiconductor Device Research Symposium (ISDRS)*. IEEE. 2011, pp. 1–2.

[111] Kristof Tahy, WS Hwang, JL Tedesco, RL Myers-Ward, PM Campbell, CR Eddy, DK Gaskill, H Xing, A Seabaugh, and D Jena. "Sub-10 nm epitaxial graphene nanoribbon FETs". In: *69th Device Research Conference*. IEEE. 2011, pp. 39–40.

[114] Ronghua Wang, Guowang Li, Tian Fang, Oleg Laboutin, Yu Cao, Wayne Johnson, Gregory Snider, Patrick Fay, Debdeep Jena, and Huili Xing. "Improvement of f_T in InAl (Ga) N barrier HEMTs by plasma treatments". In: *69th Device Research Conference*. IEEE. 2011, pp. 139–140.

[119] Grace Huili Xing and Debdeep Jena. "GaN HEMTs with Low Ron for Power Conversion". In: *ECS Meeting Abstracts*. 33. IOP Publishing. 2011, p. 2207.

[121] Pei Zhao, Debdeep Jena, and Siyuranga O Koswatta. "RF performance projections for 2D graphene transistors: Role of parasitics at the ballistic transport limit". In: *69th Device Research Conference*. IEEE. 2011, pp. 81–82.

[130] Wan Sik Hwang, Maja Remskar, Rusen Yan, Vladimir Protasenko, Kristof Tahy, Soo Doo Chae, Huili Xing, Alan Seabaugh, and Debdeep Jena. "First demonstration of two-dimensional WS_2 transistors exhibiting 10^5 room temperature modulation and ambipolar behavior". In: *70th Device Research Conference*. IEEE. 2012, pp. 187–188.

[133] Raj Jana and Debdeep Jena. "A surface-potential based compact model for GaN HEMTs incorporating polarization charges". In: *70th Device Research Conference*. IEEE. 2012, pp. 147–148.

[134] Raj K Jana, Gregory L Snider, and Debdeep Jena. "Resonant clocking circuits for reversible computation". In: *2012 12th IEEE International Conference on Nanotechnology (IEEE-NANO)*. IEEE. 2012, pp. 1–6.

[136] Debdeep Jena, Wan Sik Hwang, Kristof Tahy, Pei Zhao, RL Myers-Ward, Paul M Campbell, Charles R Eddy, DK Gaskill, Huili Xing, and Alan C Seabaugh. "Wafer-Scale Graphene Nanoribbon Transistor Technology". In: *ECS Meeting Abstracts*. 17. IOP Publishing. 2012, p. 754.

[137] Jiahao Kang, Deblina Sarkar, Wei Liu, Debdeep Jena, and Kaustav Banerjee. "A computational study of metal-contacts to beyond-graphene 2D semiconductor materials". In: *2012 International Electron Devices Meeting*. IEEE. 2012, pp. 17–4.

[139] Eok Su Kim, Sunkook Kim, Yun Sung Lee, Sang Yoon Lee, Sunhee Lee, Woong Choi, Hartwin Peelaers, Chris G Van de Walle, Wan-Sik Hwang, Thomas Kosel, et al. "Multilayer transition-metal dichalcogenide channel thin-film transistors". In: *2012 International Electron Devices Meeting*. IEEE. 2012, pp. 5–5.

[144] Guowang Li, Ronghua Wang, Jai Verma, Huili Xing, and Debdeep Jena. "Ultra-thin body GaN-on-insulator nFETs and pFETs: Towards III-nitride complementary logic". In: *70th Device Research Conference*. IEEE. 2012, pp. 153–154.

[146] Berardi Senale-Rodríguez, Yeqing Lu, Patrick Fay, Debdeep Jena, Alan Seabaugh, Huili Grace Xing, Leonardo Barboni, and Fernando Silveira. "Perspectives of TFETs for low power analog ICs". In: *2012 IEEE Subthreshold Microelectronics Conference (SubVT)*. IEEE. 2012, pp. 1–3.

[149] Berardi Sensale-Rodriguez, Rusen Yan, Subrina Rafique, Mingda Zhu, Michelle Kelly, Vladimir Protasenko, Debdeep Jena, Lei Liu, and Huili Grace Xing. "Exceptional tunability of THz reflectance in graphene structures". In: *2012 37th International Conference on Infrared, Millimeter, and Terahertz Waves*. IEEE. 2012, pp. 1–3.

[154] Bo Song, Berardi Sensale-Rodriguez, Ronghua Wang, Andrew Ketterson, Michael Schuette, Edward Beam, Paul Saunier, Xiang Gao, Shiping Guo, Patrick Fay, et al. "Monolithically integrated E/D-mode InAlN HEMTs with Ä t/Ä max¿ 200/220 GHz". In: *70th Device Research Conference*. IEEE. 2012, pp. 1–2.

[155] Jai Verma, Prem Kumar Kandaswamy, Vladimir Protasenko, Amit Verma, Huili Xing, and Debdeep Jena. "Tunnel injection GaN/AlN quantum dot UV LED". In: *70th Device Research Conference*. IEEE. 2012, pp. 249–250.

[159] Pei Zhao, R. M. Feenstra, Gong Gu, and Debdeep Jena. "SymFET: A proposed symmetric graphene tunneling field effect transistor". In: *70th Device Research Conference*. 2012, pp. 33–34. DOI: 10.1109/DRC.2012.6257006.

[161] Sara Fathipour, Wan Sik Hwang, Thomas Kosel, Huili Grace Xing, Wilfried Haensch, Debdeep Jena, and Alan Seabaugh. "Exfoliated $MoTe_2$ field-effect transistor". In: *71st Device Research Conference*. IEEE. 2013, pp. 115–116.

[162] Wan Sik Hwang, Amit Verma, Vladimir Protasenko, Sergei Rouvimov, Huili Grace Xing, Alan Seabaugh, Wilfried Haensch, Chris Van de Walle, Zbigniew Galazka, Martin Albrecht, et al. "Nanomembrane β-Ga_2O_3 high-voltage field effect transistors". In: *71st Device Research Conference*. IEEE. 2013, pp. 207–208.

[166] Wei Liu, Jiahao Kang, Wei Cao, Deblina Sarkar, Yasin Khatami, Debdeep Jena, and Kaustav Banerjee. “High-performance few-layer-MoS 2 field-effect-transistor with record low contact-resistance”. In: *2013 IEEE International Electron Devices Meeting*. IEEE. 2013, pp. 19–4.

[169] Nan Ma and Debdeep Jena. “Interband tunneling transport in 2-dimensional crystal semiconductors”. In: *71st Device Research Conference*. IEEE. 2013, pp. 103–104.

[175] Berardi Sensale-Rodriguez, Pei Zhao, Debdeep Jena, and Huili Grace Xing. “Perspectives of graphene SymFETs for THz applications”. In: *2013 38th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz)*. IEEE. 2013, pp. 1–1.

[182] Ronghua Wang, G Li, J Guo, B Song, J Verma, Z Hu, Y Yue, K Nomoto, S Ganguly, S Rouvimov, et al. “Dispersion-free operation in InAlN-based HEMTs with ultrathin or no passivation”. In: *2013 IEEE International Electron Devices Meeting*. IEEE. 2013, pp. 28–6.

[185] Rusen Yan, Subrina Rafique, Wei Li, Xuelei Liang, Debdeep Jena, Lei Liu, Berardi Sensale-Rodriguez, and Huili Grace Xing. “Tunable graphene-based metamaterial terahertz modulators”. In: *CLEO: 2013*. IEEE. 2013, pp. 1–2.

[189] Pei Zhao, Wan-Sik Hwang, Eok Su Kim, Randy Feenstra, Gong Gu, Jiahao Kang, Kaustav Banerjee, Alan Seabaugh, Grace Huili Xing, and Debdeep Jena. “Novel logic devices based on 2D crystal semiconductors: Opportunities and challenges”. In: *2013 IEEE International Electron Devices Meeting*. IEEE. 2013, pp. 19–1.

[190] Pei Zhao, Amit Verma, Jai Verma, Huili Xing, Patrick Fay, and Debdeep Jena. “GaN heterostructure barrier diodes (HBD) with polarization-induced delta-doping”. In: *71st Device Research Conference*. IEEE. 2013, pp. 203–204.

[191] Pei Zhao, Amit Verma, Jai Verma, Huili Xing, and Debdeep Jena. “Comparison of Schottky diodes on bulk GaN substrates & GaN-on-sapphire”. In: *CS Mantech Proceedings*. Vol. 1000. 2013, p. 2.

[198] Zongyang Hu, Raj Jana, Meng Qi, Satyaki Ganguly, Bo Song, Erhard Kohn, Debdeep Jena, and Huili Grace Xing. “Characteristics of $In_{0.17}Al_{0.83}N$/AlN/GaN MOSHEMTs with steeper than 60 mV/decade sub-threshold slopes in the deep sub-threshold region”. In: *72nd Device Research Conference*. IEEE. 2014, pp. 27–28.

[204] SM Islam, Vladimir Protasenko, Huili Xing, Debdeep Jena, and Jai Verma. “Temperature dependence of sub-220nm emission from GaN/AlN quantum structures by plasma assisted molecular beam epitaxy”. In: *2014 Conference on Lasers and Electro-Optics (CLEO)-Laser Science to Photonic Applications*. IEEE. 2014, pp. 1–2.

[205] Raj K Jana, Arvind Ajoy, Gregory Snider, and Debdeep Jena. “Sub-60 mV/decade steep transistors with compliant piezoelectric gate barriers”. In: *2014 IEEE International Electron Devices Meeting*. IEEE. 2014, pp. 13–6.

[207] Debdeep Jena. “Electron Device Potential of 2D Crystal Semiconductors”. In: *Electrochemical Society Meeting Abstracts 226*. 44. The Electrochemical Society, Inc. 2014, pp. 2104–2104.

[209] Debdeep Jena, Mingda Li, Nan Ma, Wan Sik Hwang, David Esseni, Alan Seabaugh, and Huili Grace Xing. “Electron transport in 2D crystal semiconductors and their device applications”. In: *2014 Silicon Nanoelectronics Workshop (SNW)*. IEEE. 2014, pp. 1–2.

[213] Mingda Oscar Li, David Esseni, Debdeep Jena, and Huili Grace Xing. “Lateral transport in two-dimensional heterojunction interlayer tunneling field effect transistor (Thin-TFET)”. In: *72nd Device Research Conference*. IEEE. 2014, pp. 17–18.

[219] Bo Song, Mingda Zhu, Zongyang Hu, Erhard Kohn, Debdeep Jena, and Huili Grace Xing. “GaN lateral PolarSJs: polarization-doped super junctions”. In: *72nd Device Research Conference*. IEEE. 2014, pp. 99–100.

[220] Bo Song, Mingda Zhu, Zongyang Hu, Meng Qi, X Yan, Yu Cao, Erhard Kohn, Debdeep Jena, and Huili Grace Xing. “AlGaN/GaN MIS-HEMT on silicon with steep sub-threshold swing¡ 60 mV/dec over 6 orders of drain current swing and relation to traps”. In: *2014 Silicon Nanoelectronics Workshop (SNW)*. IEEE. 2014, pp. 1–2.

[225] Jai K Verma, Vladimir V Protasenko, SM Islam, Huili Xing, and Debdeep Jena. “Boost in deep-UV electroluminescence from tunnel-injection GaN/AlN quantum dot LEDs by polarization-induced doping”. In: *Gallium Nitride Materials and Devices IX*. Vol. 8986. SPIE. 2014, pp. 239–244.

[227] Shudong Xiao, Mingda Li, Alan Seabaugh, Debjeep Jena, and Huili Grace Xing. “Vertical heterojunction of MoS&ltinf&gt2&lt/inf&gt and WSe&ltinf&gt2&lt/inf&gt”. In: *72nd Device Research Conference*. IEEE, 2014.

[235] Kaijun Feng, William Streyer, SM Islam, Jai Verma, Debdeep Jena, Dan Wasserman, and Anthony Hoffman. “Localized surface phonon polariton resonators in GaN”. In: *CLEO: QELS*. Optica Publishing Group. 2015, FTu2E–7.

[240] SM Islam, Vladimir Protasenko, Sergei Rouvimov, Jai Verma, Huili Xing, and Debdeep Jena. “Deep-UV LEDs using polarization-induced doping: Electroluminescence at cryogenic temperatures”. In: *2015 73rd Annual Device Research Conference (DRC)*. IEEE. 2015, pp. 67–68.

[244] X Liu, X Li, S Vishwanath, S Dong, T Yoo, D Jena, H Xing, M Dobrowolska, and JK Furdyna. “MBE-grown Mn-doped $SnSe_2$ 2D films on GaAs (111) B substrates”. In: *2015 IEEE International Magnetics Conference (INTERMAG)*. IEEE. 2015, pp. 1–1.

[246] Kazuki Nomoto, Z Hu, B Song, M Zhu, M Qi, R Yan, V Protasenko, E Imhoff, J Kuo, N Kaneda, et al. “GaN-on-GaN pn power diodes with 3.48 kV and 0.95 mΩ-cm2: A record high figure-of-merit of 12.8 GW/cm2”. In: *2015 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2015, pp. 9–7.

[248] Meng Qi, Kazuki Namoto, Mingda Zhu, Zongyang Hu, Yuning Zhao, Bo Song, Guowang Li, Patrick Fay, Huili Xing, and Debdeep Jena. “High-voltage polarization-induced vertical heterostructure pn junction diodes on bulk GaN substrates”. In: *2015 73rd Annual Device Research Conference (DRC)*. IEEE. 2015, pp. 31–32.

[250] Alan Seabaugh, Sara Fathipour, Wenjun Li, Hao Lu, Jun Hong Park, Andrew C Kummel, Debdeep Jena, Susan K Fullerton-Shirey, and Patrick Fay. "Steep subthreshold swing tunnel FETs: GaN/InN/GaN and transition metal dichalcogenide channels". In: *2015 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2015, pp. 35–6.

[251] Bo Song, Mingda Zhu, Zongyang Hu, Kazuki Nomoto, Debdeep Jena, and Huili Grace Xing. "Design and optimization of GaN lateral polarization-doped super-junction (LPSJ): An analytical study". In: *2015 IEEE 27th International Symposium on Power Semiconductor Devices & IC's (ISPSD)*. IEEE. 2015, pp. 273–276.

[254] Huili Grace Xing, Bo Song, Mingda Zhu, Zongyang Hu, Meng Qi, Kazuki Nomoto, and Debdeep Jena. "Unique opportunity to harness polarization in GaN to override the conventional power electronics figure-of-merits". In: *2015 73rd Annual Device Research Conference (DRC)*. IEEE. 2015, pp. 51–52.

[259] Samuel James Bader and Debdeep Jena. "Introducing the spiked pn junction for tunnel devices and current gain". In: *2016 74th Annual Device Research Conference (DRC)*. IEEE. 2016, pp. 1–2.

[262] Alexander Chaney, Meng Qi, SM Islam, Huili Grace Xing, and Debdeep Jena. "GaN tunnel switch diodes". In: *2016 74th Annual Device Research Conference (DRC)*. IEEE. 2016, pp. 1–2.

[265] P Fay, W Li, L Cao, K Pourang, SM Islam, C Lund, S Saima, H Ilatikhameneh, T Amin, J Huang, et al. "Novel III-N heterostructure devices for low-power logic and more". In: *2016 IEEE 16th International Conference on Nanotechnology (IEEE-NANO)*. IEEE. 2016, pp. 767–769.

[270] SM Islam, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. "250 nm deep UV LED using GaN/AlN heterostructures on bulk AlN substrates". In: *2016 Conference on Lasers and Electro-Optics (CLEO)*. IEEE. 2016, pp. 1–2.

[271] SM Islam, Meng Qi, Bo Song, Kazuki Nomoto, Vladimir Protasenko, Jingshan Wang, Sergei Rouvimov, Patrick Fay, Huili Grace Xing, and Debdeep Jena. "First demonstration of strained AlN/GaN/AlN quantum well FETs on SiC". In: *2016 74th Annual Device Research Conference (DRC)*. IEEE. 2016, pp. 1–2.

[272] Debdeep Jena. "Gallium Oxide Based Materials and Devices". In: *Electrochemical Society Meeting Abstracts 229*. 24. The Electrochemical Society, Inc. 2016, pp. 1245–1245.

[273] Debdeep Jena. "Layered Semiconductor Materials and Device Applications". In: *Electrochemical Society Meeting Abstracts 229*. 26. The Electrochemical Society, Inc. 2016, pp. 1295–1295.

[275] Mingda Oscar Li, Shudong Xiao, Rusen Yan, Suresh Vishwanath, Susan Fullerton-Shirey, Debdeep Jena, and Huili Grace Xing. "Fermi level tunability of a novel 2D crystal: Tin Diselenide (SnSe 2)". In: *2016 74th Annual Device Research Conference (DRC)*. IEEE. 2016, pp. 1–2.

[276] Mingda Oscar Li, Rusen Yan, Debdeep Jena, and Huili Grace Xing. "Two-dimensional heterojunction interlayer tunnel FET (Thin-TFET): From theory to applications". In: *2016 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2016, pp. 19–2.

[277] Wenjun Li, Kasra Pourang, SM Moududdul Islam, Debdeep Jena, and Patrick Fay. “GaN Nanowire MISFETs for Low-Power Applications”. In: *Proc. Compound Semiconductor Manufacturing Technology Conf.(CS-MANTECH)*. 2016.

[281] Bo Song, Amit Kumar Verma, Kazuki Nomoto, Mingda Zhu, Debdeep Jena, and Huili Grace Xing. “Vertical Ga_2O_3 Schottky barrier diodes on single-crystal β-Ga_2O_3 (- 201) substrates”. In: *2016 74th Annual Device Research Conference (DRC)*. IEEE. 2016, pp. 1–2.

[284] Amit Verma, Bo Song, David Meyer, Brian Downey, Virginia Wheeler, Huili Grace Xing, and Debdeep Jena. “Demonstration of GaN HyperFETs with ALD VO_2”. In: *2016 74th Annual Device Research Conference (DRC)*. IEEE. 2016, pp. 1–2.

[286] Huili Grace Xing, Kazuki Nomoto, Zongyang Hu, Bo Song, Mingda Zhu, and Debdeep Jena. “Recent Progress in GaN Power Devices with BV¿ 1200 V”. In: *Electrochemical Society Meeting Abstracts 229*. 24. The Electrochemical Society, Inc. 2016, pp. 1223–1223.

[287] Mingda Zhu, Bo Song, Zongyang Hu, Kazuki Nomoto, Ming Pan, Xiang Gao, Debdeep Jena, and Huili Grace Xing. “Comparing buffer leakage in PolarMOSH on SiC and free-standing GaN substrates”. In: *2016 Lester Eastman Conference (LEC)*. IEEE. 2016, pp. 27–30.

[288] Shyam Bharadwaj, SM Islam, Kevin Lee, Andrew Devine, Vladimir Protasenko, Sergei Rouvimov, Huili Grace Xing, and Debdeep Jena. “High-temperature p-type polarization doped AlGaN cladding for sub-250 nm deep-UV quantum well LEDs by MBE”. In: *2017 75th Annual Device Research Conference (DRC)*. IEEE. 2017, pp. 1–2.

[289] Shyam Bharadwaj, Kevin Lee, SM Islam, Vladimir Protasenko, Huili Grace Xing, and Debdeep Jena. “Tunnel-junction p-contact sub-250 nm deep-UV LEDs”. In: *2017 Conference on Lasers and Electro-Optics (CLEO)*. IEEE. 2017, pp. 1–2.

[294] Zongyang Hu, Wenshen Li, Kazuki Nomoto, Mingda Zhu, Xiang Gao, Manyam Pilla, Debdeep Jena, and Huili Grace Xing. “GaN vertical nanowire and fin power MISFETs”. In: *2017 75th Annual Device Research Conference (DRC)*. IEEE. 2017, pp. 1–2.

[295] Zongyang Hu, Kazuki Nomoto, Wenshen Li, Liheng Jerry Zhang, Jae-Ho Shin, Nicholas Tanen, Tohru Nakamura, Debdeep Jena, and Huili Grace Xing. “Vertical fin Ga_2O_3 power field-effect transistors with on/off ratio ¿ 10^9”. In: *2017 75th Annual Device Research Conference (DRC)*. IEEE. 2017, pp. 1–2.

[299] Okan Koksal, SM Moududdul Islam, Tongbo Wei, Grace Huili Xing, Debdeep Jena, and Farhan Rana. “Two-pulse photoluminescence correlation technique for studying ultra-fast carrier dynamics in deep-UV few monolayer thick nitride quantum wells”. In: *2017 Conference on Lasers and Electro-Optics (CLEO)*. IEEE. 2017, pp. 1–1.

[301] Wenshen Li, Kazuki Nomoto, Kevin Lee, SM Islam, Zongyang Hu, Mingda Zhu, Xiang Gao, Manyam Pilla, Debdeep Jena, and Huili Grace Xing. “600 V GaN vertical V-trench MOSFET with MBE regrown channel”. In: *2017 75th Annual Device Research Conference (DRC)*. IEEE. 2017, pp. 1–2.

[304] Cheng Liu, Yu Kee Ooi, SM Islam, Huili Grace Xing, Debdeep Jena, and Jing Zhang. “246 nm AlN-delta-GaN quantum well ultraviolet light-emitting diode”. In: *2017 Conference on Lasers and Electro-Optics (CLEO)*. IEEE. 2017, pp. 1–2.

[305] Cheng Liu, Yu Kee Ooi, SM Islam, Huili Grace Xing, Debdeep Jena, and Jing Zhang. “Dominant transverse-electric polarized emission from 298 nm MBE-grown AlN-delta-GaN quantum well ultraviolet light-emitting diodes”. In: *Gallium Nitride Materials and Devices XII*. Vol. 10104. SPIE. 2017, pp. 189–196.

[306] Kazuki Nomoto, Samuel James Bader, Kevin Lee, Shyam Bharadwaj, Zongyang Hu, Huili Grace Xing, and Debdeep Jena. “Wide-bandgap Gallium Nitride p-channel MISFETs with enhanced performance at high temperature”. In: *2017 75th Annual Device Research Conference (DRC)*. IEEE. 2017, pp. 1–2.

[309] Hugo O Condori Quispe, Ashish Chanana, Jimy Encomendero, Mingda Zhu, Ajay Nahata, Debdeep Jena, Huili Grace Xing, and Berardi Sensale-Rodriguez. “Experimental demonstration of enhanced terahertz coupling to plasmon in ultra-thin membrane AlGaN/GaN HEMT arrays”. In: *2017 75th Annual Device Research Conference (DRC)*. IEEE. 2017, pp. 1–2.

[310] Henryk Turski, Rusen Yan, Samuel J Bader, Grzegorz Muzioł, Czesław Skierbiszewski, Huili Grace Xing, and Debdeep Jena. “S-shaped negative differential resistance in III-Nitride blue quantum-well laser diodes grown by plasma-assisted MBE”. In: *2017 75th Annual Device Research Conference (DRC)*. IEEE. 2017, pp. 1–2.

[316] Alexander Chaney, Henryk Turski, Kazuki Nomoto, Qingxiao Wang, Zongyang Hu, Moon Kim, Huili Grace Xing, and Debdeep Jena. “Realization of the first GaN based tunnel field-effect transistor”. In: *2018 76th Device Research Conference (DRC)*. IEEE. 2018, pp. 1–3.

[318] C De Santi, E Fabris, K Nomoto, Z Hu, W Li, X Gao, D Jena, HG Xing, G Meneghesso, M Meneghini, et al. “Demonstration of avalanche capability in polarization-doped vertical GaN pn diodes: Study of walkout due to residual carbon concentration”. In: *2018 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2018, pp. 30–2.

[326] Wenshen Li, Zongyang Hu, Kazuki Nomoto, Riena Jinno, Zexuan Zhang, Thieu Quang Tu, Kohei Sasaki, Akito Kuramata, Debdeep Jena, and Huili Grace Xing. “2.44 kV Ga_2O_3 vertical trench Schottky barrier diodes with very low reverse leakage current”. In: *2018 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2018, pp. 8–5.

[328] Wenshen Li, Kazuki Nomoto, Zongyang Hu, Nicholas Tanen, Kohei Sasaki, Akito Kuramata, Debdeep Jena, and Huili Grace Xing. “1.5 kV vertical Ga_2O_3 trench-MIS Schottky barrier diodes”. In: *2018 76th Device Research Conference (DRC)*. IEEE. 2018, pp. 1–2.

[331] Wenshen Li, Mingda Zhu, Kazuki Nomoto, Zongyang Hu, Xiang Gao, Manyam Pilla, Debdeep Jena, and Huili Grace Xing. “Enhancement of punch-through voltage in GaN with buried p-type layer utilizing polarization-induced doping”. In: *2018 IEEE 30th International Symposium on Power Semiconductor Devices and ICs (ISPSD)*. IEEE. 2018, pp. 228–231.

[332] Cheng Liu, Kevin Lee, SM Islam, Huili Xing, Debdeep Jena, and Jing Zhang. "Demonstration of AlGaN-delta-GaN QW by plasma-assisted molecular beam epitaxy for 260-nm ultraviolet light emitting diodes". In: *Gallium Nitride Materials and Devices XIII*. Vol. 10532. SPIE. 2018, pp. 40–47.

[335] Hugo O Condori Quispe, Ashish Chanana, Ajay Nahata, Berardi Sensale-Rodriguez, Jimy Encomendero, Mingda Zhu, Debdeep Jena, Huili Grace Xing, and Nicole Trometer. "Synchronized plasma wave resonances in ultrathin-membrane GaN heterostructures". In: *2018 43rd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz)*. IEEE. 2018, pp. 1–2.

[342] SJ Bader, R Chaudhuri, A Hickman, K Nomoto, S Bharadwaj, HW Then, HG Xing, and D Jena. "GaN/AlN Schottky-gate p-channel HFETs with InGaN contacts and 100 mA/mm on-current". In: *2019 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2019, pp. 4–5.

[355] Zongyang Hu, Kazuki Nomoto, Wenshen Li, Riena Jinno, Tohru Nakamura, Debdeep Jena, and Huili Xing. "1.6 kV vertical Ga_2O_3 FinFETs with source-connected field plates and normally-off operation". In: *2019 31st International Symposium on Power Semiconductor Devices and ICs (ISPSD)*. IEEE. 2019, pp. 483–486.

[359] Kevin Lee, Shyam Bharadwaj, Vladimir Protasenko, Huili Xing, and Debdeep Jena. "Efficient InGaN p-contacts for deep-UV light emitting diodes". In: *2019 Device Research Conference (DRC)*. IEEE. 2019, pp. 171–172.

[360] W Li, K Nomoto, Z Hu, T Nakamura, D Jena, and HG Xing. "Single and multi-fin normally-off Ga_2O_3 vertical transistors with a breakdown voltage over 2.6 kV". In: *2019 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2019, pp. 12–4.

[361] Wenshen Li, Zongyang Hu, Kazuki Nomoto, Riena Jinno, Tohru Nakamura, Debdeep Jena, and Huili Grace Xing. "High-Voltage β-Ga_2O_3 vertical Power Diodes and Transistors with Fin Channels". In: *Electrochemical Society Meeting Abstracts 235*. 26. The Electrochemical Society, Inc. 2019, pp. 1267–1267.

[363] Wenshen Li, Kazuki Nomoto, Zongyang Hu, Debdeep Jena, and Huili Grace Xing. "Field-plated Ga_2O_3 trench Schottky barrier diodes with a record high figure-of-merit of 0.78 GW/cm^2". In: *2019 Device Research Conference (DRC)*. IEEE. 2019, pp. 209–210.

[366] Wenshen Li, Kazuki Nornoto, Zongyang Hu, Debdeep Jena, and Huili Grace Xing. "Barrier Height Stability and Reverse Leakage Mechanisms in Ni/Ga_2O_3 (001) Schottky Barrier Diodes". In: *2019 Device Research Conference (DRC)*. IEEE. 2019, pp. 159–160.

[367] Xiang Li, Mingda Li, Alyosha Molnar, Debdeep Jena, and Huili Grace Xing. "A Single-Device Embodiment of XNOR Logic: TransiXNOR". In: *2019 Device Research Conference (DRC)*. IEEE. 2019, pp. 101–102.

[369] Kazuki Nomoto, Zongyang Hu, Wenshen Li, Mingda Zhu, Kevin Lee, Debdeep Jena, and Huili Grace Xing. "Recent Progress of GaN-Based Vertical Devices". In: *Electrochemical Society Meeting Abstracts 236*. 31. The Electrochemical Society, Inc. 2019, pp. 1348–1348.

[373] K Shinohara, C King, EJ Regan, J Bergman, AD Carter, A Arias, M Urteaga, B Brar, R Page, R Chaudhuri, M. Islam, H. Xing, and D. Jena. "GaN-based multi-channel transistors with lateral gate for linear and efficient millimeter-wave power amplifiers". In: *2019 IEEE MTT-S International Microwave Symposium (IMS)*. IEEE. 2019, pp. 1133–1135.

[378] Henryk Turski, Marcin Siekacz, Grzegorz Muziol, Mikolaj Zak, Shyam Bharadwaj, Mikolaj Chlipala, Krzesimir Nowakowski-Szkudlarek, Mateusz Hajdel, Huili Grace Xing, Debdeep Jena, et al. "Buried tunnel junction for p-down nitride laser diodes". In: *2019 Device Research Conference (DRC)*. IEEE. 2019, pp. 241–242.

[379] Huili Grace Xing, Jimy Encomendero, and Debdeep Jena. "New physics in GaN resonant tunneling diodes". In: *Gallium Nitride Materials and Devices XIV*. Vol. 10918. SPIE. 2019, pp. 45–50.

[411] Cheng Liu, Kevin Lee, Galen Harden, Anthony Hoffman, Huili Grace Xing, Debdeep Jena, and Jing Zhang. "High internal quantum efficiency from AlGaN-delta-GaN quantum well at 260 nm". In: *CLEO: Applications and Technology*. Optica Publishing Group. 2020, AF1I–2.

[416] K Nomoto, R Chaudhuri, SJ Bader, L Li, A Hickman, S Huang, H Lee, T Maeda, HW Then, M Radosavljevic, et al. "GaN/AlN p-channel HFETs with $I_{max} > 420$ mA/mm and ~ 20 GHz f_T/f_{MAX}". In: *2020 IEEE International Electron Devices Meeting (IEDM)*. IEEE. 2020, pp. 8–3.

[418] Devansh Saraswat, Wenshen Li, Kazuki Nomoto, Debdeep Jena, and Huili Grace Xing. "Very high parallel-plane surface electric field of 4.3 MV/cm in Ga_2O_3 Schottky barrier diodes with PtOx contacts". In: *2020 Device Research Conference (DRC)*. IEEE. 2020, pp. 1–2.

[421] Henryk Turski, Shyam Bharadwaj, Marcin Siekacz, Grzegorz Muziol, Mikolaj Chlipala, Mikolaj Zak, Mateusz Hajdel, Krzesimir Nowakowski-Szkudlarek, Szymon Stanczyk, Huili Xing, et al. "Monolithically p-down nitride laser diodes and LEDs obtained by MBE using buried tunnel junction design". In: *Gallium Nitride Materials and Devices XV*. Vol. 11280. SPIE. 2020, pp. 111–116.

[423] Huili Grace Xing, Wenshen Li, Kazuki Nomoto, and Debdeep Jena. "GaN Power Electronics and Associated Fundamental Limits". In: *Electrochemical Society Meeting Abstracts 2020*. 24. The Electrochemical Society, Inc. 2020, pp. 1739–1739.

[425] Mohammad Javad Asadi, Lei Li, Wenwen Zhao, Kazuki Nomoto, Patrick Fay, Huili Grace Xing, Debdeep Jena, and James CM Hwang. "SiC substrate-integrated waveguides for high-power monolithic integrated circuits above 110 GHz". In: *2021 IEEE MTT-S International Microwave Symposium (IMS)*. IEEE. 2021, pp. 669–672.

[430] Carlo De Santi, Elena Fabris, Alessandro Caria, Matteo Buffolo, Wenshen Li, Kazuki Nomoto, Zongyang Hu, Debdeep Jena, Huili Grace Xing, Gaudenzio Meneghesso, et al. "Trapping processes and band discontinuities in Ga_2O_3 FinFETs investigated by dynamic characterization and optically-assisted measurements". In: *Oxide-based Materials and Devices XII*. Vol. 11687. SPIE. 2021, pp. 15–22.

[431] Len van Deurzen, Shyam Bharadwaj, Kevin Lee, Vladimir Protasenko, Henryk Turski, Huili Grace Xing, and Debdeep Jena. “Enhanced efficiency in bottom tunnel junction InGaN blue LEDs”. In: *Light-Emitting Devices, Materials, and Applications XXV*. Vol. 11706. SPIE. 2021, pp. 30–35.

[435] Ved Gund, Benyamin Davaji, Hyunjea Lee, Mohammad Javad Asadi, Joseph Casamento, Huili Grace Xing, Debdeep Jena, and Amit Lal. “Temperature-dependent lowering of coercive field in 300 nm sputtered ferroelectric $Al_{0.70}Sc_{0.30}N$”. In: *2021 IEEE International Symposium on Applications of Ferroelectrics (ISAF)*. IEEE. 2021, pp. 1–3.

[436] Ved Gund, Benyamin Davaji, Hyunjea Lee, Joseph Casamento, Huili Grace Xing, Debdeep Jena, and Amit Lal. “Towards Realizing the Low-Coercive Field Operation of Sputtered Ferroelectric $Sc_xAl_{1-x}N$”. In: *2021 21st International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers)*. IEEE. 2021, pp. 1064–1067.

[438] Austin Hickman, Reet Chaudhuri, Neil Moser, Michael Elliott, Kazuki Nomoto, Lei Li, James CM Hwang, Huili Grace Xing, and Debdeep Jena. “Large signal response of AlN/GaN/AlN HEMTs at 30 GHz”. In: *2021 Device Research Conference (DRC)*. IEEE. 2021, pp. 1–2.

[463] J Casamento, K Nomoto, TS Nguyen, H Lee, C Savant, L Li, A Hickman, T Maeda, J Encomendero, V Gund, et al. “FerroHEMTs: High-Current and High-Speed All-Epitaxial AlScN/GaN Ferroelectric Transistors”. In: *2022 International Electron Devices Meeting (IEDM)*. IEEE. 2022, pp. 11–1.

[470] Ved Gund, Benyamin Davaji, Shubham Jadhav, Hyunjea Lee, Debdeep Jena, Huili Grace Xing, and Amit Lal. “Multi-level Analog Programmable Graphene Resistive Memory with Fractional Channel Ferroelectric Switching in Hafnium Zirconium Oxide”. In: *2022 Joint Conference of the European Frequency and Time Forum and IEEE International Frequency Control Symposium (EFTF/IFCS)*. IEEE. 2022, pp. 1–4.

[471] Ved Gund, Kazuki Nomoto, Huili Grace Xing, Debdeep Jena, and Amit Lal. “Intrinsically switchable GHz ferroelectric ScAlN SAW resonators”. In: *2022 IEEE International Symposium on Applications of Ferroelectrics (ISAF)*. IEEE. 2022, pp. 1–4.

[476] Taehee Kang, Jia Zhang, Achintya Kundu, Klaus Reimann, Michael Woerner, Thomas Elsaesser, Bernard Gil, Guillaume Cassabois, Christos Flytzanis, Giorgia Fugallo, et al. “Probing Ultrafast Dynamics of Anharmonically Coupled Phonons in Few-Layer Hexagonal Boron Nitride”. In: *2022 Conference on Lasers and Electro-Optics (CLEO)*. IEEE. 2022, pp. 1–2.

[478] Eungkyun Kim, Zexuan Zhang, Jashan Singhal, Kazuki Nomoto, Austin Hickman, Masato Toita, Debdeep Jena, and Huili Grace Xing. “First demonstration of N-polar GaN / AlGaN / AlN HEMT on Single Crystal AlN Substrates”. In: *2022 Device Research Conference (DRC)*. IEEE. 2022, pp. 1–2.

[480] Lei Li, Steve Reyes, Mohammad Javad Asadi, Debdeep Jena, Huili Grace Xing, Patrick Fay, and James CM Hwang. “Single-Sweep vs. Banded Characterizations of a D-band Ultra-Low-Loss SiC Substrate-Integrated Waveguide”. In: *2022 99th ARFTG Microwave Measurement Conference (ARFTG)*. IEEE. 2022, pp. 1–4.

[482] Wenshen Li, Debdeep Jena, and Huili Grace Xing. “A Composite TE-TFE-FE Model for Schottky Barrier Reverse Current over the Entire Electric-Field Range”. In: *2022 Device Research Conference (DRC)*. IEEE. 2022, pp. 1–2.

[491] Henryk Turski, Mikolaj Chlipala, Marcin Siekacz, Grzegorz Muziol, Mikolaj Zak, Mateusz Hajdel, Krzesimir Nowakowski-Szkudlarek, Len H van Deurzen, Huili G Xing, Debdeep Jena, et al. “Next-generation of III-nitride light emitters based on buried tunnel junction design”. In: *Light-Emitting Devices, Materials, and Applications XXVI*. SPIE. 2022, PC120220G.

[511] Shubham Jadhav, Ved Gund, Madhav Ramesh, Debdeep Jena, and Amit Lal. “Design and Implementation of an AlScN-Based FeMEMS Multiplier for In-Memory Computing Applications”. In: *2023 IEEE International Symposium on Applications of Ferroelectrics (ISAF)*. IEEE. 2023, pp. 1–4.

[531] Eungkyun Kim, Yu-Hsin Chen, Jimy Encomendero, Debdeep Jena, and Huili Grace Xing. “AlN/GaN/AlN HEMTs on bulk AlN substrates with high drain current density¿ 2.8 A/mm and average breakdown field¿ 2 MV/cm”. In: *2024 Device Research Conference (DRC)*. IEEE. 2024, pp. 1–2.

[542] Xiaopeng Wang, Kazuki Nomoto, Gianluca Fabi, Richard Al Hadi, Marco Farina, Debdeep Jena, Huili Grace Xing, and James CM Hwang. “Inverted scanning microwave microscopy of GaN/AlN high-electron mobility transistors”. In: *2024 103rd ARFTG Microwave Measurement Conference (ARFTG)*. IEEE. 2024, pp. 1–4.