



C. Jayant Praharaj, Ph.D.

Designation : Professor

Department : Department of Electronics Engineering
(Joined the institute in July, 2022)

Contact : 7894990873(M)

Email : jayant.praharaj@silicon.ac.in

RESEARCH INTERESTS

- Semiconductor Device Modeling and Characterisation
- Polarization Engineering in Nanostructures
- Semiconductor Photovoltaic Devices
- Semiconductor sensors
- Advanced devices for VLSI

Academic Qualifications

Ph. D, 2004 (Electrical and Computer Engineering), Cornell University, USA
(specialization in nanoelectronics)

M. S. 2000 (Electrical Engineering), Cornell University, USA
(specialization in semiconductor devices)

Teaching Experience/Industrial Experience/Research Experience

- ✓ Teaching Experience: 8 years
- ✓ Research Experience: 16 years
- ✓ Industrial Experience: 10 years

PUBLICATIONS

JOURNALS:

JOURNAL ARTICLES & CONFERENCE PAPERS

- [1]. Devika Jena, Sanghamitra Das, **C. Jayant Praharaj**, Aruna Tripathy and Taraprasanna Dash, Process-induced stress tuning to improve linearity performance in AlGaIn/GaN HEMTs with SiNx passivation, Physica Scripta, Vol. 99, 2024.
- [2]. **C. Jayant Praharaj**, Quantum Entanglement and Quantum Memory using MoSe₂/h-BN Quantum Dots, International Journal of Electrical, Electronics and Data Communications, 2023
- [3]. **C. Jayant Praharaj**, Indium Gallium Nitride on Silicon Heterojunction Schottky Barrier Solar Cell Characteristics, MRS Communications (2021)

- [4]. **C.Jayant Praharaj**, Ohmic Contacts to Wurtzite Silicon Carbide Using Polarization Technology, Materials Research Society Proceedings (2010)
- [5]. **C.Jayant Praharaj**, Plasmon Spectra at Wurtzite Aluminum Gallium Nitride / Silicon Carbide Heterojunctions, Materials Research Society Proceedings (2011)
- [6]. **C.Jayant Praharaj**, J.Hwang and L.F.Eastman, Asymmetrical current conduction across 50 angstroms thick AlGa_N polarization barrier, Micro and Nano Letters(2006)
- [7]. **C.Jayant Praharaj**, Spontaneous and Piezoelectric Polarization Effects on the Frequency Response of Wurtzite Aluminium Gallium Nitride / Silicon Carbide Heterojunction Bipolar Transistors, Materials Research Society Proceedings(2008)
- [8]. **C.Jayant Praharaj**, Spontaneous and Piezoelectric Polarization Effects on the Frequency Response of Wurtzite Aluminium Gallium Nitride / Silicon Carbide Heterojunction Bipolar Transistors, Materials Research Society Proceedings(2008)
- [9]. **C.Jayant Praharaj**, Electron Energy Spectra of Single and Multiple AlGa_N/Ga_N quantum dots with spontaneous and piezoelectric polarization effects, Materials Research Society Proceedings(2007)
- [10]. **C.Jayant Praharaj**, Enhanced tunneling through sub 30 angstroms thick Gallium nitride cap layers on silicon carbide for low contact resistance, Materials Research Society Proceedings (2007)
- [11]. **C.Jayant Praharaj**, Optical Absorption at digitally and continuously graded indium gallium nitride Schottky barriers, Materials Research Society Proceedings (2007)
- [12]. **C.Jayant Praharaj**, Variational Calculation of Donor Binding Energy in Rectangular Aluminum Gallium Nitride/Gallium Nitride Quantum Wires , Materials Research Society Proceedings(2007)
- [13]. **C.Jayant Praharaj**, W.J.Schaff , L.F.Eastman et al, Ga_N/SiC Heterojunction Bipolar Transistors , Solid State Electronics(2000)
- [14]. **C.Jayant Praharaj**, L.F.Eastman, Current Scaling in ALGa_N/Ga_N and Ga_N/SiC Heterojunction Bipolar Transistors, MRS Journal Nitride Semiconductor Research (2003)
- [15]. **C.Jayant Praharaj**, L.F.Eastman, High Breakdown Voltage AlGa_N/ AlN/Ga_N HEMTs, MRS Journal Nitride Semiconductor Research (2002)

CONFERENCES:

- [1]. **C.Jayant Praharaj**, Indium Gallium Nitride/Boron Nitride/ALuminum Gallium Nitride E-Mode High Electron Mobility Transistor Modeling, Conference on Circuits, Power and Intelligent Systems, 2023
- [2]. **C.Jayant Praharaj**, Aluminum Gallium Nitride Power Heterojunction Bipolar Transistor Optimization for Power Electronics, Conference on Circuits, Power and Intelligent Systems, 2023
- [3]. **C.Jayant Praharaj**, Excitonic Quantum Memory using Ga_N Quantum Dots with Polarization Optimization, MRS Fall Meeting, 2022
- [4]. **C.Jayant Praharaj**, Indium Gallium Nitride on Silicon Wurtzite Schottky Barrier Solar Cells, MRS Fall Meeting, 2020
- [5]. **C.Jayant Praharaj**, Spin and Coulomb Dynamics in Gallium Nitride Quantum Dots for Quantum Computation, MRS Fall Meeting, 2020
- [6]. **C.Jayant Praharaj**, Quasi-Ballistic Transitions in AlGa_N/SiC Heterojunction Bipolar Transistors, IEEE International Conference on Devices, Circuits and Systems, 2020

- [7]. **C.Jayant Praharaj**, Excitonic Memory in BN/GaN Quantum Dots, International Conference on Advances in Mathematics, Physics and Applied Sciences, 2019
- [8]. **C.Jayant Praharaj**, Indium Gallium Nitride Quantum Wire Transport for Lasers, International Conference on Mathematics, Physics and Applied Sciences, 2018
- [9]. **C.Jayant Praharaj**, Quantum Confined Stark Effect in InGaN/AlGaN quantum wells and quantum wires, 2016
- [10]. **C.Jayant Praharaj**, Plasmon dispersion in Indium Gallium Nitride 2DEGs, Wide Band Gap Semiconductor Conference(2015)
- [11]. **C.Jayant Praharaj**, Plasmon dispersion in Indium Gallium Nitride 2DHGs, ESSDERC Conference(2014)
- [12]. **C.Jayant Praharaj**, Polarization Enhancement of Tunneling Contacts to Indium Gallium Nitride, MRS Spring Meeting, 2013
- [13]. **C.Jayant Praharaj**, Ohmic Contacts to Silicon Carbide Using Polarization Engineering, MRS Spring Meeting(2010)
- [14]. **C.Jayant Praharaj**, Plasmon Spectra in Aluminum Gallium Nitride / Silicon Carbide Gate Tunable 2DEGs, MRS Spring Meeting Proceedings(2011)
- [15]. **C.Jayant Praharaj** and L.F.Eastman, Modeling of hole tunneling in polarization-based contacts to wurtzite ptype Gallium Nitride using thin indium Gallium Nitride caps, IEEE Device Research Conference, 2009
- [16]. **C.Jayant Praharaj**, Multiple AlGaN/GaN quantum dots Spectrum Scaling with spontaneous and piezoelectric polarization effects, MRS Spring Meeting (2007)
- [17]. **C.Jayant Praharaj**, 20 Angstroms thick Gallium nitride cap layers on silicon carbide for contact resistance optimization, MRS Spring Meeting(2007)
- [18]. **C.Jayant Praharaj**, Photovoltaic Cells using Graded Epitaxial Indium Gallium Nitride Schottky barriers, MRS Spring Meeting(2007)
- [19]. **C.Jayant Praharaj**, Donor and Acceptor Binding in Gallium Nitride Quantum Wires , MRS Spring Meeting(2007)
- [20]. **C.Jayant Praharaj**, Spontaneous and Piezoelectric Polarization Effect on Nitride Varactors, Wide Band Gap Semiconductor Session, ESSDERC (2010)

ANY OTHER

BOOK CHAPTER

Books and Book Chapters

- [1]. **C.Jayant Praharaj**, Group III Nitride Semiconductor Optoelectronics, John Wiley, 2023 (Book)
- [2]. **C.Jayant Praharaj**, Plasmon-coupled III Nitride Optoelectronic Devices, Book chapter, 2024
- [3]. **C.Jayant Praharaj**, Polaritons in Nitride Semiconductor Heterostructures, Book chapter, 2024

PROJECTS/ CONSULTANCIES

- [1]. Aluminum Gallium Nitride/Silicon Carbide Heterojunction Bipolar Transistors, Cornell University
- [2]. Aluminum Gallium Nitride Polarization Barriers, Cornell University
- [3]. Gate oxide quality improvement for Flash transistors, Intel Corporation

- [4]. Advanced Memory Devices for Non-volatile memory scaling, SanDisk Corporation
- [5]. Novel memory architectures, SanDisk Corporation
- [6]. Indium Gallium Nitride LEDs, Band Photonics Materials

PATENTS

- 1. Application Number : PRV8088789251
Title of Invention : A Strained Indium Gallium Nitride InfraRed Sensor
Year of publication : 2021
- 2. Application Number : PRV8088674563
Title of Invention : Wurtzite Tunneling Emitter Heterojunction Bipolar Transistor.
Year of publication: 2021
- 3. Application Number : PRV8089758752
Title of Invention : Fully scalable Indium Gallium Nitride detector
Year of publication: 2022

ACADEMIA/ INDUSTRY TALKS

- [1]. **C.Jayant Praharaj**, Wide Band Gap Semiconductor Power HEMTs, IIT BBSR, 2017
- [2]. **C.Jayant Praharaj**, Fully scalable detectors using wurtzite Nitride emiconductors, Luminasic, 2019
- [3]. **C.Jayant Praharaj**, Power Electronic and High Frequency Devices using Wide Band Gap Semiconductors, CET, Odisha, 2018
- [4]. **C.Jayant Praharaj**, Wide Band Gap Semiconductor Power HEMTs, IIT BBSR, 2017
- [5]. **C.Jayant Praharaj**, Indium Gallium Nitride Quantum Wire Laser Cycling, C. Photonics, 2015
- [6]. **C.Jayant Praharaj**, Polarization in the Transport and Optics of Wurtzite Semiconductors, UC Berkeley, 2013
- [7]. **C.Jayant Praharaj**, Scalable programming architectures for 3D NVRAM, Sandisk, USA, 2011
- [8]. **C.Jayant Praharaj**, Extreme scaling for 3D Phase Change Memory, SanDisk Corp, 2009
- [9]. **C.Jayant Praharaj**, Carbon Nanotube 3D NVRAM Retention and Cycling, Sandisk, USA, 2008
- [10]. **C.Jayant Praharaj**, ETOX process optimization for NVRAM , 2007

MAJOR COURSES TAUGHT:

- 1. Electronic Circuits Lab
- 2. Semiconductor Devices and Circuits Lab
- 3. Electronic Testing and Semiconductor Device Parametrics
- 4. Six-Sigma and Semiconductor Process Control
- 5. Digital Communications Lab
- 6. Digital VLSI Lab
- 7. Pattern Recognition and Machine Learning
- 8. MEMS and Sensor Design
- 9. Embedded System Design

10. 3DNVRAM Device Modeling
11. Six-Sigma and Advanced Memory Process Parametrics