Dr. Bratati Mukhopadhyay

Institute of Radio Physics and Electronics
University of Calcutta
92, Acharya Prafulla Chandra Road, Kolkata-700009, India
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Education:

Ph.D (Tech), Institute of Radio Physics and Electronics, University of Calcutta
Year: 2006
Specialization: Semiconductor Device Physics and Optoelectronics
Thesis: Some Investigations on Optoeletronic Device Applications of Si Based Quantum Nanostructures.
Supervisor: Prof. Prasanta Kumar Basu

M.Tech: Institute of Radio Physics and Electronics, University of Calcutta
Year 1997:1999

B.Tech: Institute of Radio Physics and Electronics, University of Calcutta
Year: 1994-1997

B.Sc Physics: University of Calcutta
Lady Brabourne College, Kolkata
Year:1991-1994

Current Employment:

Assistant Professor, Institute of Radio Physics and Electronics, University of Calcutta

Areas of Research:

- Transport and optical process in semiconductor bulk and quantum wells
- Semiconductor device physics and modelling quantum well electrnic and photonic devices
- Physics of Nanoelectronic Devices

Teaching:

Year: 2008 to till date

Semiconductor Physics, Advanced Semiconductor theory, Heterostructure Devices, CMOS Analog Circuit, Quantum Theory of Solids, Guided Wave Photonics, Photonic Devices

Administrative and Professional Details:

1. Coordinator :"M.Tech in VLSI Design", a self sponsored course at Institute of Radio Physics and Electronics since 2015
2. Treasurer, CODEC-2015, CODEC-2019
3. Secretary, IEEE Photonic Society, Kolkata Chapter, 2013-2017
4. Chairman, IEEE Woman in Engineering (WIE)
5. Course Coordinator, "PHOTOSMART", "FABTECH"- organized at Institute of Radio Physics and Electronics under UGC-NRCPS Program

Funded Project:

1. **High-responsivity GeSn short-wave infrared phototransistors,** DST, Govt. of India, (collaborative project with Taiwan) :**Completed**
2. **Studies on Group IV Semiconductors and Their Alloys for Photonic Device Applications,** DST, Govt. of India **: Completed**
3. **Physics and Modeling of Some Emerging Nanophotonic Devices,** Centre for Research in Nanoscience and Nanotechnology, University of Calcutta: **Completed**

Doctoral Student:

- Degree Awarded: **2**
- Thesis Submitted: **1**
- Predoctoral Thesis Submitted:**1**
- Registered: **2**
- Enrolled: **1**

Research Publications:

Book Chapter

Transistor Laser: Principles, Analytical Models and Applicarions, Chapter–8, pp.1-34, 2011, Advances in Microelectronics and Photonics, Editor: Satyabrata Jit,
Publisher:
Nova Science Publishers Year:2011

Book:

Semiconductor Laser Theory: P.K. Basu, Bratati Mukhopadhay and Rikmantra Basu, CRC Press: Taylor & Francis, USA

Journal Papers:

1. Namrata Shaw, Gopa Sen and **Bratati Mukhopadhyay**, "An analytical approach of elimination of ambipolarity of DPDG-TFET using strained type II staggered SiGeSn heterostructures", ***Superlattices and Microstructures***, **141**, 106488, 2020.
2. Namrata Shaw, **Bratati Mukhopadhyay** and Gopa Sen, "Study of electrical parameters of a dual material double gate TFET using a strained type II staggered $Ge_{1-x-y}Si_xSn_y/Ge_{1-a-b}Si_aSn_b$ heterojunction", ***J Comput Electron***, **DOI: 10.1007/s10825-020-01540-3**.
3. Soumava Ghosh, **Bratati Mukhopadhyay** and Guo-En Chang, "Design and Analysis of GeSn-Based Resonant-Cavity-Enhanced Photodetectors for Optical Communication Applications," ***IEEE Sensors J.***, **20**, 7801-7809, 2020.
4. Soumava Ghosh, Kuan-Chih Lin, Chen-Hsun Tsai, Kwang Hong Lee, Qimiao Chen, Bongkwon Son, **Bratati Mukhopadhyay**, Chuan Seng Tan and Guo-En Chang, "Resonant-cavity-enhanced responsivity in germanium-on-insulator photodetectors," ***Optics Express***, **28**, 23739-23747, 2020.
5. Soumava Ghosh, Kuan-Chih Lin, Cheng-Hsun Tsai, Harshvardhan Kumar, Qimiao Chen, Lin Zhang, Bongkwon Son, Chuan Seng Tan, Munho Kim, **Bratati Mukhopadhyay**, and Guo-En Chang, "Metal-Semiconductor-Metal GeSn Photodetectors on Silicon for short-wave infrared applications," ***Micromachines***, **11**, 795, 2020.
6. Soumava Ghosh, **Bratati Mukhopadhyay**, Gopa Sen and P.K. Basu, "Performance analysis of GeSn/SiGeSn quantum well infrared photodetector in terahertz wavelength region", **Physica E**, vol 115, 113692 (9pg), 2020.
7. Soumava Ghosh, **Bratati Mukhopadhyay**, Gopa Sen and P.K. Basu, "Study of Si-Ge-Sn based Heterobipolar Phototransistor (HPT) exploiting Quantum Confined Stark Effect and Franz Keldysh effect with and without resonant cavity", **Physica E**, vol 106, 62-67, 2019.
8. **Bratati Mukhopadhyay**, Gopa Sen, Souradeep De, Rikmantra Basu, Vedatrayee Chakraborty, and Prasanta K. Basu, "Calculated Characteristics of a Transistor Laser Using Alloys of Gr-IV Elements", **Phys. Stat. sol. B**., vol 255, 1800117 (6pp) 2018.
9. Swagata Dey, Gopa Sen, Vedatrayee Chakraborty, **Bratati Mukhopadhyay** "Performance prediction of a quantum well Infrared photo detector (QWIP) using GeSn/SiGeSn quantum well structure" **Journal of Communications Technology and Electronics**, **64**(11), 1298–1306, 2019.
10. Swagata Dey, Vedatrayee Chakraborty, **Bratati Mukhopadhyay** and Gopa Sen, "Modeling of tunneling current density of GeC based double barrier multiple quantum well resonant tunneling diode", **Journal of Semiconductors**, vol 39, 1-5, 2018.

11. Neetesh Kumar, **Bratati Mukhopadhyay** and Rikmantra Basu, "Tunnel injection transistor laser for optical interconnects", **Opt Quant Electron**, vol. 50, 160(12pp) 2018.

12. Swagata Dey, **Bratati Mukhopadhyay**, Gopa Sen and P.K. Basu, "Type II band alignment in $Ge_{1-x-y}Si_xSn_y/Ge_{1-\alpha-\beta}Si_\alpha Sn_\beta$ heterojunctions", **Solid State Communications**, vol 270, 155-159, 2018.

13. **Bratati Mukhopadhyay**, Gopa Sen, P. K. Basu, Rikmantra Basu, Shyamal Mukhopadhyay, "Prediction of Large Enhancement of Electron Mobility in Direct Gap $Ge_{1-x}Sn_x$ Alloy", **Phys. Stat. sol. B**., vol 254, 1700244 (7pp) 2017.

14. Vedatrayee Chakraborty, Swagata Dey, Rikmantra Basu, **Bratati Mukhopadhyay**, P. K. Basu, "Current gain and external quantum efficiency modeling of GeSn based direct bandgap multiple quantum well heterojunction phototransistor, ", **Opt Quant Electron**, vol. 49, 125(13pp) 2017.

15. Guo-En Chang, Rikmantra Basu, **Bratati Mukhopadhyay**, and Prasanta K. Basu, "Design and Modeling of GeSn-based Heterojunction Phototransistors for Communication Applications IEEE **J. Sel Top in Quantum Electron**, Vol.: 22(6), 8200409 (9pp), 2016

16. Vedatrayee Chakraborty, **Bratati Mukhopadhyay** and P.K. Basu,"Effect of different loss mechanisms in SiGeSn based mid-infrared lasers", **Semiconductor** (Springer) vol. 49(6), 836-842, 2015.

17. Rikmantra Basu, Vedatrayee Chakraborty, **Bratati Mukhopadhyay** and P.K. Basu, Predicted performance of Ge/GeSn hetero-phototransistors on Si substrate at 1.55μm, **Optical & Quantum Electronics**, vol. 47, 387-399, 2015.

18. Vedatrayee Chakraborty, **Bratati Mukhopadhyay** and P.K. Basu," Study of GeSn/SiGeSn RCE photodetectors based on Franz-Keldysh effect and quantum confined Stark effect", **Opt. Quantum Electron.**, vol. 47, 2381-2389, 2015.

19. Vedatrayee Chakraborty, **Bratati Mukhopadhyay** and P.K. Basu, Perfomance Prediction of an Electroabsorption Modulator at 1550 nm Using GeSn/SiGeSn Quantum Well Structure", **Physica E: Low Dimensional Systems and Nanostructures**, vol. 50, 67-72, 2013.

20. Rikmantra Basu, **Bratati Mukhopadhyay** and P. K. Basu, Analytical Model for Threshold Base Current of a Transistor Laser with Multiple Quantum Wells in the Base" **IET-Optoelectronics (UK)**, vol. no. 7 pp.71-76, 2013.

21. Rikmantra Basu, **Bratati Mukhopadhyay** and P.K. Basu ,"Modeling resonance-free modulation response in transistor lasers with single and multiple quantum wells in the base", **IEEE Photonics J.**, vol. 4(5), 1572-1581, 2012.

22. Rikmantra Basu, **Bratati Mukhopadhyay** and P.K. Basu, "Modeling of current gain compression in common emitter mode of a transistor laser above threshold base current", **J Appl. Phys**., vol.

111, 083103(7pp), 2012.

23. Rikmantra Basu, **Bratati Mukhopadhyay** and P.K. Basu, "Analytical theory of a small signal modulation response of atransistor laser with dots-in-well in the base", **Semicond. Sci. Technol**, vol. 27, 015022 (7pp), 2012.

24. Rikmantra Basu, **Bratati Mukhopadhyay** and P.K. Basu, "Estimated threshold base current and light power output of a transistor laser with InGaAs quantum well in GaAs base", **Semicond. Sci. Technol**, vol. 26, 105014(6pp), 2011.

25. P.K.Basu, N.R.Das, **Bratati Mukhopadhyay**, Gopa Sen and Mukul Kumar Das, "Ge/Si photodetectors and group IV alloy based photodetector materials", **Opt. Quant Electron**, vol. 41, 567-581, 2009.

26. **Bratati Mukhopadhyay**, Abhijit Biswas, P.K.Basu, G.Eneman, P.Verheyen, E.Simoen and C Claeys, "Modelling of threshold voltage and subthreshold slope of strained Si MOSFETs including quantum effects", **Semicond. Sci. Technol**, vol. 23, 095017(8pp), 2008.

27. **Bratati Mukhopadhyay**, Sumitra Ghosh and P.K.Basu, "Estimation of the composition of $Si_{1-x-y}Ge_xC_y$ layers on Si for photodetection at 1.3 and 1.55 μm", **Optical Engineering**, vol. 46(1), 014001(7pp.), 2007.

28. **Bratati Mukhopadhyay** and P.K.Basu, "Alloy and phonon scattering limited mobility in strain-free ternary $Si_{1-x-y}Ge_xC_y$", **Phys. Stat. Sol. (b)**, vol. 241(15), 3600-3606, 2004.

29. **Bratati Mukhopadhyay** and P.K.Basu, "Linewidth for interconduction subband transition in $Si/Si_{1-x}Ge_x$ quantum wells", **Phys. Stat. Sol. (b)**, vol. 241(8), 1859-1864, 2004.

30. Sumitra Ghosh, **Bratati Mukhopadhyay** and P.K.Basu "Calculated gain and threshold current density for interconduction-subband transition in Si triple quantum well structures", **Microwave and Optical Technology Letters**, vol. 35(6), 470-475, 2002.