Dr. Kunal Singh

Assistant Professor
Department of Electronics & Communication Engineering
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RESEARCH INTERESTS

Nanoelectronics, Non-Conventional Semiconductor device modeling using TCAD simulator, Fabrication and Characterization of Semiconductor Devices for Optoelectronics and Microelectronics applications.

PROFESSIONAL EXPERIENCE

- **National Institute of Technology, Jamshedpur, Jharkhand.**
  Duration: 06/2018 till date
  Working as Assistant Professor in Department of Electronics and Communication Engineering, NIT, Jamshedpur, Jharkhand.
- **Thapar University, Patiala, Punjab.**
  Duration: 07/2017 to 05/2018
  Worked as Lecturer in Department of Electronics and Communication, Thapar University, Patiala, Punjab.

EDUCATION

- **INDIAN INSTITUTE OF TECHNOLOGY (BHU),**Varanasi
  Doctor of Philosophy (Ph.D.)in Microelectronics
  Thesis Title:**"**Modeling and Simulation of Some Ultra Shallow Junction based Non-ConventionalMOSFETs"

COURSES TAUGHT

- **At UG Level:**
  - VLSI Technology
  - Analog Electronics
  - Microelectronics and VLSI Design
- **At PG Level:**
  - Sensor Technology and MEMS.
  - Semiconductor device physics.

INVITED TALK

Delivered expert lecture in TEQIP-III sponsored ONE WEEK short course on "Modeling and Simulation of Advanced Semiconductor Devices & VLSI Circuits" scheduled on June 25-29, 2018 in the department of Electronics and Communication Engineering of this institute.

TECHNICAL PROGRAM COMMITEE

Joint Coordinator, Department of Electronics and Communication Engineering, NIT Jamshedpur is conducting five days' workshop on "Hands on Introduction of HFSS in Microwave Applications" (WHFSSMA-2018) from 29th October to 2nd November.

List of Articles Published

Published Papers in International Journals

1. J. Talukdar, G. Rawat, B. Choudhuri, **K. Singh**, and K. Mummaneni, "Device Physics Based Analytical Modeling for Electrical Characteristics of Single Gate Extended Source Tunnel FET (SG-ESTFET)," *Superlattices Microstruct.*, p. 106725, 2020, doi: https://doi.org/10.1016/j.spmi.2020.106725. (Impact Factor: 2.123).
2. S. Kumar, **K. Singh**, K. Baral, P. K. Singh, and S. Jit, "2-D Analytical Model for Electrical Characteristics of Dual Metal Heterogeneous Gate Dielectric Double-Gate TFETs with Localized Interface Charges," *Silicon*, 2020, doi: 10.1007/s12633-020-00564-5.
3. R. Misra, **K. Singh**, M. Kumar, R. Rastogi, A. Kumar, and S. Dubey, "An Ultra-Low-Power Black Phosphorus (B-Ph)/Si Heterojunction Dopingless-Tunnel FET (HD-TFET) with Enhanced Electrical Characteristics," *Superlattices Microstruct.*, vol. 149, p. 106752, 2021, doi: https://doi.org/10.1016/j.spmi.2020.106752. (Impact Factor: 2.123).
4. J. Talukdar, G. Rawat, **K. Singh**, and K. Mummaneni, "Comparative Analysis of the Effects of Trap Charges onSingle- and Double-Gate Extended-Source Tunnel FET withδp+ SiGe Pocket Layer," *J. Electron. Mater.*, vol. 49, no. 7, pp. 4333–4342, 2020, doi: 10.1007/s11664-020-08151-5. (Impact Factor: 1.579)
5. V. Purwar Gupta, Rajeev Kumar, Nitish Awasthi, Himanshi Dixit, Vijay Kumar, **Kunal Singh**, Sarvesh Dubey, Pramod Kumar Tiwari, "Investigating linearity and effect of temperature variation on analog/RF performance of dielectric pocket high-k double gate-all-around (DP-DGAA) MOSFETs," *Appl. Phys. A*, vol. 126, no. 9, p. 746, 2020, doi: 10.1007/s00339-020-03929-0. (Impact Factor: 1.75).
6. K. N. Priyadarshani, S. Singh, and **K. Singh**, "A Novel Self-Aligned Dopingless Symmetric Tunnel Field Effect Transistor (DL-STFET): A Process Variations Tolerant Design," *Silicon*, 2020, doi: 10.1007/s12633-020-00804-8. (Impact Factor: 1.5).
7. J. Talukdar, G. Rawat, **K. Singh**, and K. Mummaneni, "Low Frequency Noise Analysis of Single Gate Extended Source Tunnel FET," *Silicon*, 2020, doi: 10.1007/s12633-020-00712-x. (Impact Factor: 1.5).
8. **Kunal Singh**, S. Kumar, P.K Tiwari, A.B Yadav, S. Dubey and and S. Jit, "Semianalytical Threshold Voltage Model of Double-Gate Nanoscale RingFET for TerahertzApplications in Radiation Hardened (Rad-Hard) Environments", ***Journal of Electronic Materials,*** Accepted, (2019), (Impact Factor: 1.579)
9. Basavaraj S Sannakashappanavar, C. R. Byrareddy, Nandini A. Pattanashetti, **Kunal Singh** and Aniruddh Bahadur Yadav, "Growth of ZnO Nanorods on Different Seed Layer Thickness Using the Hydrothermal Method for UV Detection", ***Journal of Nanoelectronics and Optoelectronics*****,** Vol. 14, no. 7, July 2019, pp. 964-971(8) (Impact Factor: 1.069).
10. **Kunal Singh**, Mirgender Kumar, Ekta Goel, Balraj Singh, Sarvesh Dubey, Sanjay Kumar, and Satyabrata Jit, "Analytical Modeling of Potential Distribution and Threshold Voltage of Gate Underlap DG MOSFETs with a Source/Drain Lateral Gaussian Doping Profile", ***Journal of Electronic Materials,*** Vol 45, pp. 2184-2192, (2016)(Impact Factor: 1.579)
11. **Kunal Singh**, Sanjay Kumar, Ekta Goel, Balraj Singh, Mirgender Kumar, Sarvesh Dubey and Satyabrata Jit, "Subthreshold Current and Swing Modeling of Gate Underlap DG MOSFETs with Source/Drain Lateral Gaussian Doping Profile", ***Journal of Electronic Materials*** vol. 46, no. 1, pp. 579–584, 2017.(Impact Factor: 1.579)
12. **Kunal Singh**, Sanjay Kumar, Ekta Goel, Balraj Singh, Sarvesh Dubey, and Satyabrata Jit, "Effects of Elevated Source/Drain and Side Spacer Dielectric on the Drivability Optimization of Non-abrupt Ultra Shallow Junction Gate Underlap DG MOSFETs" ***Journal of Electronic Materials,***vol. 46, no. 1, pp. 520–526, 2017.(Impact Factor: 1.579)
13. **Kunal Singh**, S. Kumar, E. Goel, B. Singh, and S. Jit, "Effects of Source / Drain Elevation and Side Spacer Dielectric on Drivability Performance of Non- Abrupt Ultra Shallow Junction Gate Underlap GAA MOSFETs," ***Indian Journal of physics,***Vol. 91, Issue1, pp. 171–176, 2018. (Impact Factor: 0.988)

14. Ekta Goel, Sanjay Kumar, **Kunal Singh**, Balraj Singh, Mirgender Kumar, and Satyabrata Jit, "2-D Analytical Modeling of Threshold Voltage for Graded-Channel Dual-Material Double-Gate MOSFETs", ***IEEE Transactions on Electron Devices,*** Vol 63, pp. 966-973, (2016). (Impact Factor: 2.605)
15. Ekta Goel, Balraj Singh, Sanjay Kumar, **Kunal Singh**, and Satyabrata Jit,"Analytical threshold voltage modeling of ion-implanted strained-Si double material double-gate (DMDG) MOSFETs", ***Indian Journal of Physics***, Vol 91, Issue 4, pp 383–390 (2017) (Impact Factor:0.988)
16. Ekta Goel, **Kunal Singh**, Balraj Singh, Sanjay Kumar, and Satyabrata Jit,"2-D Analytical Modeling of Subthreshold Current and Subthreshold Swing for Ion-implanted Strained-Si Double-Material Double-Gate(DMDG) MOSFETs", ***Indian Journal of Physics***, Volume 91, Issue 9, pp 1069–1076(Impact Factor: 0.988)
17. Ekta Goel, Sanjay Kumar, Balraj Singh, **Kunal Singh** and Satyabrata Jit, "Two-dimensional model for subthreshold current and subthreshold swing of graded-channel dual-material double gate (GCDMDG) MOSFETs"**Superlattices and Microstructures**, Vol 106, 2017, pp 147-155, (Impact Factor: 2.123).
18. B. Singh, D. Gola, **K. Singh**, E. Goel, S. Kumar, and S. Jit, "2-D Analytical Threshold Voltage Model for Dielectric Pocket Double-Gate Junctionless FETs by Considering Source /Drain Depletion Effects," ***IEEE Transactions Electron Devices***, vol. 64, no. 3, pp. 901–908, 2017. (Impact Factor: 2.605)
19. Balraj Singh, DeeptiGola, **Kunal Singh**, EktaGoel, Sanjay Kumar and SatyabrataJit, "Analytical Modeling of Subthreshold Characteristics of Ion-Implanted Symmetric Double Gate Junctionless Field Effect Transistors", ***Materials Science in semiconductor processing***, Vol 58, pp. 82-88, (2017). (Impact Factor: 2.359)
20. Balraj Singh, Deepti Gola, **Kunal Singh**, Ekta Goel, Sanjay Kumar and Satyabrata Jit, "Analytical Modeling of Channel Potential and Threshold Voltage of Double Gate Junctionless Field Effect Transistors with a Vertical Gaussian-Like Doping Profile", ***IEEE Transactions on Electron Devices***, Vol 63, pp. 2299-2305, (2016). (Impact Factor: 2.605)
21. Balraj Singh, Trailokya Nath Rai, Deepti Gola, **Kunal Singh**, Ekta Goel, Pramod Kumar Tiwari, Sanjay Kumar and Satyabrata Jit, "Ferro-Electric Stacked Gate Oxide Heterojunction Electro-Statically Doped Source/Drain Double-Gate Tunnel Field Effect Transistors: A Superior Structure", ***Materials Science in semiconductor processing,***Volume 71, 15 November 2017, Pages 161-165 (Impact Factor: 2.359).
22. Sanjay Kumar, Ekta Goel, **Kunal Singh**, Balraj Singh, Mirgender Kumar and Satyabrata Jit, "A Compact 2D Analytical Model for Electrical Characteristics of Double-Gate Tunnel Field-Effect Transistors with a SiO2/High-k Stacked Gate-Oxide Structure", ***IEEE Transactions on Electron Devices*** Vol 63, pp. 3291-3299, (2016). (Impact Factor: 2.605)
23. Sanjay Kumar, Ekta Goel, Kunal Singh, Balraj Singh, Prince Kumar Singh, Kamalaksha Baral and Satyabrata Jit "2-D Analytical Modeling of the Electrical Characteristics of Dual-Material Double- Gate TFETs With a SiO_2 / HfO_2 Stacked Gate-Oxide Structure," ***IEEE Transactions on Electron Devices***, vol. 64, no. 3, pp. 960–968, 2017. (Impact Factor: 2.605).
24. Mirgender Kumar, Sanjay Kumar, Ekta Goel, **Kunal Singh**, Balraj Singh, and Satyabrata Jit, "Strain-Induced Plasma Radiation at Terahertz Domain in Strained-Si-on-Insulator MOSFETs*", **IEEE Transactions on Plasma Science***, Vol. 44, no. 3, pp. 245-249. 2016 (Impact Factor: 0.958)
25. Balraj Singh, Deepti Gola, Ekta Goel, Sanjay Kumar, **Kunal Singh**, and Satyabrata Jit, "Dielectric Pocket Double Gate Junctionless FET: A New MOS Structure with Improved Subthreshold Characteristics for Low Power VLSI Applications", ***Journal of Computational Electronics,*** Vol 15, pp. 502-507, (2016)(Impact Factor: 1.526)
26. Pramod Kumar Tiwari**, Kunal Singh ,**Sarvesh Dubey and S. Jit, "Analytical modeling for the subthreshold current and subthreshold swing of the triple-material double-gate(TM-

DG) MOSFETs" ,***Superlattices and Microstructures,*** 51 (2012) 715–724) (Impact Factor: 2.123)

27. H. Kumar, Y. Kumar, K. Singh, S. Kumar, G. Rawat, C. Kumar, B.N. Pal and S. Jit, "Kink Effect in TiO2 Embedded ZnO Quantum Dot based Thin Film Transistors" ***Electronics Letters***, 53(4):15–16, 2017. (Impact Factor: 1.0)
28. AB Yadav, **Kunal Singh**, A Pandey and S Jit, "Annealing-temperature effects on the properties of ZnO thin films and Pd/ZnOSchottky contacts grown on n-Si (100) substrates by vacuum deposition method" ,***Superlattices and Microstructures***, 71 (2014) 250-260.(Impact Factor: 2.123)
29. Sanjay Kumar , Kunal Singh, Sweta Chander, Ekta Goel, Prince Kumar Singh, Kamalaksha Baral, Balraj Singh and Satyabrata Jit, "2-D Analytical Drain Current Model of Double-Gate Heterojunction TFETs With a SiO2/HfO2/Stacked Gate-Oxide Structure", ***IEEE Transactions on Electron Devices*** (Accepted) (2017). (Impact Factor: 2.605)
30. Sweta Chander, Sanjeet Kumar Sinha, Sanjay Kumar, Prince Kumar Singh, KamalakshaBaral, **Kunal Singh** and Satyabrata Jit, "Temperature Analysis of Ge/Si Heterojunction SOI-Tunnel FET",***Superlattices and Microstructures,***110 (2017) 162-170.(Impact Factor: 2.123).
31. Shaivalini Singh, Pramod Kumar Tiwari, Hemant Kumar, Yogesh Kumar, Gopal Rawat, Sanjay Kumar, **Kunal Singh**, Ekta Goel, S. Jit, Si-Hyun Park" Theoretical and Experimental Study of UV Detection Characteristics of Pd/ZnONanorodSchottky Diodes", *NANO,*Vol 12, 1750137-(1-8) (2017), (Impact Factor: 1.293).

Articles in National/International Conferences

1. **Kunal Singh**, Ekta Goel, Sanjay Kumar, Balraj Singh, M. Kumar and S. Jit, "Source/Drain Lateral Extension as Current On/Off ratio Booster in Gate Underlap DG MOSFETs with Source/Drain Lateral Gaussian Doping Profile", *18th International Workshop on the Physics of Semiconductor Devices **(IWPSD)***, @Indian Institute of Science, Banglore, 2015.
2. EktaGoel**, Kunal Singh**, Sanjay Kumar, Balraj Singh, M. Kumar and S. Jit, "Impact of Heterogeneous Gate Dielectric on Strained Silicon Double-Gate Tunnel Field Effect Transistor", *18th International Workshop on the Physics of Semiconductor Devices **(IWPSD)***, @Indian Institute of Science, Banglore, 2015.
3. Sanjay Kumar, EktaGoel, **Kunal Singh**, Balraj Singh, Mirgender Kumar, and S. Jit, "A 2D Analytical Model of Double-Gate (DG) Tunnel-Field-Effect Transistor (TFET): Impact of Shortest Tunneling Distance", *18th International Workshop on the Physics of Semiconductor Devices **(IWPSD)***, @Indian Institute of Science, Banglore, 2015.
4. Sanjay Kumar, EktaGoel, GopalRawat, **Kunal Singh**, Mirgender Kumar, SarveshDubey and S. Jit, "Threshold Voltage Modeling of Short-Channel DG MOSFETs with Non-Uniform Doping in the Vertical Direction", *17th International Workshop on the Physics of Semiconductor Devices **(IWPSD)***, *@Noida, India*, 2013.
5. Sanjay Kumar, EktaGoel, **Kunal Singh**, Mirgender Kumar and S. Jit, "Surface Potential Based Subthreshold Current Modeling of DG MOSFETs with Non-uniform Doping in the Vertical Direction", *4th International Conference on Current Developments in Atomic, Molecular & Optical Physics with Applications **(CDAMOP-2015)***, 11th-14th March, 2015 held at University of Delhi, Delhi.
6. Mirgender Kumar, **Kunal Singh**, S. Kumar and S. Jit, Analytical Study of Hot-Carrier Induced Effect on Current Characteristics of Strained-Si (s-Si) on Silicon-Germanium-on-Insulator (SGOI) MOSFETs, *National Conference on Research & Innovations in Electronics and Communication Engineering*, @ Noida Institute of Engineering and Technology (NIET), on 10-11th Oct, 2014.

7. Balraj Singh ,Deepti Gola,Sanjay Kumar,**Kunal Singh**,Ekta Goel and Satyabrata Jit, Analytical Study of Hot-Carrier Induced Effect on Current Characteristics of Strained-Si (s-Si) on Silicon-Germanium-on-Insulator (SGOI) MOSFETs, *IEEE International Conference On Recent Trends In Electronics Information Communication Technology*, 10-11th Oct, 2014.