

## Dr. Manjari Garg

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### EMPLOYMENT

- June 2024 – Till date : Assistant Professor Grade – I, School of Nano–Science & Technology, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India
- November 2021 – May 2024 : Postdoctoral Researcher (CNRS), Nanoelectronics Group, Service de Physique de l’Etat Condensé (SPEC), Commissariat à l’énergie atomique (CEA-CNRS), Paris – Saclay, France  
Topic: Quantum transport of heat in Quantum Hall states and fractional Quantum Hall states in Graphene and twisted bilayer-Graphene
- August 2019 – September 2019: Postdoctoral Researcher, Department of Physics, Indian Institute of Science, Bengaluru, Karnataka, India  
Topic: Study of electrical and thermoelectric transport in variable-angle Twisted bilayer-Graphene structures in in-plane and cross-plane directions
- August 2019 – August 2021: CV Raman Postdoctoral Research Fellow, Department of Instrumentation and Applied Physics, Indian Institute of Science, Bengaluru, Karnataka, India  
Topic: Study of electrical and thermoelectric transport in variable-angle Twisted bilayer-Graphene structures in in-plane and cross-plane directions
- June 2019 – August 2019: Research Associate, Department of Physics, Indian Institute of Science, Bengaluru, Karnataka, India  
Topic: Study of electrical and thermoelectric transport in variable-angle Twisted bilayer-Graphene structures in in-plane and cross-plane directions
- August 2012 – December 2012: Project Assistant, National Physical Laboratory Delhi, India  
Topic: Research and Development in thin film solar cells
- October 2011 – March 2012: Project Assistant, National Physical Laboratory Delhi, India  
Topic: Development of high density graphite and copper reinforced graphite for multistage depressed collector of electron tubes

### EDUCATION

**Indian Institute of Technology Delhi**, New Delhi, India

**Ph.D.**, Department of Physics, August 2019

Dissertation: Investigations on the Improvement in GaN-based HEMTs and Ultraviolet Photodetectors using Organic Molecular Surface Modification  
Supervisor: Prof. Rajendra Singh

**Indian Institute of Technology Delhi**, New Delhi, India

**M. Sc.**, Department of Physics, June 2011

Dissertation: Microwave Processing and Characterization of Double Perovskites  
Supervisor: Prof. Subhash C. Kashyap

**University of Delhi**, New Delhi, India

**B. Sc. (Hons.)**, Department of Physics, June 2009

### RESEARCH INTERESTS

- ◆ Quantum Hall Effect and fractional Quantum Hall Effect in 2D materials
- ◆ Quantum transport in 2-Dimensional materials and heterostructures

- ◆ Twistronics
- ◆ Engineering novel device structures using low-dimensional materials and 2D/3D heterojunctions
- ◆ Straintronics, Piezotronics

## **PUBLICATIONS**

[Google Scholar](#)

2024

- **Manjari Garg\***, O. Maillet\*, L. A. Cohen\*, N. L. Samuelson\*, D. Ferraro, M. Sassetti, K. Watanabe, T. Taniguchi, P. Roche, P. Roulleau, A. F. Young, and F.D. Parmentier, “*Enhanced shot noise in graphene quantum point contacts with electrostatic reconstruction*” Manuscript under preparation  
(\*Equal Contribution)
- R. Delagrance\*, **Manjari Garg\***, G. Le Breton, A. Zhang, Q. Dong, Y. Jin, K. Watanabe, T. Taniguchi, P. Roulleau, O. Maillet, P. Roche, and F.D. Parmentier, “*Vanishing bulk heat flow in the  $\nu = 0$  quantum Hall ferromagnet in monolayer graphene*”, Just Accepted in **Nature Physics**  
(\*Equal Contribution)
- B. Ghawri\*, P. S. Mahapatra\*, **Manjari Garg\***, S. Mandal, A. Jayaraman, K. Watanabe, T. Taniguchi, M. Jain, U. Chandni, and A. Ghosh, “*Non-Boltzmann thermoelectric transport in minimally twisted bilayer graphene*”, **Physical Review B**, 109, 045436, 2024.  
(\*Equal Contribution)

2022

- G. Le Breton, R. Delagrance, Y. Hong, **Manjari Garg**, K. Watanabe, T. Taniguchi, R. Ribeiro-Palau, P. Roulleau, P. Roche, and F.D. Parmentier, “*Heat equilibration of integer and fractional quantum Hall edge modes in graphene*”, **Physical Review Letters**, 129, 116803, 2022.
- P. S. Mahapatra, **Manjari Garg**, B. Ghawri, A. Jayaraman, K. Watanabe, T. Taniguchi, A. Ghosh, and U. Chandni, “*Quantum Hall Interferometry in Triangular Domains of Marginally Twisted Bilayer Graphene*”, **Nano Letters**, 22, 14, 5708, 2022.
- B. Ghawri\*, P. S. Mahapatra\*, **Manjari Garg\***, S. Mandal, S. Bhowmik, A. Jayaraman, R. Soni, K. Watanabe, T. Taniguchi, H. R. Krishnamurthy, M. Jain, S. Banerjee, U. Chandni, and Arindam Ghosh, “*Breakdown of Semiclassical Description of Thermoelectricity in Near-Magic Angle Twisted Bilayer Graphene*”, **Nature Communications**, 13:1522, 1, 2022.  
(\*Equal Contribution)

2020

- P. Prasad, **Manjari Garg**, and U. Chandni, “*Tailoring the Transfer Characteristics and Hysteresis in MoS<sub>2</sub> Transistors Using Substrate Engineering*”, **Nanoscale**, 12, 23817, 2020.
- P. S. Mahapatra\*, B. Ghawri\*, **Manjari Garg**, S. Mandal, K. Watanabe, T. Taniguchi, M. Jain, S. Mukerjee, and Arindam Ghosh, “*Misorientation-Controlled Cross-Plane Thermoelectricity in Twisted Bilayer Graphene*”, **Physical Review Letters**, 125, 226802, 2020.  
(\* Equal Contribution)
- S. Kaushik, T. R. Naik, A. Alka, **Manjari Garg**, B. R. Tak, M. Ravikanth, V. R. Rao, and R. Singh, “*Surface Modification of AlN Using Organic Molecular Layer for Improved Deep UV Photodetector Performance*”, **ACS Applied Electronic Materials**, 2, 3, 739, 2020.

2019

- **Manjari Garg**, A. Kumar, H. Sun, C.-H. Liao, X. Li, and R. Singh, “*Temperature dependent electrical studies on Cu/AlGa<sub>N</sub>/Ga<sub>N</sub> Schottky barrier diodes with its microstructural characterization*”, **Journal of Alloys and Compounds**, 806, 852, 2019.
- B. R. Tak, **Manjari Garg**, S. Dewan, C. G. Torres-Castanedo, K.-H. Li, V. Gupta, X. Li, and R. Singh, “*High-Temperature Photocurrent Mechanism of  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> Based Metal-Semiconductor-Metal Solar-Blind Photodetectors*”, **Journal of Applied Physics**, 125, 144501, 2019.
- B. R. Tak, **Manjari Garg**, A. Kumar, V. Gupta, and R. Singh, “*Gamma Irradiation Effect on Performance of  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> Metal-Semiconductor-Metal Solar-Blind Photodetectors for Space Applications*”, **ECS Journal of Solid State Science and Technology**, 8, Q3149, 2019.

- **Manjari Garg**, B. R. Tak, V. R. Rao, and R. Singh, “Enhanced Performance of MSM UV Photodetectors by Molecular Modification of Gallium Nitride Using Porphyrin Organic Molecules”, **IEEE Transactions on Electron Devices**, 66, 2036, 2019.
- **Manjari Garg**, B. R. Tak, V. R. Rao, and R. Singh, “Giant UV Photoresponse of GaN-based photodetectors by surface modification using Phenol functionalized Porphyrin organic molecules”, **ACS Applied Materials and Interfaces**, 11, 12017, 2019.

2018

- **Manjari Garg**, T. R. Naik, R. Pathak, V. R. Rao, C.-H. Liao, K.-H. Li, H. Sun, X. Li, and R. Singh, “Effect of surface passivation process for AlGaIn/GaN HEMT heterostructures using phenol functionalized-Porphyrin based organic molecules”, **Journal of Applied Physics**, 124, 195702, 2018.
- M. Moun, M. Kumar, **Manjari Garg**, R. Pathak, and R. Singh, “Understanding of MoS<sub>2</sub>/GaN Heterojunction Diode and its Photodetection Properties”, **Scientific Reports**, 8, 11799, 2018.
- C. S. Pathak, **Manjari Garg**, J. P. Singh, and R. Singh, “Current Transport Properties of Monolayer Graphene/n-Si Schottky Diodes”, **Semiconductor Science and Technology**, 33, 055006, 2018.
- **Manjari Garg**, T. R. Naik, C. S. Pathak, S. Nagarajan, V. Ramgopal Rao, and R. Singh, “Significant improvement in the electrical characteristics of Schottky barrier diodes on molecularly modified Gallium Nitride surfaces”, **Applied Physics Letters**, 112, 163502, 2018.

2017

- Ashutosh Kumar, R. Kapoor, **Manjari Garg**, V. Kumar, and R. Singh, “Direct evidence of barrier inhomogeneities at metal/AlGaIn/GaN interfaces using nanoscopic electrical characterizations”, **Nanotechnology**, 28, 26LT02, 2017.

2016

- **Manjari Garg**, A. Kumar, S. Nagarajan, M. Sopenen, and R. Singh, “Investigation of significantly high barrier height in Cu/GaN Schottky diode”, **AIP Advances**, 6, 015206, 2016.

2014

- Saroj Kumari, A. Kumar, A. P. Singh, **Manjari Garg**, P. K. Dutta, S. K. Dhawan and Rakesh B. Mathur, “Cu–Ni alloy decorated graphite layers for EMI suppression”, **RSC Advances** 4, 23202, 2014.

## **CONFERENCE PROCEEDINGS**

2018

- **Manjari Garg**, B. R. Tak, V. R. Rao, and R. Singh, “Improvement in self-powered GaN-based symmetric metal-semiconductor-metal ultraviolet photodetectors by using phenol-functionalized porphyrin organic molecules” **2018 4th IEEE International Conference on Emerging Electronics (ICEE)**, 17-19 Dec. 2018, DOI: 10.1109/ICEE44586.2018.8937959.

2016

- **Manjari Garg**, A. Kumar, S. Nagarajan, M. Sopenen, and R. Singh, “Study of 1/f noise characteristics in Cu/n-GaN Schottky barrier diode”, **AIP Conference Proceedings**, 1731, 120011, 2016.

## **PATENTS**

- Rajendra Singh, **Manjari Garg**, V. Ramgopal Rao, “Molecularly Modified Gallium Nitride based Ultraviolet Photodetector and a Method of Fabrication Thereof”, Application No. 201811019707, Dated: 25 May 2018 (**Accepted**).
- Rajendra Singh, **Manjari Garg**, V. Ramgopal Rao, Tejas R. Naik, “Molecularly Modified AlGaIn/GaN HEMT Epitaxial Film Surface and Improvement of Schottky Barrier Diode Thereof”, Application No. 201711041322, Dated: 18 November 2017 (**Accepted**).

## **FELLOWSHIPS AND AWARDS**

- 2023 : Quantum Technologies in Paris Region (QuantIP)
- 2019 : National Post-Doctoral Fellowship (NPDF), DST-SERB
- 2019 : CV Raman Post-doctoral Fellowship, Indian Institute of Science, India
- 2018 : Best Oral Presentation Award, 4th IEEE International Conference on Emerging

- Electronics (ICEE-IEEE)
- 2018 : Best Presentation Award, Indian Institute of Technology Delhi
- 2015 : Best Presentation Award, 60<sup>th</sup> Department of Atomic Energy-Solid State Physics Symposium (DAE-SSPS)
- 2015 : Council of Scientific and Industrial Research (CSIR), Senior Research Fellowship (SRF)
- 2013 : Council of Scientific and Industrial Research (CSIR), Junior Research Fellowship (JRF)
- 2012 : National Eligibility Test (NET) – CSIR (JRF+LS), All India rank: 16
- 2009 : Indian Institute of Technology Joint Admission Test (IIT JAM), All India rank: 105
- 2009 : First in the order of merit, Graduation (B. Sc) III<sup>rd</sup> year, University of Delhi, Delhi, India
- 2008 : First in the order of merit, Graduation (B. Sc) II<sup>nd</sup> year, University of Delhi, Delhi, India

## **RESEARCH SKILLS**

- Class 100, Class 1000 – Clean Room experience
  - Laboratory Expertise
    - Fabrication techniques:
      - Maskless Photolithography – Intelligent Micro Patterning LLC, SF-100
      - Electron Beam Lithography – Raith Pioneer
      - Reactive Ion Etching – Oxford Instruments – PlasmaLab system 100 ICP 380
      - Nanofabrication techniques
    - Characterisation techniques:
      - Hall Effect Measurement system – Ecopia, HMS-5000
      - Semiconductor Characterization System – Keithley, SCS-4200
      - Variable temperature measurements
      - Low temperature and high magnetic field measurements (Liquid He dipping experiments, Measurements using Jains cryogen free closed cycle refrigerator – Model 9TM-CF-2.0K-SV-20 and Leiden Cryogenics Wet dilution refrigerator – MNK 126)
      - Dilution refrigerator (Oxford)
      - Dynamic Signal Analyzer (Noise measurement system) – Stanford Research Systems, SR785
      - DC Probe Station – EverBeing International Corporation, EB6
  - Software used: Python, Origin, Labview
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