RAJAT KUMAR GOYAL

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RESEARCH INTEREST

Quantum Materials, 2D Materials, Perovskite Materials, Quantum Dots, Devices and Sensor Technology, Semiconductors Technology, Utilization of Machine Learning in Experimental Physics, Batteries, Molecular Dynamics Simulation, DFT.

EDUCATION

- **Indian Institute of Technology (IIT), Jodhpur, India** *2023- Present*
  M.Tech in Quantum Technology, Inter-Disciplinary Research Platform (IDRP)
- **National Institute of Technology, Rourkela, Odisha, India** *2021-2023*
  Masters of Science in Physics, Department of Physics and Astronomy **CGPA: 7.82**
- **Ramjas College, University of Delhi (DU), New Delhi, India** *2018-2021*
  Bachler of Science in Physical Sciences **CGPA: 7.89**

PROFESSIONAL EXPERIENCE

- Research Fellow (in Perovskite Photovoltaic Research Industry) at Laboratory of Advance Synthesis and Characterization, Gandhinagar *May 2023 - July 2023*
- Physics and Mathematics Teacher *May 2017 - June 2018*

CERTIFICATIONS

- IBM certified Course offered through Coursera **"Machine Learning with Python"**, issued on 22 Oct 2023, Certificate ID No. RJGPUM4MXW9N
- **Data Science Summer School By Hertie School Data Science Lab from** 14^{th} **Aug 2023 to** 25^{th} **Aug 2023**
- **One Month hands-on session on Machine Learning for Solar Cells,** Issued by Laboratory of Advance Synthesis and Characterization.
- **Summer school of Quantum Information and Quantum Technology 2022** hosted by IISER Kolkata sponsored by IISER Kolkata and Quest, DST Government of India

PUBLISHED/ ACCEPTED JOURNAL PAPER

- **Rajat Kumar Goyal**,.....,et.al Structural, dielectric and electrical transport properties of thermal stable $(1-x)K_{0.5}Bi_{0.5}TiO_3 - xBaTiO_3$ ceramics, Ceramic International. (I.F. 5.5)

JOURNAL PAPER UNDER COMMUNICATION / UNDER MODIFICATIONS

- **Rajat Kumar Goyal**,....., et al., Figuring out the Quantum Domain: A Comprehensive Review of Quantum Materials and Their Multidisciplinary Applications.
- **Rajat Kumar Goyal**,....., et al., Unlocking the Importance of Electrochemical Impedance Spectroscopy: Unveiling Advances and Insights into Equivalent Circuits for Perovskite Solar Cells.
- **Abdullah*, Rajat Kumar Goyal***,....., et al., Exploring the Structural, Dielectric, and Ferroelectric Properties of (1-x) $BaTiO_3$-x $Bi[Mg_{0.5}Ti_{0.5}]O_3$ solid solution for Next-Generation Energy-Efficient Devices. Note: * equal Contribution

BOOK CHAPTER UNDER MODIFICATION

- **Rajat Kumar Goyal**,.....,et.Comprehensive analysis of structural, dielectric, and electrical transport properties of thermal stable NN-modified BNT-BT-BKT perovskite materials with enhanced energy storage properties.

MASTER THESIS

- **Studies of Structural, Dielectric, Ferroelectric and Electrical Properties of Lead-free $(1-x)K_{0.5}Bi_{0.5}TiO_3 - xBaTiO_3$ Ceramic** *July 2022-April 2023*
  Supervisor: **Dr. Dillip Kumar Pradhan**
  Associate Professor, National Institute of Technology, Rourkela

RESEARCH EXPERIENCE AND PROJECTS

- **Enhancing Electrical Properties of Mixed Halide Perovskites through Machine Learning-Enhanced Synthesis and Characterization** *May 2023- July 2023*
  Supervisor: **Dr. Pankaj Yadav**
  Assistant Professor, Pandit Deendayal Energy University, Gandhinagar
- **Synthesis and characterization of Thin Film inorganic Perovskite Materials for different types of PhotoVolatic Applications.** *August 2022- May 2023*
  Supervisor: **Dr. Pawan Kumar**
  Professor, National Institute of Technology, Rourkela
- **Synthesis and Characterization of Thin Film and Single Crystal Perovskites for Photovoltaic applications** *Dec 2022-Jan 2023*
  *Supervisor:***Dr. Pankaj Yadav**
  Assistant Professor, Pandit Deendayal Energy University, Gandhinagar
- **Studies of Structural, Microstructural, Dielectric and Ferroelectric Properties of Lead-free $Ba_{0.85}Sr_{0.15}TiO_3$ solid solution with doping of ZnO.** *May 2022-July 2022*
  *Supervisor:***Dr. Kanhaiya Lal Yadav**
  Professor, Indian Institute of Technology, Roorkee, India

TECHNICAL SKILLS

- **Synthesis and Device fabrication skills (hands-on):** Growth of 2D materials, Perovskites, Single Crystals, Thermal evaporation, Chemical Vapour Deposition, Sputtering, Spin coating, Dip Coating, Chemical Bath Deposition, Spray pyrolysis.
- **Characterization techniques:** X-Ray Analysis (Rietveld Refinement), Raman spectra, Photoluminescence, FESEM, Current-voltage measurement, Electrochemical and Complex Impedance Spectroscopy, Thermal Characterizations,
- **Apparatus proficiency (hands-on):** XRD by Rigaku Smart Lab, Raman Spectrometer, Hokoi LCR meter, P-E Loop Tracer by Radiant Ferroelctric, Four Probe system, Solar Simulator, Biologic SP-300, Differents Types of Microwave Furnace, Glove Box.
- **Software and Programming Languages:** MS Office, Python, Machine Learning, windows, Linux, High-Performance Computing (HPC), LaTex(Overleaf), EC-Lab, SCAPS software, DRT Tools, Origin Software, EIS Analyzer, Full Proof, Gromacs,

AWARDS/ACHIEVEMENT AND SCHOLARSHIPS

- Gate Scholarship by MOE India for Mtech in IIT Jodhpur
- Joint CSIR - UGC NET December 2022 - JUNE 2023, JRF and NET Qualified
- Graduate Aptitude Test in Engineering (GATE) 2023, 2022, 2021 Qualified

- Joint Admission Test For Masters (JAM) IIT - JAM 2021 Qualified
- Selected for Summer Research internship at IIT Roorkee in 2022
- 1^{st} Prize in Secondary School Education with Highest marks in Mathematics
- Awarded UP Government State Scholarship from Class 6^{th} to Class 12^{th}.

WORKSHOPS

- INUP i2i,**"11th User Awareness Workshop on Fabrication & Characterization Facility for Nanotechnology"**, held at IIT Delhi (7 to 8 December, 2023)
- INUP i2i, 2023 **"Online Familiarization Workshop on Quantum Materials and Nano Device"**, organized by the Centre for Nanotechnology, IIT Guwahati (6 to 8 December, 2023)
- National webinar on **"Li-ion Batteries and Beyond - A Perspective for Future Energy Storage and Needs"** Organized by Department of Ceramic Engineering, NIT Rourkela (23 to 25 June, 2022)
- National webinar on **"Intellectual Property Rights: A Fuel for Building and Sustaining Brands"** organized by School of Management, NIT Rourkela (21 to 25 March, 2022)

RELEVANT COURSEWORK AND HANDS-ON LABORATORIES

- **Advance Compulsory Courses:** Electrodynamics, Mathematical Physics, Analog and Digital Electronics, Thermodynamics, and Statistical Mechanics, Quantum Mechanics, Condensed Matter Physics, Atomic and Molecular Physics, Classical Mechanics, Introduction to Quantum Information, Introduction to Quantum Computing, Introduction to Quantum Technology,
- **Advance Special Elective Courses:** Introduction to Material Characterization, Advanced X-Ray Structure Analysis, Crystal Symmetry, and Crystal Physics, Magnetism - Principles and Applications, Computational Materials Science
- **Advance Laboratories:** Computational Methods in Physics, Thin Film and Low-Temperature Physics Laboratory, Modern and Condensed Matter Physics Laboratory, Electrical Circuits and Network Skills, Quantum Optics, and Photonics Laboratory

POSITIONS OF RESPONSIBILITY

- **Initiator and Core Member** of "quantum Computing Innovators Group" at IIT Jodhpur
- **Class Committee Member (CCM)** of IDRP Department at IIT Jodhpur during the academic year 2023-24
- **Class Representative (CR)** of M.Tech. Department of IIT Jodhpur during 2023-24

DECLARATION

I hereby declare that all the facts given above are true and correct to the best of my knowledge.

Date: 20.01.2024