

Dr. Rinku Kumar

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Educational Qualifications

Degree/ Board	Year	Institution/ University	Division
PhD (Physics)	2024	Indian Institute of Technology, Roorkee	First
M.Sc (Physics)	2015	Chaudhary Charan Singh University, Meerut	First
B.Sc (PCM)	2013	Chaudhary Charan Singh University Meerut	First

Awards / Scholarships / Academic Achievements

- Qualified **Joint Entrance Screening Test (JEST)-2014.**
- Qualified **Joint Admission Test (JAM)-2015.**
- Qualified **National Eligibility Test (CSIR NET JRF)-2017.**
- Qualified **Bhabha Atomic Research Centre Test (BARC)-2017.**
- Qualified **Graduate Aptitude Test of Engineering (GATE)-2018.**
- Received **Best Poster Award (Frist Position)** form the organizers of the **National Workshop on Material Design and Processing (May 08-10, 2023).**

Experimental Skills (Expertise in Data Fitting and Analysis):

- 1: Superconducting Quantum Interference Device and Vibrating Sample Magnetometer (SQUID VSM)** for probing the magnetic properties as a function of magnetic field (0-8T) and temperature (5-900K).
- 2: X-Ray diffraction (XRD)** to investigate the crystallography and lattice instability of the material.
- 3: High Resolution X-ray Diffraction (HRXRD)** to study the in-plane or out-of-plane lattice parameters, strain state (tensile or compressive), strain disorder, mosaic defects, lateral correlation length, reciprocal space mapping and epitaxial nature of the thin films.
- 4: X-ray Reflectivity (XRR)** to calculate the material density, depth profile, interface nature and thickness of the thin films.
- 5: X-ray Photoelectron Spectroscopy** to calculate the charge state, charge transfer, chemical shift and binding energy of the ions using lab source and synchrotron source based facility.
- 6: Field Emission Scanning Electron Microscopy (FE-SEM)** to characterize the morphology, particle shape and size, growth of the structures etc. of the materials in the form of bulk and thin films.
- 7: Low Temperature at High Magnetic Field Dielectric Measurements** to characterize the ferroelectric, dielectric, relaxor ferroelectric, magneto-dielectric, multiferroic nature of the material under the application of temperature (5-300K) and applied magnetic field (0-8T).

I am very familiar and confident to operate and collect the data using these techniques, independently. I have used all the techniques and the results are included with thorough analysis in my research work.

Research Interest:

My research interests lie at the intersection of Experimental Condensed Matter Physics, with a specialized focus on Thin Films and Multilayers of Complex Oxide Materials, Magnetism, Nanomaterials, and Energy Storage Devices. This multifaceted research agenda reflects a commitment to advancing our understanding of fundamental physical phenomena while exploring innovative applications in the realm of materials science.

Teaching Interest:

Electromagnetism, Mathematical Physics, Thermal and Statistical Physics, Quantum Mechanics, Wave and Optics.

Publications

- **Rinku Kumar**, Priyanshu Kumar, Saurav Gupta, Gaourav Paliwal, Manoj Kumar, Milan Singh, “**A Review on Advancements in Nanomaterial Synthesis, Characterization, and Application: Towards Sustainable and Innovative Solutions**” Brazilian Journal of Physics, 54 (2024), 137.
- Akash Raj, Ashwani Kumar, **Rinku Kumar**, Ravi Kumar, and Ramesh Chandra. "**Toward enhancing the thermoelectric performance of PLD-grown single and bilayer Bi₂Te₃ and Sb₂Te₃ thin films.**" Journal of Materials Science: Materials in Electronics 35 (7) (2024): 1.
- **Rinku Kumar**, Balasubramanian Padmanabhan, Mohd. Anas, Ankita Singh, Ramesh Chandra, V.K.Malik, “**Griffiths Phase, Re-Entrant Spin-Glass Behaviour and Schottky Anomaly in Anti-Site Disordered Double Perovskite Pr₂MnNiO₆.**” Physica Scripta 98, no.10 (2023):105931
- Divya Meena, **Rinku Kumar**, Meena, Saurav Gupta, Deepak Gupta, Milan Singh “**Energy storage in the 21st century: A comprehensive review on factors enhancing the next-generation supercapacitor mechanisms.**” Journal of Energy Storage, 72 (2023), 109323.
- Mohd Anas; Sarita Rajput; Ankita Singh; **Rinku Kumar**; T. Maitra, Vivek K. Malik, **Spin reorientation, negative magnetization and magnetocaloric effect in Nd_{0.5}Dy_{0.5}CrO₃**, Journal of Magnetism and Magnetic Materials, 566 (2023), 170231.
- Jitender Kaur, Atul Khanna, **Rinku Kumar**, Ramesh Chandra “**Growth and characterization of Cu₂O and CuO thin films**”, Journal of Material Science: Materials in Electronics, 33(1) (2022): 16154.
- Ashwani Kumar, Shekhar Tyagi, **Rinku Kumar**, Siddharth Sharma, Meenakshi Sharma, Ravikant Adalati, Yogesh Kumar, and Ramesh Chandra. "**Catalyst-free grown carbonaceous MoS₂ nanoworm electrodes for symmetrical supercapacitors.**" Materials Letters, (2022), 132576.
- Ankita Singh, Balasubramanian Padmanabhan, Mohd Anas, **Rinku Kumar**, P. D. Babu, C. M. N. Kumar, Wojciech Tabis, and V. K. Malik. "**Magnetocaloric and heat capacity studies on NdFe_{0.5}Mn_{0.5}O₃.**" Journal of Applied Physics 129 (5) (2021): 053902.
- Puneet Kaur, Atul Khanna, Jatinder Kaur, **Rinku Kumar**, and Ramesh Chandra. "**Rare earth doped CaWO₄ and CaMoO₄ thin films for white light emission.**" Journal of Vacuum Science & Technology B, Nanotechnology and Microelectronics: Materials, Processing, Measurement, and Phenomena 39 (1) (2021): 012205.
- M. Anas, Padmanabhan Balasubramanian, K. Vikram, Ankita Singh, C. M. N. Kumar, Andreas Hoser, Dariusz Rusinek, A.K. Sinha, V. Srihari, Ranjan K. Singh, **Rinku Kumar**, Mukul Gupta, T. Maitra, V. K., Malik“**Complex interplay of magnetic ordering and spin-lattice coupling in orthochromite Nd_{0.5}Dy_{0.5}CrO₃.**”, arXive,(2021).

Book Chapter

- **Rinku Kumar**, Radhika Chauhan, Milan Singh, Deepak Gupta, Novel Approach in Nanomaterial Synthesis for Nanoelectronics Devices, Nanoelectronics Devices: Design, Materials, and Applications Part II (2023), Bentham Science Publisher, pp.322-354.

Patent

Design Patent: Smart Recycler Compost Machine, **2024**, 372372-001.

Talk and Courses

- Completed two week online two week interdisciplinary Refresher Course on “**ADVANCED RESEARCH METHODOLOGY**” from 26 April to 09 May, 2024 and obtained Grade A⁺.
- An oral presentation has been given on the topic of “**PNMO as a supercapacitor**” in the “**Conference on Innovations in Materials Science & Workshop on Characterization Techniques (I-MAT 24)**” from April 24, 2024 to 27 April 2024 in Institute Instrumentation Centre, Indian Institute of Technology Roorkee, India.
- Completed a 4week Faculty Induction/Orientation Programme for “**Faculty in Universities/ Colleges/ Institutes of Higher Education**” from 27 March to 23 April, 2024 and obtained Grade A⁺.
- Participated in “**NEP 2020 Orientation & Sensitization Programme**” under Malaviya Mission Teacher Training Programme (MM-TTP), of university Grants Commission (UGC) organized by Centre for Professional Development in Higher Education (UGC-MMTTC), University of Delhi from 1st February 2024 – 9th February 2024.
- A research talk has been given on the topic of “**Materials for Energy Storage Devices**” on five days FDP cum Workshop on- “**Frontiers in Multidisciplinary Research**” from August 16, 2023 to August 22, 2023 in Galgotias University, Greater Noida.

International/ National Conferences/Workshops

- Poster presented on “**Strain Driven Magnetic Properties in Epitaxial Layers of Site-Ordered Double Perovskite Pr₂MnNiO₆**” in **National Workshop on Material Design and Processing**, jointly organized by **School of Physical Sciences, Jawaharlal Nehru University (JNU), New Delhi & Indian Association of Physics Teachers (IAPT) RC-1 (Delhi & Haryana)** in JNU from 8–10 May, 2023.
- Poster presented on “**Investigation of Magnetic Ordering and Magneto-Caloric Effect in Pr₂MnNiO₆**” in **Materials Research Society (MRS) Fall Meeting 2021, USA** from 6–8 December, 2021.
- I have participated in E-International Symposium on “**Synthesis and Characterization of Smart Materials and Their Potential Applications (ISSCSMPA-2020)**” held at University School of Basic and Applied Sciences Guru Govind Singh Indraprastha University, New Delhi during 14-17 June, 2020.
- Poster presented on “**Study of Magneto caloric Effect on NdFe_{0.5}Mn_{0.5}O₃**” in **64th DAE Solid State Physics Symposium** held at Indian Institute of Technology Jodhpur, India from 18-22 December, 2019.
- Poster presented on “**Structural and Magnetic studies of Pr₂NiMnO₆**” in **International Conference on Condensed Matter & Applied Physics (ICC-2019)** held at Government Engineering College, Bikaner, India during October 14-15, 2019.
- I have attended conference on “**2nd Annual Meeting on Physics of Strongly Correlated Electron Systems**” held at Department of Physics, Indian Institute of Technology, Delhi, during March 6-8, 2019.
- I have participated in the “**International Meeting on Energy Storage Devices (IMESD-2018)**” held at Department of Physics, Indian Institute of Technology, Roorkee during December 10-12, 2018.
- I have attended workshop on “**Thin Film Solar Cells**”, held at Department of Chemistry, Indian Institute of Technology Roorkee, during April 16-17, 2018.

Membership of Professional Bodies

- A member of **American Physical Society (APS)**.
- A member of **Materials Research Society (MRS)**.

Skills

- **Computational skills**

Operating system: Windows, Programming skills: Data analysis package like Origin, Application and utilization of packages like MS-Office and Xpert Highscore, Python.

- **Language:** Hindi, English

Administrative Experience

- I had served as Deputy General Secretary, Hostel Affairs (PG) in IIT Roorkee for the session of 2020-2021.
- I had served as a member of Bhawan and Maintenance Monitoring Committee (BMMC) in IIT Roorkee for the session of 2019-2020.

Extra Curriculars

- ❖ Member of organizing committee for the lecture titled Women Achievers in re-independent India by Prof. Rama Jayasundar, Professor and Head, Department of NMR & MRI, AIIMS, organized by the Department of Physics, Maitreyi College in collaboration with Indraprastha Vigyan Bharati on the occasion of "NATIONAL SCIENCE DAY" on February 29, 2024.
- ❖ I had worked as a coordinator in Thomso (Cultural Fest) and Cognizance (Technical Fest) held in IIT Roorkee in 2018-2019.
- ❖ I had worked as the Mess Council Member (MCM) of Cautley Bhawan, IIT Roorkee for the session 2018-2019.
- ❖ I had served as a core team member on a workshop "Thin Film Solar Cells", held at Department of Chemistry, Indian Institute of Technology Roorkee, during April 16-17, 2018.
- ❖ I was a Core Team Member in the "International Meeting on Energy Storage Devices (IMESD)-2018" held at Department of Physics, IIT Roorkee, during Dec 8-10, 2018.

References

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Declaration

I hereby declare that the information provided above is true to the best of my knowledge.

Date-09/07/2024



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