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Received PhD in Physics from Kurukshetra University, Kurukshetra in 2014.
Joined as assistant professor in Department of Physics, Guru Jambheshwar University of Science and Technology, Hisar in 2016.

Core area of research

Condensed Matter Physics

Simulation and modelling of advanced materials for energy applications using density functional theory-based software (WIEN2k, SIESTA, Quantum Espresso, VASP & Quantum ATK), and AFORS-HET, SCAPS and MATLAB software.

Research Interest: CIGS Solar Cell, Perovskite Solar Cell, Nanomaterials, Topological Insulators, Thermoelectric Materials and 2D Materials

Project completed/ongoing

UGC project Rs. 10 lacs Completed

ISRO project Rs. 60 lacs ongoing

PhD Completed/ongoing

06 completed

04 ongoing

List of Publications

In SCI Journals:

1. Munish Kumar, Tanuj Kumar, Ratnesh K. Pandey, **Ramesh Kumar** et al., “*Synthesis of noble metal nanostructures by ion beam irradiation and their characterization*”, Nuclear Inst. and Methods in Physics Research, B, 554, 165437 (2024)
<https://doi.org/10.1016/j.nimb.2024.165437>. (IF 1.4, Elsevier)

2. Ritu, Priyanka, **Ramesh Kumar**, Vinod Kumar, and Fakir Chand, “*Theoretical simulation of mixed organic–inorganic perovskite solar cell using SCAPS-1D simulator*”, *Journal of Photochemistry & Photobiology, A: Chemistry*, 455, 115763 (2024) <https://doi.org/10.1016/j.jphotochem.2024.115763>. (IF 4.1, Elsevier)
3. Priyanka, Ritu, **Ramesh Kumar**, Vinod Kumar and Fakir Chand, “*Tailoring the Electronic and Optical Properties of ReS₂ Monolayer Using Strain Engineering*”, *Micro and Nanostructures*, 192, 207873 (2024). (IF 2.7, Elsevier).
4. Priyanka, Ritu, **Ramesh Kumar**, Vinod Kumar and Fakir Chand, “*First principle calculations to explore the electronic, mechanical and optical properties of 2D NiX₂ (X = O, S, Se) monolayers*”, *Physica B*, 686, 416066 (2024). (IF 2.8, Elsevier).
5. Ritu, Priyanka, **Ramesh Kumar**, Vinod Kumar, and Fakir Chand, “*Performance analysis of ecofriendly Ge based perovskite solar cell using computational approach*”, *Materials Letter*, 361(17), 136145 (2024) DOI: 10.1016/j.matlet.2024.136145. (IF 2.7, Elsevier)
6. Ritu, Priyanka, **Ramesh Kumar**, Vinod Kumar, and Fakir Chand, “*Enhancement in MAPbI_{3-x}Cl_x -based perovskite solar cell performance using numerical simulation*”, *Modern Physics Letter B*, 0245207 (2024) DOI: 10.1142/S0217984924502075. (IF 1.8, World Scientific)
7. Priyanka, Suman Choudhary, Ritu, **Ramesh Kumar**, Vinod Kumar and Fakir Chand, “*Detailed investigations on stability and optoelectronic characteristics of the 1T-PdS₂ monolayer*”, *Physica Scripta*, 99, 025945 (2024). (IF 2.7, IOP)
8. Anisha, **Ramesh Kumar**, Sunita Srivastava and Kumar Tankeshwar, “*Thermoelectric performance of 1T-ZrS₂ bilayer using stacking engineering*”, *Physica Scripta* (2024). (IF 2.6, IOP)
9. Ritu, Gagandeep, **Ramesh Kumar** and Fakir Chand, “*Optimization of mixed cation organic–inorganic lead halide perovskite solar cell performance*”, *International Journal of Modern Physics B* (2024). (IF 1.7, World Scientific)
10. Ritu, Priyanka, Vinod Kumar, **Ramesh Kumar** and Fakir Chand, “*A theoretical comparison of MAPbI₃, FAPbI₃ and (FAPbI₃)_{1-x}MAPb (Br_{3-y}Cl_y)_x based solar cells*”, *Journal of Optics* (2023) <https://doi.org/10.1007/s12596-023-01474-6>. (IF 1.8, Springer)
11. Rajesh Kumar, Jitender Kumar, **Ramesh Kumar**, Akshay Kumar, Aditya Sharma, S. O. Won, K. H. Chae, Mukhtiyar Singh, and Ankush Vij, “*Monoclinic to cubic structural*

- transformation, local electronic structure, and luminescence properties of Eu-doped HfO₂”, *Applied Physics A* **129**, 712 (2023). (IF 2.7, Springer)
12. Ritu, Gagandeep, **Ramesh Kumar** and Fakir Chand, “Numerical simulation of a mixed-halide perovskite solar cell using doping gradient”, *Journal of Computational Electronics* **22**, 1-9 (2023). (IF 2.1, Springer)
 13. Priyanka, **Ramesh Kumar**, and Fakir Chand, “Tuning of electronic and optical properties of PtS₂ monolayer using stacking engineering”, *Phy. Status Solidi B* **260**, 2300132 (2023). (IF 1.6, Wiley)
 14. Rajesh Kumar, Sangeeta, Ramesh Kumar, **Ramesh K Bibiyan** and Mukhtiyar Singh, An ab-initio study of induced half metallic ferromagnetism in Hf–Nb alloy oxides, *Eur. Phys. J. Plus* **138**, 561 (2023). (IF 3.758, Springer).
 15. Anisha, **Ramesh Kumar**, Sunita Srivastava and Tankeshwar Kumar, “Thermoelectric properties of PtX₂ (X = Se, Te) monolayers,” *Indian J. Phys.* (2023). (IF 1.778, Springer)
 16. Ritu, Gagandeep, **Ramesh Kumar** and Fakir Chand, “Performance Enhancement in MA_{0.7}FA_{0.3}PbI₃ based Perovskite Solar Cell by Gradient Doping,” *Optik* **274**, 170558 (2023). (IF 2.84, Elsevier)
 17. Sanjeev, Mukhtiyar Singh, **Ramesh Kumar**, Sunita Srivastava and Tankeshwar Kumar, “Non-trivial topological crossover in functionalized AlBi monolayer,” *Chem. Phys. Lett.* **816**, 140388 (2023). (IF 2.719, Elsevier)
 18. Sanjeev, Mukhtiyar Singh, **Ramesh Kumar**, Sunita Srivastava and Tankeshwar Kumar, “Topological nature of large bulk band gap materials Sr₃Bi₂ and Ca₃Bi₂”, *Physica Scripta* **98**, 035813 (2023). (IF 3.081, IOP)
 19. Anisha, **Ramesh Kumar**, Sunita Srivastava and Tankeshwar Kumar, “Optimizing 1T-NiS₂ Monolayer Thermoelectric Performance via Valley Engineering,” *Materials Today Communications* **34**, 105169 (2023). (IF 3.662, Elsevier)
 20. Anisha, Mukhtiyar Singh, **Ramesh Kumar**, Sunita Srivastava and Tankeshwar Kumar, “Tuning of Thermoelectric performance of CrSe₂ material using dimension engineering” *J. Phys. Chem. Solid.* **172**, 111083 (2023). (IF 4.383, Elsevier)
 21. Rajesh Kumar, **Ramesh Kumar**, Mukhtiyar Singh, Deshraj Meena and Ankush Vij, “Carrier Concentration Mediated Enhancement in Thermoelectric Performance of Various Polymorphs of Hafnium Oxide: A Plausible Material for High Temperature

- Thermoelectric Energy Harvesting Application*”, **J. Phys. D: Appl. Phys.** **55**, 495302 (2022). (IF 3.409, IOP)
22. Rajesh Kumar, **Ramesh Kumar**, Ankush Vij, and Mukhtiyar Singh, “A first-principle study of electronic, thermoelectric, and optical properties of sulfur doped c-HfO₂”, **Physica Scripta** **97**, 075813 (2022). (IF 3.081, IOP)
 23. Sangeeta, **Ramesh Kumar**, and Mukhtiyar Singh, “Realizing high thermoelectric performance in p-type RbZn₄P₃ Zintl compound: a first-principles investigation”, **J Mater Sci.** **57**, 10691 (2022). (IF 4.682, Springer)
 24. Ramesh Kumar, **Ramesh K. Bibiyan**, and Mukhtiyar Singh, “Pressure-induced topological phase transition in XMR material YbAs: a first-principles study”, **Eur. Phys. J. Plus** **137**, 633 (2022). (IF 3.758, Springer)
 25. Sanjeev, Mukhtiyar Singh, **Ramesh Kumar**, Sunita Srivastava and Tankeshwar Kumar, “Ab-initio study of topological phase tuning in half-heusler YPdBi compound” **Physica B** **640**, 414056 (2022). (IF 2.988, Elsevier)
 26. Gagandeep, Mukhtiyar Singh, **Ramesh Kumar**, Vinamrita Singh, and Sunita Srivastava “Theoretical study of highly efficient CH₃NH₃SnI₃ based perovskite solar cell with CuInS₂ quantum dot”, **Semicond. Sci. Technol.** **37**, 025010 (2022). (IF 2.048, IOP)
 27. Sanjeev, Mukhtiyar Singh, **Ramesh Kumar**, Sunita Srivastava and Tankeshwar Kumar, “Structural, electronic and topological properties of NaCaBi and KBaBi compounds” **J. Phys. Chem. Solid.** **161**, 110416 (2022). (IF 4.383, Elsevier)
 28. Gagandeep, Mukhtiyar Singh, **Ramesh Kumar**, and Vinamrita Singh, “Investigation of CH₃NH₃PbI₃ and CH₃NH₃SnI₃ based perovskite solar cells with CuInSe₂ nanocrystals”, **Optik** **246**, 167839 (2021). (IF 2.84, Elsevier)
 29. Munish Kumar, Tanuj Deswal, Ratnesh Pandey, Sachin Pathak, Vandana, and **Ramesh Kumar**, “Roughening and Sputtering Kinetics of Pt Thin Films at different Angles of Ion Irradiation,” **Materials Letters** **303**, 130474 (2021). (IF 3.574, Elsevier)
 30. Munish Kumar, Ratnesh Pandey, Sachin Pathak, Vandana, S. Ojha, Tanuj Kumar, and **Ramesh Kumar**, “Surface engineering of Pt thin films by low energy heavy ion irradiation.” **Applied Surface Science.** **540**, 148338 (2021). (IF 7.392, Elsevier)
 31. Gagandeep, Mukhtiyar Singh, **Ramesh Kumar**, and Vinamrita Singh, “Investigating the impact of layer properties on the performance of p-graphene/CH₃NH₃PbI₃/n-cSi solar cell

- using numerical modelling”, *Superlattices and Microstructures* **140**, 106468 (2020). (IF 3.22, Elsevier)
32. Gagandeep, Mukhtiyar Singh, **Ramesh Kumar**, and Vinamrita Singh, “Graphene as charge transport layers in lead free perovskite solar cell”, *Mater. Res. Express* **6**, 115611 (2019). (IF 2.025, IOP)
 33. Vinamrita Singh and **Ramesh Kumar**, “Fowler Nordheim Plot Analysis of Degradation in P₃HT:PCBM Thin Film MIM Devices,” *Macromolecular Research* **27**, 1045-1049 (2019). (IF 2.127, Springer)
 34. **Ramesh Kumar** and Fakir Chand, “Solutions to the N-dimensional radial Schrödinger equation for the potential $ar^2 + br - C/r$,” *Pramana.* **83**, 39-48 (2014). (IF 2.699, Springer)
 35. **Ramesh Kumar** and Fakir Chand, “Asymptotic Study to the N-Dimensional Radial Schrödinger Equation for the Quark-Antiquark System,” *Communications in Theoretical Physics* **59**, 528 (2013). (IF 2.877, IOP)
 36. **Ramesh Kumar** and Fakir Chand, “Energy Spectra of the Coulomb Perturbed Potential in N-Dimensional Hilbert Space,” *Chinese Physics Letters* **29**, 060306 (2012). (IF 2.293, IOP)
 37. **Ramesh Kumar** and Fakir Chand, “Series solutions to the N -dimensional radial Schrödinger equation for the quark–antiquark interaction potential,” *Physica Scripta* **85**, 055008 (2012). (IF 3.081, IOP)
 38. **Ramesh Kumar** and Fakir Chand, “Reply to Comment ‘Series solutions to the N-dimensional radial Schrödinger equation for the quark–antiquark interaction potential’,” *Physica Scripta* **86**, 027002 (2012). (IF 3.081, IOP).

Book Chapter:

1. Tanuj Kumar, Ratnesh K. Pandey, **Ramesh Kumar**, C.V. Sudkeep, S. Sreelakshmi, Sikha Awasthi, Vandana, and Rahul Sanghal, “Historical Perspective of Nanotechnology and Functionalized Nanomaterials”, In: Hussain, C.M., Ahamed, M.B. (eds) Functionalized

Nanomaterials Based Supercapacitor. *Materials Horizons: From Nature to Nanomaterials*. Springer, Singapore (2023). https://doi.org/10.1007/978-981-99-3021-0_1.

In Conference Proceedings

1. Ritu, Gagandeep, **Ramesh Kumar** and Fakir Chand, “Performance optimization of FASnI_3 based perovskite solar cell,” *AIP Conf. Proc.* **2995**, 020142 (2024).
2. Priyanka, **Ramesh Kumar** and Fakir Chand, “Stacking Impact on the Optical Properties of PdSe_2 Layers,” *AIP Conf. Proc.* **2995**, 020200 (2024).
3. Ritu, Gagandeep, **Ramesh Kumar** and Fakir Chand, “Optimization of $\text{ITO/SnO}_2/\text{FASnI}_3/\text{PCBM}/\text{Ag}$ based perovskite solar cell,” *Material Today: Proceeding* (<https://doi.org/10.1016/j.matpr.2023.05.690>) (2023).
4. Ritu, Gagandeep, **Ramesh Kumar** and Fakir Chand, “Performance optimization of FASnI_3 based perovskite solar cell,” *Material Today: Proceeding* (<https://doi.org/10.1016/j.matpr.2023.05.516>) (2023).
5. Priyanka, **Ramesh Kumar** and Fakir Chand, “Tuning of optical performance of CrS_2 monolayer using strain engineering,” *Materials Today: Proceedings*. (<https://doi.org/10.1016/j.matpr.2023.05.205>) (2023).
6. Anisha, Mukhtiyar Singh, **Ramesh Kumar** and Sunita Srivastava, “Thermoelectric response of 1T-ZrS_2 monolayer: Ab-initio study”, *Material Today: Proceeding* (<https://doi.org/10.1016/j.matpr.2023.03.246>) (2023).
7. Anisha, Mukhtiyar Singh, **Ramesh Kumar** and Sunita Srivastava, “Band gap engineering of 2H-MX_2 ($M = \text{Mo}$; $X = \text{S, Se, Te}$) monolayers using strain effect,” *Materials Today: Proceedings* **54**, 677-681 (2022).
8. Nimit Jain, Rajesh Kumar, **Ramesh Kumar** and Mukhtiyar Singh, “Enhancement of thermoelectric performance of ZrO_2 via Titanium doping”, *Material Today: Proceeding* **51**, 699 (2022).

9. Sanjeev, Mukhtiyar Singh, **Ramesh Kumar** and Sunita Srivastava, “*Structural, electronic and elastic properties of topological pyrite-type OsSe₂ semimetal*” ***Material Today: Proceeding* 46, 5823 (2021).**
10. Gagandeep, Mukhtiyar Singh, **Ramesh Kumar**, Vinamrita Singh, and Sunita Srivastava “*A theoretical comparison between CH₃NH₃PbI₃ and CH₃NH₃SnI₃ based solar cells*” ***AIP Conf. Proc.* 2265, 030609 (2020).**
11. Gagandeep, **Mukhtiyar Singh**, Ramesh Kumar, and Sonia Kumari “*Numerical Simulation of n-TiO₂/p-CIGS Solar Cell*” ***AIP Conf. Proc.* 2265, 030675 (2020).**
12. Vinamrita Singh and **Ramesh Kumar**, *Effect of degradation on the charge transport mechanism in P3HT:PCBM based MIM device,*” ***AIP Conference Proceedings.* 2115, 030532 (2019).**
13. Gagandeep, **Mukhtiyar Singh**, and Ramesh Kumar, “*Simulation of perovskite solar cell with graphene as hole transporting material,*” ***AIP Conference Proceedings.* 2115. 030548 (2019).**
14. Anushka Nagpal, Bhuvan Agrawal, **Ramesh Kumar**, Hardev S. Saini, Manish K. Kashyap, and Mukhtiyar Singh, “*Study of FeCrSn_{1-x}Gax Heusler alloys: Tuning Fermi level to attain half-metallic ferromagnetism*” ***AIP Conf. Proc.* 2093, 020019 (2019).**
15. Gagandeep, Mukhtiyar Singh, **Ramesh Kumar**, and Fakir Chand “*A theoretical modeling of the Cu(In, Ga)Se₂ solar cell.*” ***AIP Conf. Proc.* 2006, 020018 (2019).**
16. Anushka Nagpal, Bhuvan Agrawal, **Ramesh Kumar**, Hardev S. Saini, Manish K. Kashyap, and Mukhtiyar Singh, “*Effect of disorders on half-metallic ferromagnetism in Cr₂CoAl inverse Heusler alloy*” ***AIP Conf. Proc.* 2093, 020023 (2019).**
17. Gagandeep, **Mukhtiyar Singh**, Ramesh Kumar, and Fakir Chand “*A Theoretical Study of Perovskite Material for Solar Cell Application*” ***AIP Conf. Proc.* 2006, 030018 (2018).**