

ZEESHAN MUHAMMAD

Ph.D. Physics

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Education

- [Apr 2016 – Aug 2021] **PhD – Physics** University of Malakand, Pakistan
(Thesis title: **ORGANIC-INORGANIC HYBRID PEROVSKITE SOLAR CELL MATERIALS: DFT STUDIES**)
- [Oct 2010 – Nov 2013] **MS – Physics** University of the Punjab Lahore, Pakistan
(Thesis title: **SIMULATION OF HIGH SPEED ULTRAVIOLET GaN-BASED METAL-SEMICONDUCTOR-METAL PHOTODETECTOR**)
- [Nov 2007 – Jul 2010] **MSc – Physics** Hazara University Pakistan

Research & Teaching Experience

- [Sep2023 – Present] **Assistant Professor** (IPFP) Department of Physics, International Islamic University, Islamabad, Pakistan
- [Sep2021 – Present] **Affiliated Researcher** at Center for Computational and Material Sciences, University of Malakand, Pakistan
- [Sep 2020 – Aug 2021] **Lecturer** for BS Physics at Department of Physics Govt. Degree College Gulabad, Pakistan
- [Jan 2019 – Jun 2019] **International Research Scholar** at Computational Materials Physics Lab., Faculty of Physics, University of Vienna, Sensengasse 8/8, A-1090, Vienna, Austria
- [Apr 2016 – Mar 2018] **Research Assistant** at Center for Computational and Material Sciences, University of Malakand, Pakistan

Courses Taught at BS Level

- Classical Mechanics
- Thermal and Statistical Physics
- Solid State Physics
- Semiconductor Devices
- Digital Electronics
- Basic Electronics Lab.

Research Skills

- Synthesis, XRD, PL spectroscopy, Fabrication etc.
- VASP, Quantum Espresso, Wien2k
- Material Studio (structure & interface generation, molecular dynamics, CASTEP, adsorption locator, DMol3 etc..)
- VESTA, XCRYSDEN, CINEMAS (for visualization)
- Fortran, Python, Bash (for coding)

- Senteurus (& Silvaco) TCAD
- LaTeX (for article, report, and thesis writing)
- Xmgrace (for data plotting)
- GIMP (image editor for creating/editing scientific HD figures)

Research Interest

- Computational Modeling of Material
- Organic-inorganic hybrid perovskite for solar cell
- 2D materials for optoelectronic applications
- Excitons and polarons in materials
- Surfaces and Interfaces
- GW-BSE calculations
- Molecular dynamic simulations (LAMMPS, GROMACS, etc.)

Publications

7. Liaqat Ali, Syed Faizan Murshid, Aqsa Zubair, Salem Abdullah, Wiqar Hussain Shah, Arooj Rashid, **Zeeshan Muhammad**, *Suppression of Metallic Phase and Dielectric Loss Factor by Divalent Ni Doping in $Zn_{1-x}Ni_xO$ Nano-particles*, (under review in Journal of Alloys and Compounds)
6. Liaqat Ali, Wiqar Hussain Shah, Syed Faizan Murshid, **Zeeshan Muhammad** and Akhtar Ali, *Effect of Fe doping on the magnetic, optical band gap and dielectric loss factor of $LaMn_{1-x}Fe_xO_3$ Nano Particles*, (under review Front. Mater. - Colloidal Materials and Interfaces)
5. Liaqat Ali, Sayed Ali Khan, Weilong Chen, Zhou Kewen Jahangeer Ahmed, Muhammad Amin Padhiar, **Zeeshan Muhammad**, Wiqar Hussain Shah, Saad M. Alshehri, *Structure Development and Photoluminescence Properties of High-Purity Greenish-Yellow Emitting $LaGaO_3:Dy^{3+}$ Phosphors*, J. of Mol. Struct. (2024) <https://doi.org/10.1016/j.molstruc.2024.140439>
4. **Zeeshan Muhammad**, Arooj Rashid, *Exciton binding energies and polaron interplay in the optical excited state of organic-inorganic lead halide perovskites*, Mater. Adv., (2024) <https://doi.org/10.1039/D4MA00454J>
3. **Zeeshan Muhammad**, Peitao Liu, Rashid Ahmad, Saeid Jalali Asadabadi, Cesare Franchini, Iftikhar Ahmad *Revealing the Quasiparticle Electronic and Excitonic Nature in Cubic, Tetragonal and Hexagonal Phases of $FAPbI_3$* , AIP Adv., 12 (2), 025330 (2022) <https://doi.org/10.1063/5.0076738>
2. **Zeeshan Muhammad**, Peitao Liu, Rashid Ahmad, Saeid Jalali Asadabadi, Cesare Franchini, Iftikhar Ahmad *Tunable Relativistic Quasi-particle Electronic and Excitonic Behavior of the $FAPb(I_{1-x}Br_x)_3$ Alloy*, Phys. Chem. Chem. Phys., 22 (21), 11943-11955 (2020) <https://doi.org/10.1039/D0CP00496K>
1. **Zeeshan Muhammad**, Tariq Munir, and Shahzad Naseem *Electrical and Optical Transient Behavior of n-GaN MetalSemiconductor-Metal (MSM) Photodetector*, Energy Environ. Focus 2, 222-226 (2013) <https://doi.org/10.1166/eef.2013.1048>

Conferences & Workshops

- One Day Conference on International Year of Light IYL 2015, November 24, 2015, University of Malakand

- 4th National Workshop on Modeling and Simulation of Materials by Density Functional Theory, November 22-24, 2016, PINSTECH, Islamabad
- 1st International Conference on Modeling and Simulation of Emerging Materials (Oral Presentation), July 02-04, 2018, Department of Physics, Abbottabad University of Science & Technology
- SFB ViCoM Workshop April 25th -26th 2019, University of Vienna, Faculty of Physics, 1090 Wien, Austria
- Two days National Conference on Computational Material Science (Oral Presentation), March 11-12th, 2021, Institute of Physics, Gomal University Dera Ismail Khan

Scholarships

- International Research Scholar at Computational Materials Physics Lab., Faculty of Physics, University of Vienna, Sensengasse 8/8, A-1090, Vienna, Austria

Projects

- HEC-NRPU Project No. 20-3959/NRPU/R & D/HEC2014/234, Efficient materials for solar cells and thermoelectric devices (Completed)
- Ab initio studies of phthalocyanine based perovskite materials for stable and efficient solar cells (Submitted to Pakistan Academy of Sciences for approval).

References

1. Professor Dr. Iftikhar Ahmad
 Chairperson,
 Professor of Physics,
 University of Malakand, Chakdara Dir (L),
 Pakistan
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2. Professor Dr. Cesare Franchini
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 Computational Materials Physics,
 Kolingasse 14-16/03.65, 1090 Vienna (Austria)
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3. Professor Shaista Shahzada
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 International Islamic University Islamabad,
 Pakistan
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