Eesha Sanjay Andharia

Phone: +91-9054823647 | eesha.andharia.blog@gmail.com | esandhar@uark.edu

ACADEMIC QUALIFICATION

- Ph.D., Materials Science & Engineering – University of Arkansas
  - August 2019 – August 2024
  - Dissertation: Computational Alchemy: Pioneering Spintronic, Thermoelectric, and Optoelectronic Materials Design through First-principles Calculations and Machine Learning
  - GPA: 3.50/4
- Master of Science in Microelectronics & Photonics – University of Arkansas
  - August 2016 – December 2018
  - Thesis: Quasi-Particle Bandstructure and Excitonic Effects in One-Dimensional Atomic Chains
  - GPA: 3.26/4
- Bachelor of Technology (B.Tech) in Nanotechnology – SRM University, Chennai, India
  - June 2010 – May 2014
  - Final Year Project: Magnetic Exchange Bias in Low Dimensional Systems
  - GPA: 7.9/10

SKILLS

Solid State Physics, Nanomaterials, Materials Science, Density Functional Theory Simulations (Codes: VASP, Quantum Espresso, BerkeleyGW, Phonopy, Alamode, Wien2k), 2D van der Waals materials (simulation and mechanical exfoliation), Simulating Phonons and Excitons, Hands-on experience with Ball-milling, Jet-milling, Sintering, Wet-chemical synthesis, Hydrothermal synthesis, Sol-gel technique, Analysis of SEM, TEM, AFM, XRD, UV-VIS spectroscopy and Electron-Spin Resonance spectroscopy data, Python for Data Science, IP Analysis, Proposal writing, Research commercialization coursework.

RESEARCH EXPERIENCE

- Postdoctoral Researcher, Niranjan Group, Dept. of Physics
  - September 2024 – Present
  - Indian Institute of Technology Hyderabad (IIT Hyderabad), Hyderabad, India
  - Supervisor: Dr. Manish Niranjan
  - Research focus: First-principles investigation of 2D van der Waals materials and heterostructures

- Assistant Professor, Dept. of Mechatronics, Parul Institute of Technology, Parul University
  - May 2024 – August 2024
  - Vadodara, Gujarat, India
  - Courses: Digital Electronics Laboratory, MEMS & Nanotechnology.
- Research Assistant, Barraza-Lopez Group, Dept. of Physics – University of Arkansas
  - Summer 2019
  - Project: Topological Crystalline Insulators
  - Analytical techniques: tight-binding model and k·p approximation; MATLAB and Mathematica for bandstructure simulations.
- Research Assistant, Barraza-Lopez Group, Dept. of Physics – University of Arkansas
  - January 2017 – August 2017
  - Project: Theoretical investigation of indirect excitons in van der Waals heterostructures and 2D nanomaterials
  - DFT using Quantum Espresso; GW-BSE calculations using BerkeleyGW; supercell and Moiré pattern construction using Xcrysden and VESTA.
- Research Assistant, Churchill Group, Dept. of Physics – University of Arkansas
  - August 2016 – December 2016
  - Project: Experimental study of indirect excitons in vdW heterostructures and 2D nanomaterials
  - Built XY-stage and transfer setup for stacking vdW monolayers.
- Junior Research Fellow, Low Temperature Physics Laboratory – IIT Madras, Chennai, India
  - July 2015 – March 2016
  - Project: Magnetic and structural property correlation in light-electron-doped colossal magneto-resistive manganite perovskites
  - XRD simulation via Rietveld analysis; magnetic entropy via Maxwell thermodynamic equations.
- Graduate Trainee, Centre for Automotive Energy and Materials – ARCI, Chennai, India
  - July 2014 – April 2015
  - Project: In-house synthesis of Strontium Hexaferrite permanent magnets
  - Ball-milling, jet-milling, sintering; XRD, SEM, TEM, Mossbauer spectroscopy.

ACADEMIC PROJECTS

- Exchange Bias Interfaces in Low Dimensional Systems
  - December 2013 – March 2014 | IISER Kolkata, India

- Wet-chemical synthesis of FM/FiM/AFM nanoparticles; ESR spectroscopy for magnetic exchange bias analysis.

- Titania Nanotubes and Application in Wastewater Treatment
  - December 2012 – January 2013 | CSMCRI, Gujarat, India
  - Hydrothermal synthesis of TiO_2 nanotubes; UV-VIS spectroscopy for bandgap analysis.

TEACHING EXPERIENCE

- Teaching Assistant – University of Arkansas (August 2019 – May 2023)
  - College Physics I & II, University Physics I & II; conducting labs, office hours, setting exams and grading for first-year Engineering and Bio-med undergraduates.

JOURNAL PUBLICATIONS – LEAD AUTHOR

• **Andharia E.** et al. 'Effect of Strain Profiling on Anisotropic Opto-Electronic Properties of As_2X_3 (X=S,Te) Monolayers from First Principles.' Front. Mater., 11 Jan 2024, Vol. 10. https://doi.org/10.3389/fmats.2023.1325194

• **Andharia E.** et al. 'Self-consistent Phonon Calculations and Quartic Anharmonic Lattice Thermal Conductivity in 2D InS Monolayer.' AIP Advances 14, 015223 (2024). https://doi.org/10.1063/5.0179609

• **Andharia E.**, Alqurashi H., Hamad B. 'Lattice Dynamics, Mechanical Properties, Electronic Structure and Magnetic Properties of Equiatomic Quaternary Heusler Alloys CrTiCoZ (Z=Al,Si).' Materials, 2022, 15, 3128.

• **Andharia E.**, Kaloni T.P., Salamo G.J., Yu S.-Q. 'Exfoliation energy, quasiparticle band structure, and excitonic properties of selenium and tellurium atomic chains.' Phys. Rev. B, 98, 035420 (2018).

JOURNAL PUBLICATIONS – CO-AUTHOR

• Badmus M.T., **Andharia E.S.** et al. 'Electronic and magnetic properties of alloyed $Ti_{1-x}Y_xSe_2$ systems.' Comp. Condensed Matter, e01209 (2026).

• Alqurashi H., **Andharia E.** et al. 'Mechanical, magnetic and thermoelectric properties of Zr_2VX (X=Al,Ga,In) full Heusler alloys.' Physica B: Condensed Matter, 417866 (2025).

• Alqurashi H., **Andharia E.** et al. 'Electronic, magnetic, and optical properties of ferrimagnet Heusler alloys Zr_2VX.' Physica B, 682, 415883 (2024).

• Hzzazi A., Alqurashi H., **Andharia E.** et al. 'CoMRhSi (M=Cr,Mn) quaternary Heusler alloys: structural, dynamical, electronic, magnetic and thermoelectric properties.' Crystals, 14(1), 33 (2023).

• Alsayegh S., Alqurashi H., **Andharia E.** et al. 'First-principles investigations of CrTiRhAl quaternary Heusler alloy.' J. Magn. Magn. Mater., 568, 170421 (2023).

• Dhal L., **Andharia E.** et al. 'Normal and inverse magnetocaloric effect in colossal magnetoresistive electron-doped manganites.' J. Magn. Magn. Mater., 474, 215-220 (2019).

CONFERENCE PUBLICATIONS

- APS March Meeting 2023 – 'Quartic Anharmonic Lattice Thermal Conductivity in 2D InS Monolayer: Self-consistent Phonon Calculations.'
- APS March Meeting 2018 – 'Quasi-particle Band Gap and Excitonic Effects in 1D Selenium and Tellurium Nano-wires.'
- 24th International Workshop on Rare-Earth and Future Permanent Magnets (REPM'16), 2016 – 'High Coercivity Strontium Hexaferrite Permanent Magnets.'
- ICMAGAMA 2015 – 'Structure, Mossbauer and Magnetic Studies of Mn-Substituted Sr-Hexaferrite Hard Magnet Prepared via Solid State Route.'
- ICMAGAMA 2015 – 'Electron Spin Resonance Evidence of Exchange Anisotropy in Nano-composites of Antiferromagnetic 2D CuO Nanoflakes and Ferrimagnetic Nanoparticles.'
- IUMRS-ICA 2013 – 'Synthesis of MgO Coated Titanium Dioxide Nanoparticles and its Application in Organic Dye Sensitized Solar Cells.'

AWARDS & FUNDING

- Attended the 4th Annual BerkeleyGW Workshop (2017), Lawrence Berkeley National Laboratory – excited state properties in 2D semiconductors.
- Funded by NSF Grant #1610126.
- Selected for 11th International HPC Summer School 2020 (PRACE, XSEDE, R-CCS, SciNet HPC Consortium).

PROFESSIONAL MEMBERSHIPS

- International Society for Optics and Photonics (SPIE)
- Optical Society of America (OSA)
- American Physical Society (APS)

LEADERSHIP

- Secretary, 'Laserbacks' RSO – University of Arkansas (August 2019 – December 2020)
- Volunteer, MAD – Making a Difference NGO for Child Welfare (August 2015 – November 2015)
- President, Materials Research Society (MRS) – UARK Chapter (2020–2021)

REFERENCES

- Dr. Ranjit Thapa – Professor, Dept. of Physics, SRM University-AP | ranjit.phy@bmail.com
- Dr. Thaneshwor Kaloni – Staff Scientist, Canadian Nuclear Laboratories | tpkaloni@uark.edu
- Dr. Atindra Shukla – Associate Professor & Director (I/C), SSCSSN, Dharmsinh Desai University | atindra.sscssn@ddu.ac.in
- Dr. R. Nirmala – Assistant Professor, Dept. of Physics, IIT Madras | nirmala@iitm.ac.in | +44-22574888
- Dr. Bothina Hamad Manasreh – Associate Professor, Dept. of Physics, University of Arkansas | bothinah@uark.edu | 479-575-3365