UZMA HIRA

(+92) 334-474-97978
Uzma.sps@pu.edu.pk
https://www.linkedin.com/in/uzma-hira-68713a154/
http://pu.edu.pk/faculty/description/2324/Dr-Uzma-Hira.html

School of Physical Sciences
University of the Punjab
Lahore, Pakistan, 54590

PROFESSIONAL EXPERIENCE

Assistant Professor | University of the Punjab, Lahore, Pakista **Sep. 2020-present**

- Teaching "Descriptive Chemistry of Some Metals" and "Inorganic Material Chemistry" courses to Ph.D. and "Industrial Aspects of Inorganic Chemistry" and "Industrial Aspects of Nanomaterials" courses to M.Phil.

Visiting Professor | Paris-Saclay University, Institute of Molecular Chemistry and materials (ICMMO), Paris, France, **15-30 April 2022**

- Research work was carried out on high-temperature perovskite oxide materials.
- Teaching 20 credit hours of "Inorganic Material Chemistry" course to 2nd and 5th year engineering students.

Scientific writing| https://nowalchemy.com/*:* **May 2020-Aug. 2020**

- Scientific writing was carried out with *Now Alchemy, Nutraceuticals, USA on the project: "*To explore the mechanism of all the ingredients in supplements from a health point of view"

Research and Scientific writing | *Primary Research Group Inc. USA* **Dec. 2019-April 2020**

- Scientific writing *was carried out with Primary Research Group Inc. USA on the project: "*Energy Storage Technologies: Government Funding, Research, Scholarly & Commercial Developments"

Maternity/Paternity Leave **July 2019-Nov. 2019**

Teaching/Research Assistant | Lahore University of Management Sciences (LUMS) Sep. 2013-Jun. 2019

- Synthesized inorganic oxide materials by using solid-state and various solution-based methods, characterized these materials by using X-ray diffraction and various spectroscopic methods and investigated electrical, magnetic, and high-temperature thermoelectric properties of these materials.

EDUCATION

Ph.D. | Lahore University of Management Sciences (LUMS), Pakistan **Sep. 2014- Jun. 2019**

Project: *Synthesis and Properties of High-Temperature Thermoelectric Perovskite Oxides for Efficient Energy Harvesting*

- Synthesized new transition metal oxide materials by using solid state chemistry, sol-gel and co-precipitation methods
- Characterization of materials using X-ray diffraction (XRD), synchrotron X-ray diffraction, powder neutron diffraction, and various spectroscopic techniques to investigate electrical, magnetic, magnetoresistance, and thermoelectric properties of oxide materials
- Rietveld analyses of diffraction patterns through GSAS EXPGUI, JANA2006 and Fullprof Suit software programs

M.Phil |National Centre of Excellence in Physical Chemistry (NCEPC), University of Peshawar, Pakistan (Distinction) **Dec. 2010- Jan. 2014**

Project: *Synthesis of Uniform Fine Particles of ZrO_2 and Electrodeposition of Cu-ZrO_2 Nanocomposite Coating on Steel Surface*

- Synthesis of ZrO_2 particles through co-precipitation and reflux methods
- Electrodeposition of Cu-ZrO_2 nanocomposite coating on the steel surface and investigated microhardness, wear, and corrosion properties of these composites

M.Sc |Institute of Chemical Sciences, University of Peshawar, Pakistan **Sep. 2007- Nov. 2010**

B.Sc |University of the Punjab, Lahore Pakistan **Sep. 2005- Aug. 2007**

ACHIEVEMENTS

Research Projects Awarded

- "Clean cooking and electricity through E-Stove in Pakistan" funded through British Council (£ 6300); **2021:** **https://www.britishcouncil.org/education/he-science/academics-researchers/researcher-links-climate-challenge-workshops-focus-glasgow-university-lums**
- "Combined waste oxidation and CO_2 reduction for tackling climate change in Pakistan" funded through British Council (£ 7000); **2021**
- "$CoNb_{2-x}W_xO_6$ ($0.0 \leq x \leq 0.2$) Columbite Materials as a Functional Photocatalysts" funded through University of the Punjab, Lahore Pakistan (200000 PKR); **2022**
- "Thermoelectric High Entropy Oxides for Harvesting Industrial Waste Heat into Electricity" (200000 PKR); **2023**

Awards & Honors

- Listed in the world scientist and university ranking **2023 and 2025** by AD scientific index
- TechWomen 2024, award funded by US Department of State
- Invitation of **Visiting Professor** by Paris-Saclay University, Institute of Molecular Chemistry and Materials (ICMMO), Paris, France, **2022**
- Higher Education Commission (HEC), Pakistan Approved Ph.D. supervisor in the discipline of Physical Sciences
- Best poster prize winner (Certificate + 500 GBP) and also featured in commonwealth chemistry website in the category of "Energy and Materials" in 2nd Commonwealth Chemistry Posters (Building Networks to Address the Goals); **2021:** **https://commonwealthchemistry.org/harvesting-waste-heat-to-power-pakistans-homes/**
- 2 months fellowship awarded by European union commission project within 2020 Horizon at Alba Synchrotron Light Source, Spain in **2018**
- 6 months fellowship awarded by HEC during Ph.D. to work in Technical University of Denmark (DTU) in **2017**
- Nomination for Lindau Nobel Laureate meeting **2017** by Higher Education Commission Pakistan (HEC) and Pakistan Institute of Engineering and Applied sciences (PIEAS)
- Scottish government Ph.D. research travel grant **2016** for Pakistani females through British Council
- 2nd position in 4rth spring research poster exhibition competition held at ICS, UOP; **2013**
- Fully Funded Ph.D. Scholarship; **2014**
- Two years merit scholarship for M.Phil. study: **2012**
- District-level scholarships throughout in academics

PUBLICATIONS

22. Ali, S.S.; Zsahra, S.A.; **Hira, U.**; Javed, K.; Haider, U.; Zulqarnain, M.; Alhashmialameer, D.; Mahmoud, S. F., Mixed phase Ce^{+3} substituted ZnFe2-xCexO4, structural, optical, I V, magnetic and dielectric features, *Phys. B* **2025**, *700*, 416953.
21. **Hira, U.;** M. Husnain, A. K. Butta, M. Zulqurnain, S. S. Ali, F. Sher, Structural, magnetic, optical and dielectric characteristics of $Ba_{2-z}Y_zMnTeO_6$ (Y = La, Bi & Sr; z = 0 & 0.1) double perovskite oxides, *J. Magn. Magn. Mater.* **2025**, *614*, 172736.
20. A. K. Butta, **Hira, U.;** M. Zulqurnain, S. S. Ali, A. Kabir, F. Sher, Interlinked structural and optical tuning, magnetic, electrical and dielectric properties of $Sr_{2-x}Bi_xCoNbO_6$ ($0 \leq x \leq 1.0$) double perovskite oxides, *Ceram. Int.* **2025**.
19. Zulqarnain, M.; Ali, S.S.; Yaqub, M.A.; Hira, U.; Khan, M.I.; Aldulmani, S.A.; Ikram, R.; Qadir, r., Synthesis, structural and opto-electrical/electronic trends of Zn/Co substituted spinel ferrites for energy conservation and supercapacitor application, Mater. Chem. Phys. 2024, 322, 129567.

18. Hameed, H.; Ullah, M. A.; **Hira, U.;** Abid. M.; Usman, Bakkour, Y.; Rizwan, M., Evaluating hydrogen storage potential of $NaNbO_{3-x}H_x$: DFT-based approach, Chin. J. Phys. **2024**, *89*, 1725-1738.

17. **Hira, U.;** Bos, J-W; Ali, S. S.; Sher, F., Substantially low thermal conductivity and high thermoelectric figure-of-merit in Bi-doped Sr_2CoRuO_6 double perovskites. *J. Alloys Comp.* **2024**, *984*, 173981.

16. Ayub, A.; Ullah, H.M.N.; Rizwan, M.; Zafar, A. A.; Usman, Z.; **Hira, U.,** Impact of Zn alloying on structural, mechanical anisotropy, acoustic speeds, electronic, optical, and photocatalytic response of $KMgF_3$ perovskite *Mater. Sci. Semocond. Process.* **2024**, *173*, 108049.

15. Zulqarnain, M.; Ali, S. S.; C. H. Wan.; **Hira, U.;** Hussain, A.; Farid, G., Structural modifications, low temperature magnetic behavior and optoelectronic trends in A-site substituted spinel ferrites. *Mater. Sci. Eng. B* **2023**, 298, 116829.

14. Latif, S.; Saeed, M.; Imran, M.; Javaid, A.; **Hira, U.;** Mitu, L., Synthesis, Characterization, and Photocatalytic Activity of Mixed-Ligand Cerium(III) and Bismuth(III) Complexes. *J. Chem.* **2022**, 12.

13. Latif, S.; Rehman, R.; Imran, M.; **Hira, U.;** Iqbal, S.; Akram, M.; Mitu, L.; Alsantali, R. I.; Al-thagafi, Z. T., Use of Green Chemistry for Amputation of Chromium Ions from Wastewater by Alkali-Treated Composts of Fruit Peels in Economical Way. *J. Chem.* **2022**, 14.

12. **Hira, U.;** Ali, S. S.; Latif, S.; Pryds, N.; Sher, F., Improved High-Temperature Thermoelectric Properties of Dual-Doped $Ca_3Co_4O_9$. *ACS Omega* **2022**, 7, 8, 6579-6590.

11. Maraj, M.; Fatima, A.; Ali, S. S.; **Hira, U.;** Rizwan, M.; Usman, Z.; Sun, W.; Shaukat, A., Taming the optical response via (Ca:Zr) co-doped impurity in c-BaTiO3: A comprehensive computational insight. *Mater. Sci. Semocond. Process.* **2022**, *144*, 106573.

10. **Hira, U.;** Bos, J-W; Missyul, A.; Fauth, F.; Pryds, N; Sher, F., $Ba_{2-x}Bi_xCoRuO_6$ ($0.0 \le x \le 0.6$) Hexagonal Double Perovskite-Type Oxides as Promising *p*-Type Thermoelectric Materials. *Inorg. Chem.* **2021**, 60, 23, 17824–17836.

9. Zulqarnain, M.; Ali, S. S.; **Hira, U.;** Feng, J. F.; Khan, M. I.; Rizwan, M.; Javed, K.; Farid, G.; hasan, M. S.; Superparamagnetic contributions, optical band gap tuning and dominant interfacial resistive mechanisms in ferrites nanostructures. *J. Alloys Comp.* **2022**, *894*, 162421.

8. **Hira, U.;** Grivel, J. C.; Christensen, D. V.; Pryds, N.; Sher, F., Electrical, magnetic and magnetotransport properties of Na and Mo doped $Ca_3Co_4O_9$ materials. *RSC adv.* **2019**, *9*, 31274.

7. **Hira, U.;** Pryds, N.; Falak, S., Thermoelectric properties of dual doped $Bi_2Sr_2Co_2O_y$-based ceramics. *J. Electron. Mater.* **2019**, *48*, 4616-4626.

6. **Hira, U.;** Falak, S., Structural, Magnetic and High-temperature thermoelectric properties of $La_{0.4}Bi_{0.4}Ca_{0.2}Mn_{1-x}Co_xO_3$ ($0 \le x \le 0.3$) Perovskites. *J. Magn. Magn. Mater.* **2018**, *452*, 64-72.

5. **Hira, U.;** Han, L.; Norrman, K.; Cristensen, D. V.; Pryds, N.; Sher, F, High-temperature thermoelectric properties of Na- and W-doped $Ca_3Co_4O_9$ system. *RSC adv.* **2018**, *8*, 12211.

4. Akhtar, K.; **Hira, U.;** Khalid, H.; Zubair, N., Uniform fine particles of ZrO_2 as reinforcement filler in the electrodeposited Cu-ZrO_2 nanocomposite coating on steel substrate. *J. Alloys Compd.* **2019**, *772,* 15-24.

3. Khan, A. A.; **Hira, U.;** Iqbal, Z.; Usman, M.; Falak, S., Structural, magnetic and magnetocaloric properties of $CoFe_{2-x}Mo_xO_4$ ($0.0 \le x \le 0.3$) ferrites. *Ceram. Int.* **2017,** *43*, 7088-7093.

2. Khan, A. A.; **Hira, U.;** Falak, S., Large relative cooling power of Bi-doped $La_{0.8-x}Bi_xSr_{0.08}(Ca_{0.55}Ba_{0.45})_{0.12}MnO_3$ (x= 0.0, 0.1 and 0.3) perovskites: Magnetic and magnetocaloric properties. *Ceram. Int.* **2017**, *43*, 7351-7357.

1. Akhtar, K.; Haq, U. I.; **Hira, U.,** Synthesis and characterization of uniform zirconia particles by homogeneous precipitation method. *High Temp. Mater. Proc.* **2013**, *32*, 391-395.

Book Chapters:

8. **Hira, U.;** Ahmad, M. N., M.; Book Chapter: **Optical Fiber Sensors**, Book Title: **Optical Fibers - Recent Advances, New Perspectives and Application, IntechOpen 2024**.

7. **Hira, U.;** Arshad, A.; Sattar, A., Book Chapter: **Robust Domain Boundary Engineering of Ferroic and Multiferroic Materials**, Book Title: Ferroic Materials-Based Technologies. **Scrivener Publishing Wiley 2024,** 257-277.

6. **Hira, U.;** Uswa, A.; Ashraf, A., Book Chapter: Elastocaloric Effect in Ferroelectric Materials, Book Title: Ferroic Materials-Based Technologies. **Scrivener Publishing Wiley 2024,** 125-156.

5. **Hira, U.;** Safdar, A., Book Chapter: Effective Flexomagnetic/Flexoelectric Sensitivity in

Ferroics/Nanosized Ferroic Materials, Book Title: Ferroic Materials-Based Technologies. **Scrivener Publishing Wiley 2024,** 157-171.

4. **Hira, U.;** Bhutta, A. K.; Safdar, A.; Book Chapter: Other New Thermoelectric Compounds, Book Title: Thermoelectric Polymer: Properties and Applications. **Materials Research Foundations 2024**, 162, 118-143.
3. **Hira, U.;** Kamal, A.; Tahir, J., Book Chapter: Industrial carbon dioxide capture and utilization, Book Title: Green Sustainable Process for Chemical and Environmental Engineering and Science Methods for Producing Smart Packaging. **Elsevier 2023**, 231-272.
2. **Hira, U.;** Husnain, M., Book Chapter: An Approach of Smart Packaging for Home Meals, Book Title: Green Sustainable Process for Chemical and Environmental Engineering and Science Methods for Producing Smart Packaging. **Elsevier 2023**, 143-170.
1. **Hira, U.;** Husnain, M., Book Chapter: Organometallic Halides-Based Perovskite Solar Cells, Book Title: Perovskite based Materials for Energy Storage Devices. **Materials Research Foundations 2023**, 151, 33-66.

STUDENTS SUPERVISION

- 10 M.Phil students thesis supervised
- 5 M.Phil and 3 Ph.D research students (Under supervision)

SKILLS

Instruments Handling -

- Fourier transform infrared spectroscopy (FTIR)
- X-ray diffractrometer (XRD)
- Scanning electron microscope (SEM)
- Oven, Thermostat, Metal (Cutting, Cleaning and
- Polishing) instruments,
- Microhadrness tester (Schimadzu, HMV-2)
- Gamry instrument (REF 3000-17134
- Potentiostat/Galvanostat/ZRA)
- Ball-on-disc tribometer
- Vibrating sample magnetometer (VSM)
- ULVAC-RIKO ZEM3
- NETZSCH LFA-457 laser flash system

Conferences/Seminars/Workshops attended

2022 Summer School on "Basics and Applications of the Rietveld Method and Pair Distribution Function Analysis" organized by Max Planck Institute for Solid State Research, Germany and National Center for Physics, Islamabad.

2021 Oral presentation in the "19th International & 31st National Conference on Emerging Trends in Chemistry-2ndCCUMT-2021".

2021 Webinar on "Taking chemistry to market".

2021 Poster presentation in "2nd Commonwealth Chemistry Posters (Building Networks to Address the Goals)".

2021 Poster presentation in the "Virtual Conference on Thermoelectrics".

2021 Online workshop on "Liverpool Inorganic Crystal Structure Prediction Tools".

2021 British Council Researcher Links Climate Challenge Workshop on "Delivering a Sustainable Energy Transition for Pakistan".

2021 Chemistry World Webinars on "Nature and mental wellbeing-building a better chemistry culture" organized by Royal Society of Chemistry.

2021 "International Conference on Research Advancements in Chemistry (ICRA-C 2021)", Department of Chemistry, School of Natural Sciences (SNS), NUST, Islamabad, Pakistan.

2021 "Online Training Workshop" organized by Punjab Higher Education Commission (PHEC) on

Teaching Methodologies.

2018 "37th annual international conference on thermoelectrics (ICT-2018) and 16th annual European
2017 conference on thermoelectrics", Caen, France.
2016 "Ph.D. annual poster symposium", Technical University of Denmark (DTU).
2013 "3rd Conference on Frontiers of Nanoscience and Nanotechnology", PINSTECH, Pakistan.
2013 "One day Chemistry Conference on Chemical trends", LUMS.
"International Conference on Physical and Environmental Chemistry" (ICEPC-**2013**), NCEPC, UOP.
"4rth Spring Research Poster Exhibition" ICS, UOP.
2011 "NAYS Science Forum", UOP, Pakistan
2011 "One day Research Poster Symposium in Physical Chemistry", UOP.
2011 "National Symposium on Kinetics and Catalysis" NCEPC, UOP.
2011 "Contribution of NCE in Physical Chemistry in National Development", NCEPC, UOP.

REFERENCES

- Associate Professor Dr. Falak Sher | Head of Department of Chemistry and Chemical Engineering, Lahore University of Management Science; Email: fsher@lums.edu.pk
- Professor Dr. Nini Pryds | Section Head | DTU Energy
  Technical University of Denmark (DTU); Email: nipr@dtu.dk

LANGUAGES

- English – Proficient
- Urdu - Native