Dr. Wiqar Hussain Shah

Associate Professor | 218-Nano-Thermoelectrics and Nano-Magnetism labs., Department of Physics, International Islamic University, H-10, Islamabad, Pakistan | +92-314-4997144, +92-51-9019730, | Fax: +92-51-9252860-4| wiqar.hussain@iiu.edu.pk, wiqarhussain@yahoo.com, orcid.org/0000-0001-5760-9798,
https://scholar.google.com/citatir.ons?view_op=list_works&hl=en&user=WQAMGtMAAAAJ

Book Published "Competing Interactions in Doped Manganites" by Wiqar Hussain Shah, ISBN 978-3-8465-1976-9, (2011), VDM Verlagsservicegesellschaft mbH, **Germany**, www.vdm-vsg.de.

EDUCATIONAL:

Ph.D. 2005: (Experimental Condensed Matter and Materials Physics)
Quaid-i-Azam University Islamabad, Pakistan

Ph.D. Thesis:
"Effects of Competing Interactions and Phase Separation in Rare-Earth Manganites"

M. Phil. 1999: (Experimental Condensed Matter and Materials Physics)
Quaid-i-Azam University Islamabad, Pakistan

M. Phil. Dissertation: "Effects of Dopants in Rare Earth Manganites"

EXPERIENCE:

Employment:

1. **Associate Professor**, Islamic International University, Islamabad, **Pakistan**, September, 2018- to present.
2. **Assistant Professor**, Islamic International University, Islamabad, **Pakistan**, September, 2013- September, 2018.
3. **Assistant Professor**, Department of Physics, King Faisal University, Hofuf, **Saudi Arabia**, February 02, 2010 to August, 2013.
4. **Postdoctoral Fellow:** Department of Chemistry, University of Waterloo, Waterloo, ON, **Canada**, March, 2008 - January, 2010.
5. **Visiting Research Faculty**: Department of Physics, Seton Hall University, South Orange, NJ, **USA**, November, 2007 - February, 2008.
6. **Postdoctoral Fellow:** Department of Materials Science & Engineering, University of Delaware, Newark, 19716, DE, **USA**, March, 2007 - February 2008.
7. **Assistant Professor**, Federal Urdu University, Islamabad, **Pakistan**, September, August, 2005- to February, 2007.

Adminstrative:

1. Chairman, Department of Physics, International Islamic University, Islamabad, December 06, 2018 to January, 2022.
2. Convener, Departmental Tenure Review Committee (DTRC), Department of Physics, International Islamic University, Islamabad, February, 2019 to present.
3. Memer, Board of study (BOF), Department of Physics, International Islamic University, Islamabad, September, 2018 to present.
4. Memer, Graudate research committee (GRC), Department of Physics, International Islamic University, Islamabad, September 2018 to present.
5. Member, Quality Assurence committee, Department of Physics, IIU, Islamabad.
6. Memer, Board of Study, Department of Physics, Faculty of Sciences, King Faisal University, Hofuf, Saudi Arabia, February, 2010 to August, 2013.
7. Memer, GRC, Department of Physics, Faculty of Sciences, King Faisal University, Hofuf, Saudi Arabia, February, 2010 to August, 2013.
8. Chairman Deparment of Physics, Urdu University Islamabad, January, 2006 to February, 2007.

DISTINCTIONS

(1) General Motors Canada, Postdoctoral Fellowship-2008-2010, **Canada**.
(2) HEC Postdoctoral Fellowship for **USA** 2007-08
(3) Productive Scientist of Pakistan award 2002 & 2004.
(4) the **Abdus Salam** ICAC Felloship for Postgraduate studies (2000-2004), **Italy**.
(5) HEC Merit Scholarship for Higher Studies 1997-98 (M.Phil.).
(6) Higher Education Commission (HEC) of Pakistan Approved Ph.D. supervisor.
(7) Membe: World Association for Scientific Research and Technical Innovation (WASRTI) www.wasrti.org.
(8) Reviewer of the Journal of " Alloys and Compounds" Elsevier Science.
(9) Reviewer of the Journal of " Materials Letter" Elsevier Science.
(10) Reviewer of the Journal of " Materials Chemistry".
(11) Reviewer of the Journal of " Nano-Paticle Research (NANO)".

Teaching and Research:

Courses to Ph.D./M.S.

1. PHY-724:Advanced Characterization Techniques for Nano-materials.
2. PHY-644: Synthesis and Characterization of Nano-Structural Materials.
3. PHY-652: Advanced Nano-Magnetism.
4. PHY-623-Nano-Materials and Applications.
5. PHY-643: Nano-Growth Structure.
6. PHY-612-Electrodynamcs.

Courses to B.S/ M.Sc.

7. PHY-414-412-Physics at Nano-scale

8. PHY-424-421-Nano-Materials and Applications
9. PHY-470-Optoelectronics, Materials and Devices.
10. PHY-412-Solid state Physics-I and II
11. PHY-326: Electromagnetic theory-I and II
12. PHY-214:Heat and Thermodynamics
13. PHY-412:Atomic and Molecular Physics
14. PHY-216: Electrcity and Magnetsim

Area of Research

- Nano-Materials for Thermoelectric and Photovoltaic Energy Conversion.
- Structural, electrical, thermal, magnetic and optical properties of nanao-materials
- Competing Interactions and Phase Separation in Rare-earth Manganites.
- Spintronics in Strongly Correlated Electronic system.
- Low dimensional system and Nano-scale magnetism.
- Transition metals oxides and orbital ordering.
- Spin dependent charge transport in magnetic nanostructures.
- Magnetism and Nano-Magnetic materials, Synthesis and Characterization.
- Diluted Magnetic Oxide Semi-conductor Nano-Materials ($Zn_{1-x}A_xO$ and $(In_{1-x}A_x)_2O_3$ (A=Fe, Ni, Co, etc.)).

- **Research Project Approved / completed:**

- "Effect of Ca Doping on the electrical and magnetic spin dynamics of La1-xCaxMnO3 Pervoskite manganite's Nano-particles" Ahmad Hussain (P.I), **Wiqar Hussain Shah** (Co-P.I), Higher Education Commission of Pakistan Research Grant of PKR 482000/ Project# 2344 (January, 2019).

- "A novel chemical synthesis of Mn_3O_4 Nano walled arrays nano-sheet and its stepwise conversion into birnessite MnO_2 through voltammetry cycling for incorporation of alkali cations", Dr. Nawishta Jabeen (PI) /Dr. **Wiqar Hussain Shah** (Co-PI), Higher Education Commission of Pakistan Research Grant of PKR 475000/- Project# 2340, (January, 2019).

- "Nano-Materials Engineering for Thermoelectric Power Generator" **Wiqar Shah (P.I),** King Abdulaziz City for Science & Technology, Riyadh, 1,872,000 SR (499,200 USD) (Submitted, September, 2012)

- "Diluted Magnetic oxide Semi-conductor Nano-Particles for Thermoelectric, Photothermoelectric and Gas sensor Applications" **Wiqar Shah (P.I),** King Abdul aziz City for Science & Technology, Riyadh, 455,000 SR (94,666 USD) (Approved, July, 2012)

- "Enhancement of Figure of Merit of Diluted Magnetic Oxide Semi-conductors Nano-particles for Thermoelectric Generators." **Wiqar Shah (P.I),** King Abdulaziz City for Science & Technology, Riyadh, 1,681,000 SR (448,266 USD) (Approved, December, 2011)

EEXPERIMENTAL EXPERTISE:

1. Synthesis and designing of Nano-structural materials (Solid State Reaction,Chemical Method, bulk, Thin Film by PVD, PLD, MOCVD, Inert gas condensation, etc).
2. X-Ray diffractometery (XRD) and energy dispersice x-rays spectroscopy (EDS).
3. Scan Electron Mircscopy (SEM) and Transmission Electron microscopy (TEM).
4. AC and DC resistivity and magnetoresistance (0.350 mK-700 K).
5. Thermoelectric and thermal conductivity (0.350 mK-700 K)
6. TGA and DSC analyzers for thermal properties of bulk, thin film and nano-materials.
7. Magnetometry (VSM) and Hall Effect.
8. AC and DC Susceptometry and Magnetometry (PPMS).
9. Four probe resisitivity techniques (1-500 K)

Experimental set-up Design and constructed:

- Designed and constructed of AC Suscepto-meter.
- Designed and construct of DC Solenoid magnet.
- Designed and construction of DC resistivity probe using the DC magnetic field of VSM.
- Designed and construct of Z-Meter (used for the measurements of thermoelectric and thermal conductivity, electric resistivity and specific heat).

Ph.D. Thesis Supervised (in-progress):

1. Liaqat Ali "Magnetic and Optical Characteristics of of $LaAl_{1-x}A_xO_3$ oxide Pervoskites" (20-10-2021-BASAR approved).

Ph.D. Thesis Supervised

1. "Effects of dopants on the Power Factor of Tellurium Telluride Chalcogenide Nano-system": Muhammad Waqas 39-FBAS/PHDPHY-F-14, September, 2022 (Completed).
2. "Effect of Dopants on thermoelectric properties of $Tl_{10-x}A_xTe_6$ Chalcogenide Materials": Muhammad Tufail 61-FBAS/PHDPHY-F-15, December, 2023 (Completed).
3. "Tunning of magnetic and Transport Properties of $La_{1-x}A_xMnO_3$ nano-system" Akhtar Ali, January 2024 (Completed).
4. Effects of dopants on the Power Factor of Tellurium Telluride Chalcogenide Nano-system": Sabir Khan, In progress, January 2024 (Completed).
5.

M.S. Thesis Supervision in progress:

1. "Effects of Sb Dopant on the Power Factor of $Tl_{10-x}Sb_xTe_6$ Nano-particles" In-progress Muhammad Aftab, September, 2019).

2. "Improving of Power Factor in Silver doped $Tl_{8.33}Sb_{1.67-x}Ag_xTe_6$ Nano-particles" M. Naseer Haider, In-progress (September, 2019).

M.S. Thesis Supervised:

1. Investigation of Bulk magnetoresistance crossover in in Fe doped $Zn_{1-x}Fe_xO$ Using Spectroscopic Techniques" Muhammad Waqas, February 2020.
2. "Effects of Sb doping on the Thermal and Electrical Properties of $Tl_{8.67}$ $Sn_{1.33-x}Sb_x$ Te_6 Nano-particles" Waheed Riaz, (November 18, 2019).
3. "Size effect on the magnetic properties of of $La_{0.70}Sr_{0.30}MnO_3$ Nanoparticles" Ziafat Ali Shah, (October, 28, 2019).
4. "Optimization of physical properties of $(Zn_{1-x}Co_x)O_2$ nano-structure system": Adil Muhammad, (June 19, 2019.
5. "Estimation of thermal band gap in $Tl_8Sb_{2-x}Pb_xTe_6$ Chalcogenide nano-particles" Nauman Khan, (March, 2019).
6. "Effects of Sn dopant on thermoelectric properties *of* $Tl_{8.67}$ $Sb_{1.33-x}Sn_xTe_6$ Nano-Particles", Rafaqat Ali Shah, (March, 2019).
7. "Particles size effects on the physical properties of $(Zn_{0.80}Mn_{0.20})O_2$ Nano-structure System": Abdur Rahim, (January, 2019).
8. "Investigation of Thermoelectric Properties of Pb Doped $Tl_{8.33}Sb_{1.67-x}Pb_xTe_6$ Compound" Noor Rehman, (January, 2019).
9. "Effects of Ca doping on the magnetic spin dynamics of $La_{1-x}A_xMnO_3$ nano-particles" Aman Khan, (December, 2018).
10. "Effects of Ni dopping on the physical properties of $(Zn_{1-x}Ni_x)O_2$ nano-structure system": Muhammad Fawad, (September, 2018).
11. "Effects of Mn dopping on the physical properties of $(Zn_{1-x}Mn_x)O_2$ nano-structure system": Ghani-ur Rahman, (September, 2018).
12. "Effects of Sn doping on the Seebeck Coefficient and Electrical Conductivity of Tin-Doped $Tl_9Sb_{1-x}Sn_xTe_6$ Nano-particles. Usman Ali Shah,(August, 2018).
13. "Effects of Pb dopping on thermal and transport properties of $Tl_{10-x}Sb_xTe_6$ nano-materials": Aqeel Khan, (June, 2017).
14. "Study of earthquick prediction through Radon gas", Zakir Ullah, (June, 2017).
15. "Optimization of power factor in Sn doped $Tl_{10-x}Sn_xTe_6$ nano-structural system": Taj Ud Din, (August, 2016).
16. "Enhancement of thermoelectric properties in Sb doped $Tl_{10-x}Sb_xTe_6$ nano-structural system": Sufaid Shah, (August, 2016).
17. "Study of Fe dopped induced effects on physical properties of CuO Nanostructures": Asghar Ali, March, 2015 Co-supervised.

M.Sc/B.S. research project Supervised:

75

Research grant/Project completed/continued:

1. "Effect of doping for the enhancement of power factor for the investigation of best thermoelectric nano-materials used for thermo-electric generator" (Rs. 14.42 million), **Wiqar Hussain Shah** (Principle investigator (P.I)) Project proposal submitted to HEC under "Technology Development Fund".
2. "Investigation of Transition Metal Doped ZnO Nano-Particles for Efficient Conversion of Waste Heat to Electricity", Akif Safeen (P.I), **Wiqar Hussain Shah** (Co. P.I), NRPU Project No 16971 (2021), HEC, Pakistan.
3. "Engineering the electronic and thermoelectric properties using MoX2 (X; S, Se, Te) and group-III nitrides: for energy applications" Altaf ur Rahman (P.I), **Wiqar Hussain Shah**, **(Co.P.I.)** funded by; HEC, under start-up research grant. Commencing date: May, 2019).
4. Effects of Ca doping on the electrical and magnetic spin dynamics of $La_{1-x}Ca_xMnO_3$ perovskite manganites nano-particles" Ahmad Hussain (P.I), **Wiqar Hussain Shah**, **(Co.P.I.)** funded by; HEC, under start-up research grant. Commencing date: January, 2019).
5. "A novel chemical synthesis of Mn_3O_4 nano-walled arrays nanosheet and its stepwise conversion into birnessite MnO_2 through voltammetric cycling for incorporation of alkali cations." Nawishta Jabeen (P.I), **Wiqar Hussain Shah**, **(Co.P.I.)** funded by; HEC, under start-up research grant. Commencing date: January, 2019).

Collaboration Established

1. College of Mechatronics and Control Engineering (CMCE-SZU), Shenzhen University, Shenzhen, China.
2. Holger Klienke group, Department of Chemistry, University of Waterloo, Waterloo, ON, Canada (Agreed for the student exchange under HEC program and for providing experimental facilities).
3. Dr. Abdulla Al-Jaffary group, Department of Physics, King Faisal University, Hofuf, Saudi Arabia (Agreed for for providing experimental facilities).
4. Dr. Maaz, and Dr. Shafqat group in PINSTECH, Islamabad (to help the student regarding their experimental needs).

Book Chapter:

1. Waqas Muhammad Khan, **Wiqar Hussain Shah** "Hybrid Nature Properties of $Tl_{10-x}A_xTe_6$ (A = Pb and Sn) used as Batteries in Chalcogenide System, Energy Storage Battery Systems - Fundamentals and Applications, Sajjad Haider, Adnan Haider, Mehdi Khodaei and Liang Chen, IntechOpen, DOI: 10.5772/intechopen.95390. Available from: https://www.intechopen.com/chapters/76473. (November 17th 2021)
2. Chapter title **"**Thermoelectric properties of Chalcogenide System" book title, "Electric Field" edited by Prof. Walter Gustavo Fano, ISBN 978-1-78984-519-8 (2020). http://mts.intechopen.com/articles/show/title/thermoelectric-properties-of-chalcogenide-system
3. Chapter title: "Materials Design and Optimization of Thermal Properties in Doped $Tl_{10-x}A_xTe_6$ Thermoelectric Chalcogenide nano-System", Book: Metal Chalcogenides," ISBN 978-1-78985-440-4.

4. Doped $Tl_{10}Te_6$ chalcogenide nano-materials for Thermoelectric applications (Book name "Thermoelectrics" ISBN 978-953-51-6058-8), 2019

PUBLICATIONS:

1. Zaffar Mehmood, **Wiqar Shah**, Waqas Khan, Ehtsham Azhar " On the Thermophysical Properties of Thallium Telluride and its application to a Rotating Disk Configuration" Submitted to Journal of the Brazilian Society of Mechanical Sciences and Engineering (submitted-BMSE) (2024).

2. Liaqat Ali, Wiqar Hussain Shah, Alam, Fakhar, Akhtar Ali, El-Bahy, Zeinhom, M. Hessien, Mahmoud "Alteration of Band Gap and Suppression of Metallic phase by Ba doping in La1-xBaxMnO3Manganite perovskites Nano-particles" Royal Society of Chemistry RA-ART-05-2024-003557 (2024).

3. Liaqat Ali, Wiqar Hussain Shah; Shayan Khan; Akhtar Ali; Mahmoud M. Hessien; Zeinhom M. El-Bahy, "Tuning of the Band Gap and Suppression of Metallic phase by Ca doping in La1-xCaxMnO3 Manganite Nano-particles" **MSB-D-24-00882,** Materials Science & Engineering B (2024).

4. Akhtar Ali, **Wiqar H Shah**, Sayed M Eldin, Zakir Ullah, Muhammad Rauf, Shaheryar Malik, Naveed Imran, "Narrowing of Band gap and decrease in a dielectric loss in doped $La_{1-x}Sr_xMnO_3$ manganite nanoparticles" Frontiers in Materials, (Submitted-2024).

5. Kashif Safeen, Danish Arif, Akif Safeen, Sayed M Eldin, **Wiqar H Shah** "ZnO/CuSe Composite-mediated Bandgap Modulation for Enhanced Photocatalytic Performance against Methyl Blue Dye" Scientific Reports 19580, **13**, (2023) (IF-4.997).).

6. **Wiqar H Shah**, Azeema Alam, Khadija Rashid, Hafsa Javeed, Akhtar Ali, Liaqat Ali, Akif Safeen "Tuning of the band gap and dielectric loss factor by Mn doping of $Zn_{1-x}Mn_xO$ nanoparticles", Scientific Reports 8646, **13**, (2023) (IF-4.997). https://doi.org/10.1038/s41598-023-35456-2

7. Kashif Safeen, Danish Arif, Akif Safeen, Sayed M Eldin, **Wiqar H Shah,** Akhtar Ali, Ghafar Ali, Fayaz Hussain, Muhammad Sohail, Naveed Imran and Atta Ullah Shah, "Tuning the optical and magnetic properties of ZnO by Co and Gd doping for photodegradation and spintronics applications" Water, 1470, **15**, (2023). https://doi.org/10.3390/w15081470, https://www.mdpi.com/2073-4441/15/8/1470/pdf (IF-3.530).

8. Liaqat Ali, Noor Zamin Khan, Muhammad Tahir Abbas, Nisar Muhammad, Saad m. Alshehri, **Wiqar H Shah**, Syed Ali Khan, "Synthesis and characterization of narrow band emmiting phosphors for plant growthwith display applications" Optik-International Journal for Light and Electron Optics, 170570, **274** (2023).

9. Liaqat Ali, **Wiqar H Shah**, Sayed M Eldin, Akhtar Ali, Abdullah Aljaafari, A Sedky, Javed Mazher, Naveed Imran, Muhammad Sohail, "Investigation of bulk magneto-resistance crossovers in Iron doped Zinc-oxide using spectroscopic techniques" Frontiers in Materials, 1112798 **10** (2023) doi: 10.3389/fmats.2023.1112798.

10. Akhtar Ali, **Wiqar H Shah**, Mian Akif Safeen, Liaqat Ali, Muhammad Tufail, Zakir Ullah, Kashif Safeen, Mohamed R. Ali, Muhammad Sohail, Naveed Imran "Effect of Ca Doping on Arbitrary Canting of Magnetic Exchange Interactions in La1-xCaxMnO3 Nano-particles" Frontiers in Materials, 1117793 **10** (2023), doi: 10.3389/fmats.2023.1117793.

11. Sabir Khan, **Wiqar H Shah**, M Tufail, Akhtar Ali, Sayed M Eldin, Naveed Imran, Muhammad Sohail, "Sb-doped $Tl_{8.67}Sn_{1.33-x}Sb_xTe_6$ nanoparticles improve power factor and electronic charge transport" Frontiers in Materials, 1108048 **10** (2023), doi: 10.3389/fmats.2023.1108048.

12. Akif Safeen, K Safeen, M. Shafgique, Y. Iqbal, n. Ahmed, M.A. Rauf, G. Asghar, Khaled Althubeiti, Sattam Al Otaibi, Ghafar Ali, **Wiqar H. Shah**, and Rajwali Khan " "The effect of Mn and Co–dual-doping on the structural, optical and magnetic properties of ZnO nano-structures" Royal Society of Chemistry Adv. **12**, 11923-11932 (2022).

13. Sabir Khan, **Wiqar Hussain Shah**, Muhammad Tufail, W.A. Syed, Waqas M Khan "Effect of Sn dopants on the power factor of $Tl_{8.67}Sb_{1.33-x}Sn_xTe_6$ nano-particles" Chalcogenide Letters, Vol. 19 (1), 45-54 (2022).

14. W. M. Khan, **W. H. Shah**, N. Khan, M. Tufail, S. Khan, W. A. Syed, "Effects on the Seebeck Co-Efficient and electrical properties of Tl_{10-x} ATe_6 (A= Pb & Sn) in Chalcogenide system" Journal of Ovonic Research, **17**(2), 201-208 (2021).

15. Shabeh ul Zahra, Nouman Rafiq, W. A. Syed, **W. H. Shah**, Zafar Iqbal " On Structural, Optical, and Electrical Properties of Chromium Oxide Cr_2O_3 Thin Film for Application" Protection of Metals and Physical Chemistry of Surfaces, **57(2)**, 321-328 (2021) http://link.springer.com/article/10.1134/S2070205121010238

16. Muhammad Tufail, Altaf Ur Rahman, Banat Gul Waseem Akram, Haseeb Ullah, Muhammad Waqas Iqbal, Shahid M. Ramay, **Wiqar Hussain Shah**, "Effect of Pb doping on electronic and thermoelectric properties of thallium antimony telluride ($Tl_{8.33}Sb_{1.67-x}Pb_xTe_6$) nano-compound: A combined experimental and theoretical investigations" Physica B **608,** 412789 (2021). https://doi.org/10.1016/j.physb.2020.412789

17. Naeem Ahmad, Abdul Majid, Saira Parveen, **Wiqar Hussain Shah**, Faryal Mughal, Suleman Khan, Imran Murtaza "Structural and uniaxial magnetic anisotropy of $Co_{1-x}Mg_x$(X=0.04-0.12) nanowires in Alumina templates" Journal of Superconductivity and Novel Magnetism, 809-815, **33**, (2020), https://doi.org/10.1007/s10948-019-05225-2

18. M. Waqas, Altaf ur Rahman, Tufail Muhammad, Muhammad Ibrar, Wiqar Hussain Shah, Waqar Adil Syed, Banat Gul, "Towards controlled thermolectric properties of Pb and Sb co-doped nanostructural Thallium Telluride for energy applications" Materials Research Express **7**, 105010 (2020). https://iopscience.iop.org/article/10.1088/2053-1591/abbb54.

19. Naeem Ahmad, Suleman Khan, Imran Murtaza, Muhammad Zahid Shafiq, Khalid Javed, **Wiqar Hussain Shah**, Affan Safeer, Abdul Majid "Dominance of shape anisotropy among magnetostatic interaction and magnetocrystalline anisotropy in electrodeposited $(FeCo)_{1-x}Cu_x$(X=0.1-0.5) Ternary Alloy Nanowires" Journal of Superconductivity and Novel Magnetism, 33 **(5)** (2020) DOI:10.1007/s10948-019-05394-0.

20. Adeela Ahmad, Waqar Adil Syed, Muhammad Asad Ghufran, Zafar Iqbal and **Wiqar H Shah**, "Green route synthesis of ZnO nanoparticles mediated by Melia azedarach for microbiological applications", Nano Express 1, 010035 (2020). https://doi.org/10.1088/2632-959X/ab8d11(2020).

21. Naeem Ahmad Abdul Majid Saira Parveen **Wiqar H Shah** Faryal Mughal Suleman Khan Imran Murtaza "Structural and Uniaxial Magnetic Anisotropy of $Co_{1-X}Mg_X$(X = 0.04–0.12) Nanowires in Alumina Templates", Journal of Superconductivity and Novel Magnetism **33** 809–815 (2020) https://doi.org/10.1007/s10948-019-05225-2

22. Hashmi, Gohar; Syed, Waqar; Hayat, Muhammad; **Shah, Wiqar** ; Shah, Nazar "$SrCl_2$ an Environment Friendly Alternate to $CdCl_2$ Treatment for CdTe thin films Solar Cell Application" Materials Research Express, **6** 106440 (2019) DOI: https://iopscience.iop.org/article/10.1088/2053-1591/ab414d.

23. Syed, Waqar; Ali, Ahsan; Rafiq, Nouman; **Shah, Wiqar**; Shah, Nazar; Yasir, Muhammad, "$BaCl_2$ an efficient replacement of $CdCl_2$ treatment step for thermally deposited CdTe thin film", Materials Research Express, **6** (8), 086438 (2019). DOI: https://doi.org/10.1088/2053-1591/ab214f.

24. M. Waqas, **W.H. Shah**, M.Tufail, Sabir Khan, W.A. Syed, "Enhancement of Power Factor by Sn doping in Tl_8Sb_{2-x} Sn_xTe_6 in the Nano-Chalcogenide System" Chalcogenide Letters, Vol. **16** (8), 395-403 (2019).

25. M. Waqas, **W.H. Shah**, Sabir Khan, W.A. Syed, M. Naeem, Akif Safeen "Increasing the power factor by Sb doped $Tl_{10-x}Sb_xPb_xTe_6$ in chalcogenide system" Chalcogenide Letters, Vol. **16** (7), 343-347 (2019).

26. Nawaz, Tariq; Syed, Waqar; Ahmad, Ishaq; **Shah, Wiqar** "Cu ion beam induced effects and phase study of Vanadium Oxide thin films" Materials Research Express, **6**, 075707 (2019), https://doi.org/10.1088/2053-1591/ab1702.

27. M. Tufail, **Wiqar H Shah,** Usman A Shah, Waqar A Syed, Waqas M. Khan Akif Safeen, Kashif Safeen "Effects of Sn doping on the Seebeck co-efficient and electrical conductivity of $Tl_9Sb_{1-x}Sn_xTe_6$ Nano-particles" Chalcogenide Letters, **16** (4), 175-184, (2019).

28. A. Safeen, W. H. Shah , R. Khan, A. Shakeel, Y. Iqbal, G. Asghar , R. Khan, G. Khan, K. Safeen, **W. H. Shah** "Measurement of plasma parameter for copper using laser induced breakdown spectroscopy" Digest Journal of Nanomaterials and Biostructures **14**, No. 1, 29-35 (2019).

29. Waqar H. Shah, Yousaf Iqbal Akif Safeen, Kashif Safeen, Gulzar Khan, **Wiqar H. Shah,** Ishaq Ahmed, Shakil Khan, Tingkai Zhao, and Khizar Ul-Haq, "Study of the structural and electrical properties of silicon ion irradiated zirconium nitride thin films" Modern Physics Letters B **32**(24), 29-35 (2018). https://doi.org/10.1142/S0217984918502810.

30. Nouman Rafiq, Waqar AA Syed, Aulia Rifada, M. Asad, Ijaz-ur-Rehman Shah, Ahsan Ali, **Wiqar Hussain Shah** "Structural, thermal and optical investigation of tin sulfide nanoparticles for next-generation photovoltaic applications" DOI: 10.1515/msp-2018-0042, Materials Science Poland, **36 (2)**, 270-275, (2018).

31. Waqas Khan, **Wiqar Hussain Shah**, Sufaid Shah, Sabir Khan, Waqar Adil Syed "Enhancement of thermoelectric properties in Sb doped $Tl_{10-x}Sb_xTe_6$ nano-structural system" Journal of Heat Transfer, **6**, 602 (2018).

32. Waqar Adil, Nouman Rafiqi, **Wiqar H Shah,** Sufaid Shah, Nisar Ali "Structural and optical investigation of cobalt doped cobalt doped $SnSb_2S_4$ thin film for photovoltaic applications" Chalcogenide Letters, **14**, 259 (2017).

33. **Wiqar H Shah**, Waqas M Khan, Taj-udin, M Tufail, Waqar Adil "Optimization of power factor in Sn doped $Tl_9Sb_{1-x}Sn_xTe_6$ thermoelctric chalcogenide nano-system" Chalcogenide Letters, **14**, 187 (2017).

34. **Wiqar H Shah**, Aqeel Khan, Waqas Khan, Waqar Adil Syed, "Effects of Pb doping on the Thermoelectric properties of $Tl_{8.67}Pb_xSb_{1.33-x}Te_6$ Materials" Chalcogenide Letters, **13**, 61-68 (2017).

35. Waqar A. Syed, Nouman Rafiq, Asad Ali, M. Saleem, **Wiqar Shah**, "Multi-layered AR Coatings of TiO_2/MgF_2 for Application in Optoelectronic Devices" Optik-international journal for light and electron optics, **136**, 564 (2017). http://dx.doi.org/10.1016/j.ijleo.2017.02.085.

36. **Wiqar H Shah**, Akif Safeen "Frequency Effects on ac Conductivity and Magnetoresistance in doped $La_{1-x}Ca_xMnO_3$ Manganites" J of Electronic Materials, **41**, 2243 (2012). doi: 10.1007/s11664-012-2092-8.

37. **Wiqar H Shah,** Kashif Safeen, G. Rehman, "Effects of Divalent Alkaline Earth Ions on the Magnetic and Transport Features of $La_{0.65}A_{0.35}Mn_{0.95}Fe_{0.05}O_3$ Compounds" Current Applied Physics, **12**, 742, (2012). doi: 10.1016/j.cap.2011.10.015.

38. **Wiqar H Shah**, "Dynamic Response in Fe doped $La_{0.65}Ca_{0.35}Mn_{1-x}Fe_xO_3$ Rare Earth Manganites" J. Materials Research, **26**, 2599, (2011). doi: 10.1557/jmr.2011.228.

39. **Wiqar H Shah,** A. Al Jaffari, "Cluster Co-existence and DC Field Effect on Re-entrant Spin Freezing behavior in Fe doped Rare Earth Manganites" Jpn. J. Appl. Phys. **50**, 053002, (2011). doi: 10.1143/JJAP.50.053002.

40. **Wiqar H Shah**, A. Mumtaz. "Frustrated Metastable Behavior of Magnetic and Transport Properties in Charge Ordered $La_{1-x}Ca_xMnO_{3+\delta}$. Manganites, J. Appl. Physics, **109**, 053707 (2011). doi:10.1063/1.3555621.

41. **Wiqar H Shah**, S.K. Hasanian "AC Susceptibility Studies in Fe doped $La_{0.65}Ca_{0.35}Mn_{1-x}Fe_xO_3$ Rare Earth Manganites", J. Appl. Physics, **108**, 113907 (2010). doi:10.1063/1.3517113.

42. M. Alper Sahiner, **Wiqar H Shah**, Marc Aranguren, Jeffrey Serfass, Joseph C. Woicik, "Local Crystal Structure Modifications in Pulsed Laser Deposited Colossal Magnetoresistive Oxide Thin Films" Materials Res. Soc. Symp. Proc. **1118**, K05-08, (2009).

43. Affia Aslam, **Wiqar Hussain Shah**, B. Ali, S.K. Hasanain, M.J. Akhtar, M. Nadeem, "Revival of Metastable Behavior in Phase separated $La_{1-x}Ca_xMnO_{3+\delta}$ (x~0.5)", Solid state Communication, **129**, 267 (2004). doi:10.1016/j.ssc.2003.10.004.

44. S.K. Hasanain, **Wiqar Hussain Shah,** Arif Mumtaz, M.J. Akhtar, M. Nadeem "Re-entrant Spin Freezing Behavior in Fe doped Rare Earth Manganites" J. Mag. & Mag. Mat. **271** 79 (2004). doi:10.1016/j.jmmm.2003.09.020.

45. **Wiqar Hussain Shah**, S.K. Hasanain "AC Conductivity in Polycrystalline $La_{1-x}Ca_xMnO_3$" J. Magnetism & Magnetic Materials, **246**, 199 (2002). doi:10.1016/S0304-8853(02)00054-9.

46. S.K. Hasanian, **Wiqar Hussain Shah**, M.J. Akhtar, M. Nadeem "Irreversible Electronic and Magnetic Transformations in CMR Compositions Close to Charge Ordering." Phys. Rev. B **65** 144442 (2002). DOI: 10.1103/PhysRevB.65.144442.

47. S.K.Hasanain, M. Nadeem, **Wiqar Hussain Shah**, M.J. Akhtar, M.M. Hasan "Effects of Fe Dopants on the Transport and Magnetic Behavior in $La_{0.65}Ca_{0.35}Mn_{1-y}Fe_yO_3$" J. Physics: Condensed Matter: **12**, 9007 (2000). doi:10.1088/0953-8984/12/42/307.

SYMPOSIUM, AND CONFERENCES PRSENTATIONS:

1. **Wiqar H Shah**, oral presentation "Designing of nano-materials for waste heat energy conversion through thermoelectric generator" International Conference on mechanical materials and manufacturing", August 18-20, 2023, Washington DC, **USA**.

2. **Wiqar H Shah**, oral presentation "Effects of dopants on the power factor and efficiency of nano-materials for thermoelectric generator" American Association for advance in Function Materials", August 10-12, 2023, University of California, Los Angeles Los Angeles, **USA**.

3. **Wiqar H Shah**, oral presentation "Enhancement of power factor of $Tl_{1-x}Sn_xTe_6$ nano-materials for energy conversion of thermoelectric generator" Advance Nano-Materials conference" July 26-28, 2023, University of Aveiro, Aveiro, **Portuga**l.

4. **Wiqar H Shah**, oral presentation "Designing and fabrication of magnetic nano-particles for used as magnetic carriers for drug delivery system" 13th International Conference on the Scientific and Magnetic Application of Magnetic Carriers", June 14-17, 2022, University College London, London, **UK**.

5. **Wiqar H Shah**, Oral presentation "Competing Interactions and Magnetization Dynamics in Doped Rare-Earth Manganites Nano-tructural System" Condensed Matter in the City, June 06-17, 2022, University College London, London, **UK**.

6. **Wiqar H Shah**, oral presentation "Designing and Fabrication of efficient nano-materials for thermoelectric generator" EuroSciCon, conference on Nano-tech and Nano-biotechnology, August 26-27, 2019, Melbourne, **Australia**.

7. **Wiqar H Shah**, Key-Note Speaker "Effects of Sn doping on power factor and efficient $Tl_{8-x}Sn_xTe_6$ nano-materials" First National Symposium on Physics, March, 27-29, 2019, Hazara University, Mansehra (KPK), **Pakistan**.

8. **Wiqar H Shah**, "Enhancement of thermoelectric property in Sb doped $Tl_{10-x}Sb_xTe_6$ nano-structural system-GICICRST1807062" ICRST (2018) IXth International Conference on Researches in Science & Technology, June, 29-30, 2018, Pattaya, **Thailand**.

9. **Wiqar H Shah,** "Spin freezing Behavior in Fe doped LaCaMnFeO3 manganite's" Magnetism 2015"30 – 31 March 2015, University of Leeds, Leeds, **UK**

10. **Wiqar H Shah,** "Competing Interactions in Doped Rare-earth Manganites Nano-Structural Materials" 3rd International Congress on Nanoscience & Nanotechnology (ICNT2015)" July 2-3, 2015, Istanbul, **Turkey**.

11. **Wiqar H Shah**, "Enhancement of Figure-of Merit of Diluted Oxide Magnetic Nan-materials for the Energy Conversion" Innovations in Strongly Correlated Electronic Systems: School and Workshop" August 06-17, 2012, the **Abdus Salam** ictp, Trieste**, ITALY**.

12. **Wiqar Hussain Shah** (**Invited talk**), "Enhancement of Magnetic and Transport Properties in Doped Rare-Earth Manganites at the Nano-Scale "Nano-electronic devices for defense and Security conference", August 29 to September 1, 2011, New York University, New York, **USA.**

13. **Wiqar Hussain Shah**, "Jahn Teller Effects in doped Rare-earth Manganites", 20th International Symposium on the Jahn Teller Effects, August 16-20, 2010, University of Fribourg, Campus Perolles II. **SWITZERLNAD**.

14. **Wiqar Hussain Shah**, H. Klienke, "Enhancement of Seebeck co-efficient of TlSbTe materials for Thermoelectric power generation" 14th Canadian Semiconductor Technology Conference "Nano and Giga Challenges in Electronics, Photonics and Renewable Energy" August 10-14, 2009, Hamilton, ON, **CANADA**,

15. **Wiqar Hussain Shah**, H. Klienke, C. Bryan "Synthesis of TlSbTe materials for Thermoelectric power generation", 41st IDW2008, (41st Inorganic Discussion Weekend), 28-30 Nov., 2008", Department of Chemistry, University of Brock, 2008, ON, **CANADA**.

16. **Wiqar H Shah**, "Synthesis and characterization of Ag Nano-particles" International Conference on Semiconductor Technology, July 29-August 03, 2007, Brooklyn, New York, **USA**.

17. **Wiqar Hussain Shah**, A. Sahiner, A. Marc "Effects of Competing Interactions in Doped Rare-earth Manganites" The International Conference on Strongly Correlated Electron System, May13-18, 2007, Hilton American Houston and George R Brown Convention Center, Houston, Texas, **USA**.

18. **Wiqar H Shah**, "Jahn Teller Effects and Competing Interaction in Manganites" International Symposium on the "Jahn-Teller Effects: Novel Aspects in Orbital Physics and Vibronic Dynamics of Molecules and Crystals" August, 28-31, 2006, the **Abdus Salam** ictp, Trieste**, ITALY**.

19. **Wiqar Hussain Shah**, **"**Frustrated Magnetic Behavior in Manganites**"** Miniworkshop on New States of Stable and Unstable Quantum Matter" 14-25 August, 2006, the **Abdus Salam** ictp, Trieste**, ITALY**

20. **Wiqar Hussain Shah**, "Magnetism in Nano-Structural Materials" Fourth Stig Lundqvist Conference on "Advancing Frontier of Condensed Matter Physics" 3-7 July, 2006, the **Abdus Salam** ictp, Trieste**, ITALY**.

21. **Wiqar Hussain Shah**, "Effect of Competing Interactions in Doped Rare-earth Manganites" Workshop on "Ion Beam Studies of Nanomaterials: Synthesis, Modification and Characterization" 26 June - 1 July 2006, the **Abdus Salam** ictp, Trieste, **ITALY**.

22. **Wiqar Hussain Shah**, "Study of Magnetic Structure of the Magnetic Nano-Particles." JCNS Symposium and European User Meeting, 16-17 February 2006, Forschungszentrum Jülich, **GERMANY**.

23. **Wiqar Hussain Shah**, "World Conference on Physics and Sustainable Development" Oct 31-Nov 2, 2005, Durban **SOUTH AFRICA**.

24. **Wiqar Hussain Shah**, "Meta-stable Behavior with Thermal Cycling in Doped Rare-Earth Manganites" Workshop on Metamaterials for Microwaves and Optical Technologies, July 18-20, 2005, Palacio, San Sebastian, **SPAIN**.

25. **Wiqar H Shah**, "Preparation and Magnetic Characterization of Rare-earth Magnetic Nano-structure Materials" Conference on "Single Molecule Magnets and Hybrid Magnetic Nanostructures" June 27-July 01, 2005, the **Abdus Salam** ictp, Trieste, **ITALY**

26. **Wiqar Hussain Shah**, "Crystal Structure analysis of Fe doped Manganites" International School on "Mathematical and Theoretical Crystallography" June 20-24, 2005, Université Henri Poincaré Nancy I – **FRANCE**

27. **Wiqar Hussain Shah**, "Spinglass Behavior in Fe Doped Manganites" International Symposium on "Advance Materials and Processing" 6-8 December, 2004, Materials Science Centre, Indian Institute of Technology, Kharagpur**, INDIA**

28. **Wiqar Hussain Shah**, "Dynamic Response in doped Manganites" Summer School and Conference on "Dynamical Systems" July 19-Augut 06, 2004 the **Abdus Salam** ictp, Trieste, **ITALY**

29. **Wiqar Hussain Shah**, "Competing interactions in Manganites" **Workshop on** "Novel States and Phase Transition in Highly Correlated Matter" July 12-23, 2004, the **Abdus Salam** ictp, Trieste, **ITALY**

30. **Wiqar Hussain Shah**, S.K. Hasanain, "AC susceptibility studied in some doped Rare-earth Manganites" 8th International Symposium on Advanced Materials, 8-11 September 2003, Islamabad, **PAKISTAN**,

31. **Wiqar Hussain Shah**, "Re-entrant Spin Glass Behavior and Harmonics studies in Fe doped Rare Earth Manganites" 28th International Nathiagali Summer College on "Physics and Contemporary needs" 30th June to 12th July, 2003, Nathiagali, **PAKISTAN**

32. **Wiqar Hussain Shah**, "Dynamic Response in Fe doped $La_{0.65}Ca_{0.35}Mn_{1-x}Fe_xO_3$ Rare Earth Manganites"Summer College and Conference on "Physics and Chemistry of Rare-earth anganites" June-1-18, 2003,the **Abdus Salam** ictp, Trieste, **ITALY**

33. **Wiqar Hussain Shah**, ICTP-INFM Spring School on "Magnetic Properties of Condensed Matter Investigated by Neutron Scattering and Synchrotron Radiation" Miramare-Trieste, Italy, May, 19-28, 2003, the **Abdus Salam** ictp, Trieste, **ITALY**

34. **Wiqar Hussain Shah**, "School on Synchrotron Radiation and Application" Miramare-Trieste, Italy, April 22-May 24, 2002, the **Abdus Salam** ictp, Trieste, **ITALY**

35. **Wiqar Hussain Shah**, S.K. Hasanain, "Irreversible Magnetic Transformations in the ac Susceptibility in CMR Compositions Close to Charge Ordering." 26th International Nathiagali Summer College on "Physics and Contemporary needs" 26th June to 15th July, 2001, Nathiagali, **PAKISTAN**

36. **Wiqar Hussain Shah**, "Effects of Fe Doping on the Transport and Magnetic Behavior in $La_{0.65}Ca_{0.35}Mn_{1-y}Fe_yO_3$" 25th International Nathiagali Summer College on "Physics and Contemporary needs" 26th June to 15th July, 2000, Bhurban, **PAKISTAN**

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