­Curriculum Vitae

**Dr. Ghulam Hassnain Jaffari**

Associate Professor (Tenured) of Physics

Department of Physics

Quaid-i-Azam Univeristy, Islamabad Pakistan

email: [hassnain@udel.edu](mailto:hassnain@udel.edu), hassnain@qau.edu.pk

**Job experience**

December 2018 – till date Associate Professor (Tenured) of Physics, Department of Physics, Quaid-i-Azam Univeristy, Islamabad Pakistan

December 2012- December 2018, Assistant Professor **(**Department of Physics, ­­Quaid-i- Azam University, Islamabad).

February 2012- December 2012, Assistant Professor on IPFP **(**Department of Physics, ­­Quaid-i- Azam University, Islamabad).

**Academic detail**

**PhD. in Physics (2007- 2011)**

**Department of Physics and Astronomy, University of Delaware USA. Course Work: (Daicar Bata Prize, For highest GPA)**

**Thesis Title:** “*MORPHOLOGICAL, MAGNETIC AND ELECTRONIC STRUCTURAL STUDIES OF NANOSTRUCTURED SPINEL FERRITES*”.

**M.Phil in Physics (2004 - 2006)**

**Quaid-i-Azam University, Islamabad, Pakistan (GPA=4) Course Work**

Title of Dissertation: “*MAGNETIC AND TRANSPORT CONTRIBUTIONS TO THE THERMOELECTRICPOWER OF* Sm-Sr *MANGANITES*”.

**Masters Degree in Physics (2002 - 2004)**

Quaid-i-Azam University, Islamabad, Pakistan (GPA=4, First position)

**Bachelor Degree (1999 – 2001)**

University of Punjab, Lahore, Pakistan

With Mathematics and Physics major.

**RESEARCH EXPERIENCE**

• Synthesis of technologically important materials in the form of thin films and nanoparticles utilizing magnetron sputtering, pulsed laser ablation, resistive evaporation, inert gas condensation and sol-gel chemistry.

• Structural and physical characterizations of thin film and nanostructured advanced materials using techniques such as X-ray diffraction, X-ray photoelectron spectroscopy, transmission/scanning electron microscopy, electrical transport, ac/dc magnetization and thermal analysis (DSC/TGA).

• Explored various aspects such as structural, morphological, electronic and magnetic properties of core/shell and hollow ferrite nanoparticles, magnetic tunnel junctions, Fe based alloys, N doped TiO2 , CeO2, Li incorporated MgO, CuInGaSe2 nanoparticles, nanoparticle assemblies, polymer/nanoparticles composites, Ferroelectric and multiferroic oxides, Heusler Alloys etc.

* Synthesis and characterization of multiferroic ceramics, composites and thin films.

**AREA OF INTEREST**

Nanophysics and its applications. (Surface magnetism in core/shell, solid and hollow nanoparticles), Complex Oxides and other correlated electron systems, Lower dimensional magnetism (thin films and nanoparticles), Ferroelectric and multiferroic systems, Heusler Alloys, Defect induced magnetism in Oxides.

Magnetoelectric coupling in single phase and composite multiferroics

**Titles of M.Phil Thesis supervised**

1. Dynamic response at the structural phase transition in BaxSr1-xTiO3 in the Antiferrodistortive regime. Student: Zahid Mehmood (2013)
2. Study of Multiferroic Properties of Bi1-x-yLaxPbyFe1-zTizO3 (x, y = 0, 0.1, 0.2, z = 0, 0.05, 0.1, 0.15) Ceramics. Student: Abdus Samad (2014)
3. Study of Diffused Phase phase transition and relaxor behavior in EuTiO3 Perovskite‏. Qadeer ul Hassan (2015)
4. Synthesis and Characterization of CeO2 Nanocrystals. Ali Imran (2015)
5. Multiferroic, Morphological and Spectroscopic Studies of PbFe0.5Ti0.5O3  
   with and without Pb Excess. Student: Muhammad Bilal (2015)
6. Structural, Morphological, Spectroscopic and Magnetic Studies of Li*x*Mg(*1-x*)O (*x* = 0, 0.05, 0.1, 0.15, and 0.2) Nanoparticles. Student: Adnan Tahir (2015)
7. Identification of Intrinsic and Extrinsic Contributions to the Dielectric Response in Sintered BaTiO3 Nanocrystals. Student: Atiq-ur-Rahman (2016)
8. Effect of co-doping of Eu, Ti, Zr, W, V on multiferroic properties of BiFeO3. Student: Fiza Mumtaz (2016)
9. STRUCTURAL, SPECTROSCOPIC, DIELECTRIC, TRANSPORT AND FERROELECTRIC PROPERTIES OF CO-DOPED BiFeO3.Student: Shumyla Qamar (2017)
10. Hydrothermal Synthesis of Oriented Rutile TiO2 Nanorods and Nanostructures on FTO Coated Glass for Solar Cell Applications. Student: Wajid Ali (2017)
11. Synthesis and Characterization of TiO2 Nanorods Coated with Cr Doped TiO2. Student: Qurat Ul Ain (2017).
12. Structural phase transition in rare-earth doped BiFeO3 and its effect on raman vibrational modes, optical and magnetic properties. Student: Saadia Nasir (2017)
13. Studyof Temperature Dependent Structural Phase Transition in Doped VO2 Thin Films Prepared by Chemical Vapor Deposition. Student: Wardah Mahmood (2017)
14. Synthesis and Characterization of CH3NH3PbI3-xClx Perovskite Coated TiO2 Nanorods. Student: Mahreen Gul (2018)
15. Synthesis and Characterization of BiFeO3-PbTiO3 ceramics. Student: Naqash Ahmed Awan (2018)
16. Synthesis and Characterization of Sr passivated TiO2 Nanorods coated with CH3NH3PbI3-xClx and CuI Layers. Student: Saba Zummard (2019)
17. Study of Dielectric Anomalies in Mn Doped BiFeO3, Student: Salma Syed (2019)
18. Synthesis, Structural and Magnetic Studies of CoFe2O4-xBaTiO3 Nano- composites Prepared by Wet Chemical Method, Student: Junaid ur Rehman(2019)
19. Synthesis and Study of Dielectric Properties of Morphotropic Phase Boundary 0.65BiFeO3-0.35PbTiO3 solid solution, Student: Nibras Ahmed Khan (2019)
20. Synthesis and characterization of TiO2 nanostructures on various substrates. Student: Tanvir Hussain (2019)
21. Synthesis and dielectric properties of Pb(Mg1/3Nb2/3)O3-PbTiO3 solid solutions. Student: Javeria Tanvir (2020)

**Title of PhD Thesis supervised**

“Role of Stoichiometry in Electrical Properties of EuTiO3 Ceramics” by Asad Muhammad Iqbal (2020)

**TEACHING**

Courses taught at the Quaid-i-Azam University are listed below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Title** | **Credit Hours** | **Level** | **Year** |
| (Spring Semester) [PH-619 Magnetism and Magnetic Materials](http://www.qau.edu.pk/physics/courses/mphil/mmm.php) | 3 | M.Phil/Ph.D | 2012 |
| (Spring Semester) PH-508 Laboratory – IV | 3 | M.Sc. | 2012 |
| (Fall Semester) [PH-304 Classical Mechanics](http://www.qau.edu.pk/physics/courses/cm.php) | 3 | M.Sc. | 2012 |
| (Fall Semester) PH-408 Laboratory – III | 3 | M.Sc. | 2012 |
| (Spring Semester) [PH-304 Classical Mechanics](http://www.qau.edu.pk/physics/courses/cm.php) | 3 | M.Sc. | 2013 |
| (Spring Semester) PH-508 Laboratory – IV | 3 | M.Sc. | 2013 |
| (Fall Semester) [PH-619 Magnetism and Magnetic Materials](http://www.qau.edu.pk/physics/courses/mphil/mmm.php) | 3 | M.Phil/Ph.D | 2013 |
| (Fall Semester) Laboratory courses PH-191 and 192  (Mechanics and waves) | 3 | BS | 2013 |
| (Spring Semester) PH-201 and Electricity and Magnetism and thermal physics | 2 | BS | 2014 |
| (Spring Semester) Laboratory course PH-292 and Electricity and Magnetism and thermal physics | 1 | BS | 2014 |
| (Spring Semester) PH 302 Electricity and Magnetism | 3 | M.Sc. | 2014 |
| (Fall Semester) Mechanics PH-101 | 3 | BS | 2014 |
| (Fall Semester) PH- and Electricity and Magnetism – II | 3 | M.Sc. | 2014 |
| (Spring Semester) PH 302 Electricity and Magnetism | 3 | M.Sc. | 2015 |
| (Spring Semester) Waves and Optics PH-104 | 3 | BS | 2015 |
| (Fall Semester) Topics in Condensed Mater Physics PH-719 | 3 | M.Phil/Phd | 2015 |
| (Fall Semester) PH-508 Laboratory – IV | 3 | M.Sc. | 2015 |
| (Spring Semester) Topics in Condensed Mater Physics PH-719 | 3 | M.Phil/Phd | 2016 |
| (Spring Semester) PH-203 Thermal Physics | 3 | BS | 2016 |
| (Fall Semester) PH-201 Basic electromagnetism | 3 | BS | 2016 |
| (Fall Semester) PH – 619 Magnetism and Magnetic Materials | 3 | M.Phil/PhD | 2016 |
| (Spring Semester) PH-408 Laboratory – III | 3 | M.Sc. | 2017 |
| (Spring Semester) PH-202 Modern Physics | 3 | BS | 2017 |
| (Fall Semester) PH-408 Laboratory - IV | 3 | M.Sc. | 2017 |
| (Fall Semester) PH-7019 Topics in condensed Matter Physics | 3 | M.Phil/PhD | 2017 |
| (Spring Semester) PH-202 Modern Physics | 3 | BS | 2018 |
| (Spring Semester) PH-619 Magnetism and Magnetic Materials | 3 | M.Phil/PhD | 2018 |
| (Fall Semester) PH-102 Introductory Mechanics | 3 | BS | 2018 |
| (Fall Semester) PH-719 Topics in Condensed Matter Physics | 3 | M.Phil/PhD | 2018 |
| (Spring Semester) PH-104 Waves and Optics | 3 | BS | 2019 |
| (Spring Semester) PH-308 Quantum Mechanics I | 3 | BS | 2019 |
| (Fall Semester) PH-719 Topics in Condensed Matter Physics | 3 | M.Phil/PhD | 2019 |
| (Fall Semester) PH-401Quantum Mechanics II | 3 | M.Phil/PhD | 2019 |

I have been part of technical committee to setup BS 4-year Physics laboratory. As a part of this project a number of experiments were installed and taught at BS level. Areas covered include Mechanics, Electricity and Magnetism, Optics, Waves and Oscillations and thermal physics.

**PUBLICATIONS**

1. Aslam A, Hasanain SK, Jaffari GH, Asim M, Ali S, Granitzer P, et al. Phase separation and stability in Sm(0.50)Sr(0.50)MnO(3): effects of cation dopants. J Phys-Condes Matter. 2008;20(7).

2. Jaffari GH, Lin HY, Ni C, Shah SI. Physiochemical phase transformations in Co/CoO nanoparticles prepared by inert gas Condensation. Mater Sci Eng B-Adv Funct Solid-State Mater. 2009;164(1):23-9.

3. Rumaiz AK, Woicik JC, Cockayne E, Lin HY, Jaffari GH, Shah SI. Oxygen vacancies in N doped anatase TiO2: Experiment and first-principles calculations. Applied Physics Letters. 2009;95(26).

4. Anjum S, Jaffari GH, Rumaiz AK, Rafique MS, Shah SI. Role of vacancies in transport and magnetic properties of nickel ferrite thin films. Journal of Physics D-Applied Physics. 2010;43(26).

5. Coskun M, Jaffari GH, Manzoor S, Korkmaz M, Shah SI. Synthesis and magnetic properties of Co-Cr2O3 nanocomposites. Journal of Magnetism and Magnetic Materials. 2010;322(13):1731-5.

6. Coskun M, Korkmaz M, Firat T, Jaffari GH, Shah SI. Synthesis of SiO2 coated NiFe2O4 nanoparticles and the effect of SiO2 shell thickness on the magnetic properties. J Appl Phys. 2010;107(9).

7. Jaffari GH, Ali SR, Hasanain SK, Guntherodt G, Shah SI. Stabilization of surface spin glass behavior in core-shell Fe67Co33-CoFe2O4 nanoparticles. J Appl Phys. 2010;108(6).

8. Jaffari GH, Ceylan A, Ni C, Shah SI. Enhancement of surface spin disorder in hollow NiFe2O4 nanoparticles. J Appl Phys. 2010;107(1).

9. Rumaiz AK, Woicik JC, Wang WG, Jordan-Sweet J, Jaffari GH, Ni C, et al. Effects of annealing on the local structure of Fe and Co in CoFeB/MgO/CoFeB tunnel junctions: An extended x-ray-absorption fine structure study. Applied Physics Letters. 2010;96(11).

10. Sharma N, Jaffari GH, Shah SI, Pochan DJ. Orientation-dependent magnetic behavior in aligned nanoparticle arrays constructed by coaxial electrospinning. Nanotechnology. 2010;21(8).

11. Yassitepe E, Khalifa Z, Jaffari GH, Chou CS, Zulfiqar S, Sarwar MI, et al. A new route for the synthesis of CuIn0.5Ga0.5Se2 powder for solar cell applications. Powder Technology. 2010;201(1):27-31.

12. Aftab M, Jaffari GH, Hasanain SK, Shah SI. Structural and magnetic properties of quaternary Co(2)Mn(1-x)Cr(x)Si Heusler alloy thin films. J Appl Phys. 2011;110(5).

13. Aftab M, Jaffari GH, Hasanain SK, Abbas TA, Shah SI. Disorder and weak localization effects in Co2MnxTi1-xAl Heusler alloy thin films. Journal of Physics D-Applied Physics. 2012;45(47).

14. Awan SU, Hasanain SK, Bertino MF, Jaffari GH. Ferromagnetism in Li doped ZnO nanoparticles: The role of interstitial Li. J Appl Phys. 2012;112(10).

15. Jaffari GH, Ceylan A, Bui HP, Beebe TP, Ozcan S, Shah SI. Non-equilibrium cation distribution and enhanced spin disorder in hollow CoFe2O4 nanoparticles. J Phys-Condes Matter. 2012;24(33).

16. Jaffari GH, Ekiert T, Unruh KM, Shah SI. Effect of particle size distribution on the magnetic properties gamma-Fe2O3 nanoparticles. Mater Sci Eng B-Adv Funct Solid-State Mater. 2012;177(12):935-41.

17. Jaffari GH, Rumaiz AK, Woicik JC, Shah SI. Influence of oxygen vacancies on the electronic structure and magnetic properties of NiFe2O4 thin films. J Appl Phys. 2012;111(9).

18. Rumaiz AK, Woicik JC, Weiland C, Xie Q, Siddons DP, Jaffari GH, et al. Band alignment in Ge/GeOx/HfO2/TiO2 heterojunctions as measured by hard x-ray photoelectron spectroscopy. Applied Physics Letters. 2012;101(22).

19. Aftab M, Jaffari GH, Hasanain SK, Abbas TA, Shah SI. Magnetic and transport properties of Co2Mn1-xCrxSi Heusler alloy thin films. J Appl Phys. 2013;114(10).

20. Awan SU, Hasanain SK, Bertino MF, Jaffari GH. Effects of substitutional Li on the ferromagnetic response of Li co-doped ZnO:Co nanoparticles. J Phys-Condes Matter. 2013;25(15).

21. Can MM, Jaffari GH, Aksoy S, Shah SI, Firat T. Synthesis and characterization of ZnGa2O4 particles prepared by solid state reaction. Journal of Alloys and Compounds. 2013;549:303-7.

22. Hussain S, Hasanain SK, Jaffari GH, Faridi S, Rehman F, Abbas TA, et al. Size and Lone Pair Effects on the Multiferroic Properties of Bi(0.75)A(0.25)FeO(3-delta) (A = Sr, Pb, and Ba) Ceramics. Journal of the American Ceramic Society. 2013;96(10):3141-8.

23. Jaffari GH, Lin H, Rumaiz AK, Yassitepe E, Ni C, Shah SI. Comparative surface studies of oxygen passivated FeCo nanoparticles and thin films. Physica Status Solidi a-Applications and Materials Science. 2013;210(2):306-10.

24. Awan SU, Hasanain SK, Jaffari GH, Anjum DH, Qurashi US. Defects induced luminescence and tuning of bandgap energy narrowing in ZnO nanoparticles doped with Li ions. J Appl Phys. 2014;116(8).

25. Awan SU, Hasanain SK, Jaffari GH, Mehmood Z. Carrier concentration dependence of ferroelectric transition in multiferroic Li doped and Li-Co co-doped ZnO nanoparticles. Applied Physics Letters. 2014;104(22).

26. Iqbal AM, Jaffari GH, Hasanain SK. Dynamic Response in Ba1-xSrxTiO3 and Anomalous Behavior at the Phase Boundary Composition. Journal of the American Ceramic Society. 2014;97(10):3177-83.

27. Jaffari GH, Mehmood Z, Iqbal AM, Hasanain SK, Shah SI. Development of ferroelectric correlations in the quantum paraelectric and antiferrodistortive regimes in BaxSr1-xTiO3 (x <= 0.10). J Appl Phys. 2014;116(8).

28. Hussain S, Hasanain SK, Jaffari GH, Ali NZ, Siddique M, Shah SI. Correlation between structure, oxygen content and the multiferroic properties of Sr doped BiFeO3. Journal of Alloys and Compounds. 2015;622:8-16.

29. Hussain S, Hasanain SK, Jaffari GH, Shah SI. Thickness dependent magnetic and ferroelectric properties of LaNiO3 buffered BiFeO3 thin films. Current Applied Physics. 2015;15(3):194-200.

30. Jaffari GH, Aftab M, Anjum DH, Cha D, Poirier G, Shah SI. Experimental investigation of inhomogeneities, nanoscopic phase separation, and magnetism in arc melted Fe-Cu metals with equal atomic ratio of the constituents. J Appl Phys. 2015;118(23).

31. Jaffari GH, Iqbal MA, Hasanain SK, Ali A, Bhatti AS, Shah SI, et al. Effect of densification on the ferroelectric response of Ba0.4Sr0.6TiO3. Solid State Communications. 2015;205:46-50.

32. Jaffari GH, Rumaiz AK, Ni C, Yassitepe E, Bah M, Shah SI. Observation of metastable phase separation and amorphous phase in Fe67Co33 alloy thin films synthesized by pulsed laser depositions. Current Applied Physics. 2015;15(6):717-21.

33. Jaffari GH, Samad A, Iqbal AM, Hussain S, Mumtaz A, Awan MS, et al. Effect of A and B-site substitution with Pb, La and Ti on phase stabilization and multiferroic properties of BiFeO3. Journal of Alloys and Compounds. 2015;644:893-9.

34. Jaffari GH, Tahir A, Bah M, Ali A, Bhatti AS, Shah SI. Study of Surface-Active Modes and Defects in Single-Phase Li-Incorporated MgO Nanoparticles. Journal of Physical Chemistry C. 2015;119(50):28182-9.

35. Bah MA, Jaffari GH, Khan FA, Shah SI. Surfaces and their effect on the magnetic properties of polycrystalline hollow gamma-Mn2O3 and MnO nanoparticles. Applied Surface Science. 2016;375:136-43.

36. Bah MA, Jaffari GH, Shah SI. Surface effects on the exchange bias and magnetic irreversibility in hollow polycrystalline NiFe2O4 nanoparticles. Surface & Coatings Technology. 2017;314:35-40.

37. Hussain S, Hasanain SK, Jaffari GH, Ali NZ, Siddique M, Shah SI. Anomalous temperature dependence of magnetic coercivity and structure property correlations in Bi(0.75)A(0.25)FeO(3) (A = Sr, Pb, and Ba) system. Journal of Materials Chemistry C. 2017;5(36):9451-64.

38. Iqbal AM, Jaffari GH, Saleemi M, Ceylan A. Relaxation dynamics and polydispersivity associated with defects and ferroelectric correlations in Ba-doped EuTiO3. J Phys-Condes Matter. 2017;29(46).

39. Jaffari GH, Bilal M, Rahman JU, Lee S. Formation of multiferroic PbTiO3/PbFe12O19 composite by exceeding the solubility limit of Fe in PbTiO3. Physica B-Condensed Matter. 2017;520:139-47.

40. Jaffari GH, Imran A, Bah M, Ali A, Bhatti AS, Qurashi US, et al. Identification and quantification of oxygen vacancies in CeO2 nanocrystals and their role in formation of F-centers. Applied Surface Science. 2017;396:547-53.

41. Jaffari GH, Mahmood W. Investigation of phase evolution and control over phase transformation temperature and thermal hysteresis using stoichiometry and co-doping in VO2 thin films. Aip Advances. 2017;7(11).

42. Jaffari GH, Rehman AU, Iqbal AM, Awan MS, Saleemi M. Extrinsic contributions to the dielectric response in sintered BaTiO3 nanostructures in paraelectric and ferroelectric regimes. Physica B-Condensed Matter. 2017;525:70-7.

43. Ali W, Jaffari GH, Khan S, Liu Y. Morphological control of 1D and 3D TiO2 nanostructures with ammonium hydroxide and TiO2 compact layer on FTO coated glass in hydrothermal synthesis. Materials Chemistry and Physics. 2018;214:48-55.

44. Jaffari GH, Aftab M, Samad A, Mumtaz F, Awan MS, Shah SI. Effects of dopant induced defects on structural, multiferroic and optical properties of Bi1-xPbxFeO3 (0 <= x <= 0.3) ceramics. Materials Research Express. 2018;5(1).

45. Jaffari GH, Tahir A, Ali NZ, Ali A, Qurashi US. Effect of Cr-N codoping on structural phase transition, Raman modes, and optical properties of TiO2 nanoparticles. J Appl Phys. 2018;123(16).

46. Mumtaz F, Jaffari GH, Shah SI. Peculiar magnetism in Eu substituted BiFeO3 and its correlation with local structure. J Phys-Condes Matter. 2018;30(43).

47. Mumtaz F, Jaffari GH, ul Hassan Q, Shah SI. Correlation between ionic size and valence state of tetra, penta and hexavalent B-site substitution with solubility limit, phase transformation and multiferroic properties of Bi0.875Eu0.125FeO3. Physica B-Condensed Matter. 2018;538:213-24.

48. Iqbal AM, Jaffari GH. Effect of stoichiometry on electrical response and polydispersivity related to hopping polarization in EuTiO3. J Appl Phys. 2019;125(11).

49. Jaffari GH, Ali W, ul Ain Q, Gul M, ul Hassan Q, Ali A, et al. Morphology and optical studies of Cr doped TiO2 and Mixed-Halide Perovskite coated rutile TiO2 nanorods. Journal of Alloys and Compounds. 2019;773:1154-64.

50. Zia L, Jaffari GH, Awan NA, Rahman JU, Lee S. Electrical response of mixed phase (1-x)BiFeO3-xPbTiO(3) solid solution: Role of tetragonal phase and tetragonality. Journal of Alloys and Compounds. 2019;786:98-108.

51. Zia L, Jaffari GH, Rahman JU, Lee S, Shah SI. Manipulation of dielectric, ferroelectric and magnetic anomalies in multiferroic, morphotropic phase boundary quenched BiFeO3-0.35PbTiO(3) solid solutions. Physics Letters A. 2019;383(26).