Abdul Mannan Majeed

Address: House # 200 Street # 2 Asif block, Allama Iqbal Town, 54000, Lahore, Pakistan

Email address: mannan.majeed@gmail.com

Phone number: (+92) 3454077366

Gender: Male **Date of birth:** 20/11/1987 **Nationality:** Pakistani

WORK EXPERIENCE

[15/11/2016 – Current] **Physics Lecturer**

University of Education Lahore

Address: Lahore, Pakistan

City: Multan

Country: Pakistan

Main activities and responsibilities:

At the University of Education, my key responsibilities and value creations were:-

1. To teach and nurture young scientific minds to understand the vast realms of Physics. To make them understand the theoretical and practical applications of scientific knowledge in the domains of Physics so that they can take on endeavors that will ultimately improve mankind's understanding of the know and unknown universe.
2. To improve their understanding of Physics and adhere to the principles of bloom's taxonomy, helped to establish a state of the art physics lab so that the students can have an outcome-based learning environment.
3. Served as a member of the board of studies to guide the OBEs in the different areas of scientific learning.
4. Took charge of Coordinator of the Department of Physics to improve coherence between the industrial applications and course curriculum. By doing this, I was able to help students increase their collaborations on research projects that had direct applications in the local industries.

[14/04/2014 – 10/11/2016] **Secondary School Educator**

Government of Punjab

City: Sahiwal

Country: Pakistan

Main activities and responsibilities:

At the Secondary School Educator, my key responsibilities and value creations were:-

1. To teach Mathematics and Physics to the students of grade 10. I ensured that the concepts delivered to the students were well aligned with the practical applications and state-of-the-art teaching methods.
2. To prepare students for their future academics, I became their class in charge. I was able to develop problem-solving in students by cultivating the principles of Design Thinking.
3. To inspire students and help explore their scientific curiosity, I became co-advisor of the Physics Society. Organized multiple collaborations between students and the industry to help them explore the practical applications of emerging technologies.

EDUCATION AND TRAINING

[20/10/2012 – 06/02/2016] **M. Phil in Applied Physics**

Government College University Lahore

Address: Lahore, Pakistan
Field(s) of study: Applied Physics
Thesis: Structure-Hardness relationship in Al 5086 alloy irradiated with Excimer laser in different ambient environments
Main subject / occupational skills covered:
- Semiconductor Physics, Physics of Materials, Laser Physics, Experimental Plasma Physics, Experimental Techniques, Laser Matter Interaction, Lab work (SEM, PLASMA, XRD, Accelerator lab, LASER Lab, Sample Preparation lab) and Electrodynamics.

[28/10/2009 – 28/12/2011] **M.Sc in Physics**

University of the Punjab

Address: Lahore, Pakistan
Thesis: Fabrication and Characterization of Aluminum antimonide
Main subject / occupational skills covered:
Physics

[26/09/2006 – 15/07/2009] **B.Sc in Double Math & Physics**

University of the Punjab

Address: lahore, Pakistan
Main subject / occupational skills covered:
Math A, Math B, Physics

RESEARCH INTERESTS

My research interests, but not limited to:

Materials Synthesis and Characterization, Metals, Alloys, Semi-conductor, Thin Film Technology, Electronic Devices Fabrication, Additive manufacturing, Laser-matter interactions, Optics, Laser Physics, Nano-Particles, Nano-fabrications etc.

RESEARCH EXPERTISE

My area of research includes:-

Optical Microscopy, SEM, TEM, XRD, Raman Spectroscopy, UV-Vis Spectroscopy, Four-Point Probe Apparatus, Electrochemical Workstation, Furnaces, Vacuum Pumps, etc.

PUBLICATIONS

[2016]

Impact of 532 nm 6 ns laser pulses on (104) oriented zinc single crystal: surface morphology, phase transformation, and structure hardness relationship

Reference: M. Zakria Butt, M. Waqas Khaliq, Abdul Mannan and Dilawar Ali, doi: 10.1088/2053-1591/3/9/096503

Specimens of (104) oriented Zn single crystal were irradiated in vacuum with pulsed Nd:YAG laser at a repetition rate 10 Hz. The number of laser shots was varied from 1 to 100. The laser fluence and laser intensity at the one laser shot irradiation spot on the target surface were 97.2 J cm−2 and 1.6 × 10^10 W cm^−2 , respectively. Crater geometry of laser irradiated specimens was examined by optical microscope. Crater area was found to increase with the increase in number of laser shots. The data points were encompassed by sigmoidal (Boltzmann) fit showing that crater area increases rapidly to begin with up to 50 laser shots and later on rather slowly till 100 laser shots. Surface morphology was examined by SEM and AFM, which revealed ripple patterns, cavities, trenches, ridges, nanohillocks, microcones, droplets, and solid flakes etc. Structural parameters, namely crystallite size and lattice strain were evaluated by Williamson–Hall analysis of x-ray diffraction patterns. Surface hardness was found to increase up to 50 laser shots and later on it decreased progressively till 100 laser shots. Correlation between surface hardness and crystallite size was also examined, and was found to obey inverse Hall–Petch relation.

[2017]

Structural, electrical, and mechanical characterization of Al 5086 alloy irradiated with 248 nm-20 ns KrF excimer laser

Reference: M.Z. Butt,A. Mannan Majeed,M. Waqas Khalid, Dilawar Ali,Journal of Alloys and Compounds 695,3069-82

Williamson-Hall analysis of XRD patterns of Al 5086 alloy specimens (10 mmx10 mmx6 mm) irradiated with 100-500 KrF excimer laser pulses in air as well as in vacuum was done to evaluate structural changes on laser irradiation. Both crystallite size and lattice strain were found, in general, to increase with the number of laser shots first rapidly up to 200 and later on rather slowly. Also, for a given number of laser shots, the crystallite size of the specimen laser-irradiated in vacuum was higher than that of the specimens laser-irradiated in air. Harris analysis of XRD patterns revealed that the most referentially oriented plane was (200) with texture coefficient in the range 2.359-2.982. Electrical resistivity of the specimens was measured by four-point probe technique. It was found to increase with the number of laser shots up to 200, and later on decreases monotonically. However, for a given number of laser shots, its value was higher for the specimen laser irradiated in air than that for the specimen laser-irradiated in vacuum. On plotting combined surface hardness data for un-irradiated and laser-irradiated specimens in air as well as in vacuum as a function of inverse square-root of crystallite size, a cross over from classical Hall-Petch relation (99nm - 55nm) to inverse Hall-Petch relation (55nm-30nm) occurred at about 55nm. This is true not only for the surface hardness but also for the hardness measured at 0.5 and 1.0 mm depth below the specimen surface. The intensity of laser-hardening effect gradually diminishes as one goes down from the uniformly laser irradiated specimen surface to a depth of 3.0 mm below it. The relationship between electrical resistivity and surface hardness was linear.

[2021]

Structural, Electronic and Optical Properties of XGaO3 (X = V, Nb) Perovskites for Optoelectronic Applications: A DFT Study

Reference: M. Iqbal, S. Awais Rouf, Umair Mumtaz, A. Mannan Majeed, H. Tariq Masoord, JCEL-D-21-00039R1

An *ab initio* study using density functional theory (DFT) is carried out to explore the structural, electronic, and optical properties of vanadium gallate (VGaO3) and niobium gallate (NbGaO3). The structural properties of these compounds are determined by using the full-potential linearized augmented plane wave (FP-LAPW) technique as implemented in WIEN2k with a standard functional, i.e., the Perdew–Burke–Ernzerhof generalized gradient approximation (PBE-GGA). In addition, the local density approximation plus Hubbard parameter (LDA +U) is employed to calculate the electronic bandgap and total and partial density of states (TDOS and PDOS), to overcome the limitation of the PBE-GGA functional in terms of underestimation of the electronic bandgap. The values computed for the indirect bandgap of VGaO3 and NbGaO3 are 0.45 and 0.51 eV, respectively, indicating that both materials are semiconductors in nature. The PDOS of the studied materials reveal that 3*d*-states of vanadium atoms, 4*d*-states of niobium atoms, and 2*p*-states of oxygen atoms form the valence band. Moreover, the Kramer–Kronig relations are used to compute the optical properties of the title compounds. The dielectric functions, refractive index, optical conductivity, absorption coefficient, extinction coefficient, energy loss function, and reflectivity of these materials are also computed. The results for the studied properties reveal that NbGaO3 exhibits better properties than VGaO3 for use in optoelectronic applications.

[2021]

An ab-initio study of electronic and optical properties of RhXO3 (X = Ga, Ag) perovskites.

Reference: Physica Scripta, PHYSICS-116300.R1

The *ab-initio* computations were performed to study the electronic and optoelectronic properties of RhXO3 (X = Ga, Ag) perovskites using WIEN2k code. The RhGaO3 has band gap of 2.29 eV, and the behavior of RhAgO3 is metallic. The sub-TDOS of the studied materials revealed that rhodium and oxygen atoms have significant contributions in the valence band and conduction band formation of both materials. The silver cation is responsible for the reasonable peaks appearing at the Fermi level of RhAgO3 which demonstrated the conducting nature of RhAgO3. The dielectric functions, optical conductivity, energy loss function, absorption coefficient, refractive index, extinction coefficient, and reflectivity are computed for these materials to understand the optical behavior of the studied materials. The analysis of optical properties ensure the RhGaO3 is a promising material for optoelectronics while RhAgO3 has metallic nature.

CONFERENCES AND SEMINARS

[05/10/2021 – 06/10/2021] **2nd International Conference on Advances in Material Science**
Department of Physics, University of Education, Lahore

[10/03/2014 – 14/03/2014] **International Scientific Spring- 2014** National Center for Physics, Islamabad, Pakistan

Jointly organized by National Center for Physics (NCP), Islamabad, Pakistan & The Abdus Salam International Center for Theoritical Physics (ICTP), Trieste, Itely

AWARDS:

During my studies I have been honored with multiple scholarships and awards

-Chief Minister Laptop Award on excellence during M.Phil. from Govt. of Punjab, Lahore, Pakistan (2013).

-Benevolent fund scholarship (2004-2013)

ORGANISATIONAL SKILLS

Organisational skills

- Use of Agile Principles and Kanban approach of project management.
- Effective and clear communicator.
- Eager to work and lead,

JOB-RELATED SKILLS

Job-related skills

- An inquisitive mind with aptitude of deep research work
- An excellent team worker
- Problem solver
- Eagerness to learn
- Positive Attitude
- Resilience

DIGITAL SKILLS

Advanced skill on Operating System Win10 Win7 Winxp etc | Advanced Windows Server 2016 2012 2008 2003 skills

SOFT SKILLS

Computer Skills

Motic, Origin, X'Pert, Basic knowledge of C++ & LabView, Microsoft Office

EXTRA SKILLS

Extra Skills

Electronics Lab, Modern Physics Lab, Laser Lab, Plasma Lab, Materials Lab, Accelerator Lab, Microscopy Lab

SOCIAL AND POLITICAL ACTIVITIES

Member of blood donation organization Multan

LANGUAGE SKILLS

Mother tongue(s): Urdu

Other language(s):

English

LISTENING C1 **READING** B2 **WRITING** B2

SPOKEN PRODUCTION B2 **SPOKEN INTERACTION** B2