Dr. Afroz Khan

Ph.D. in Physics
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Education

Jan 2018- Dec 2021	○ **Ph.D (Physics), Aligarh Muslim University, India.** **Thesis Title:** *"Electrical and optical properties of indium oxide based transparent conducting oxide materials"* **Supervisor: Prof. F. Rahman** Aligarh Muslim University, India.
2014-2016	○ **M.Tech. (Nanotechnology), Aligarh Muslim University, India.** *Division: First (CPI – 9.0; Percentage – 78.988%)*
2012-2014	○ **M.Sc. (Physics), Aligarh Muslim University, India.** *Division: First (Percentage – 68.958%)*
2009-2012	○ **B.Sc. (Physics), Aligarh Muslim University, India.** *Division: First (Percentage – 76.534%)*
2009	○ **Intermediate, U. P. Board, Allahabad, India.** *Division: First (Percentage – 81.60%); Rank – 1st in District*
2007	○ **High School, U. P. Board, Allahabad, India.** *Division: First (Percentage – 79.167%); Rank – 2nd in Sub-District*

Academic Experience

Number of Publications

- International Journals : 09 (Nine)
- International Conf. Proc. : 02 (Two)

Referee of international peer-reviewed journals

- IOP Publishing : 1. Nanotechnology
  2. Materials Research Express
- Elsevier : 1. Chemosphere
- Springer : 1. Applied Nanoscience

Academic Experience (continued…)

Membership

- American Physical Society (APS)

Awards and Achievements

- Jul 2021 : Appreciation letter from Nanotechnology, IOP Publishing
- Oct 2020 : Appreciation letter from Materials Research Express, IOP Publishing
- Sep 2019 : SRF-Funded by IUAC (UFR-61305), New Delhi
- Aug 2018 : Beam time project (64503), IUAC, New Delhi
- March 2018 : JEST (National level exam)
- Sep 2017 : JRF project (UFR-61305) funded by IUAC, New Delhi
- March 2017 : GATE (National level exam)
- Jan 2016 : JRF project funded by DST PURSE Programme-Phase II

Oral presentation

- Jul 2018 : (64th Accelerator Users Workshop), Oral presentation at IUAC, New Delhi.

Conferences and Workshops attended

- Feb 2022 : **(NCFM Online)** National Conference on functional materials: synthesis, properties and applications, Department of Physics, AMU, Aligarh.
- Sep 2020 : **(ICASMA Online)** International conference on advance materials science and application, MS Ramaiah Institute of Technology, Bangalore.
- Jun 2020 : **(ISSCSMPA)** E-International Symposium on "Synthesis and Characterization of Smart Materials and their Potential Applications, GGS Indraprastha University, New Delhi.
- Apr 2019 : **(NICES)** National Information System for Climate and Environment Studies and its Activities Conducted by Department of Geography, AMU, Aligarh and ISRO, Hyderabad.
- Mar 2019 : **(RTMS)** Recent Trends in Materials Science and Spectroscopy, AMU, Aligarh.
- Feb 2019 : Neutron and Muon Science Meeting and Workshop on Data Analysis of Neutron Scattering and Muon Spectroscopy, JNCASR, Bangaluru.
- Dec 2018 : **(DAE SSPS)** 63rd DAE Solid State Physics Symposium, GJUS & T, Hisar, Haryana.
- Jul 2018 : 64th Accelerator Users Workshop and Presented BTR-2 and BTR-5, IUAC, New Delhi.
- Mar 2016 : **(ALIGARH NANO V)** International Conference, Department of Applied Physics, AMU, Aligarh.
- Feb 2014 : **(Course and Workshop**) Atomic and Molecular Radiation Physics: Astronomy

to Biomedicine and a Workshop on Superstructure and R-Matrix Code, conducted by Prof. Sultana N. Nahar and Prof. Anil K. Pradhan, The Ohio State University, USA.

Research Project

Designation	*Project Title*	*Funding Agency*	*Duration*	*PI*
JRF and SRF	Swift Heavy Ion Irradiation Induced Modification of Doped Indium Oxide Thin Films for Optoelectronic Applications	Inter-University Accelerator Center, New Delhi	26.09.2017 to 25.11.2021	Prof. Faiyazur Rahman
BTR	Synthesis and Characterization Doped and Undoped Indium Oxide Thin Films	Inter-University Accelerator Center, New Delhi	31.07.2018 to 13.12.2021	Mr. Afroz Khan
JRF	Synthesis and Photocatalysis Properties of Nanomaterials	DST PURSE Programme Phase-II	05.01.2016 to 15.03.2017	Prof. Ameer Azam

Research Experience & Interest

Experience

- During my Ph.D., I studied transparent conducting oxides (TCOs) materials extensively using binary metal oxide compound such as pure and doped indium sesquioxide or indium (III) oxide (In_2O_3) nanocrystalline powder and thin film, which has potential application in optoelectronic devices *viz.* solar cell, touchscreens, LEDs and sensors etc. My research involved for enhancing the optical and electrical properties of TCO system and finding the correlation between transparency, sheet resistance and carrier density to explain the exotic phenomenon in indium oxide and figure of merit (FOM) to understand the TCO properties. Two different series of cubic crystal structure name as IFO ($In_{2-x}Fe_xO_3$) and ITO ($In_{2-x}Sn_xO_3$) were investigated using sophisticated **(X-ray photoelectron spectroscopy, X-ray diffraction, Raman spectroscopy, FTIR, High resolution-transmission electron microscopy, Scanning electron microscopy, EDX, Atomic force microscopy, UV-Vis spectroscopy, Photoluminescence) and conventional (four probe resistivity, Hall measurement, Magnetization)** techniques. For deposition of the doped and undoped thin films, I have utilized pulsed laser deposition (PLD) techniques at optimized parameters. Moreover, I have also participated in several beamtimes at mega research facilities (IUAC, New Delhi, India and UGC-DAE CSR, Indore, India, RRCAT, Indore, India).

Keywords

- Thin films, Nanomaterials, Nanoparticles, Electrical transport, Crystal structure, Optoelectronics, Transparent conducting oxide (TCO),

Electronic structure, Photocatalytic activity, Antibacterial activity, Wastewater treatment.

Skills

Experimental skills	○ X-ray diffraction analysis and measurement, Experience in measuring the Electrical Resistivity, Hall effect measurement, UV-Vis spectroscopy, Photoluminescence, FTIR, TEM, HRTEM, SAED, SEM, EDX, AFM and their analysis, X-ray photoelectron spectroscopy with fitting,.
Synthesis methods	○ Thin film deposition, PLD, Sol-gel synthesis, Co-precipitation method, Hydrothermal synthesis, Microwave assisted synthesis, Sonication method, Auto-combustion method, Solid state synthesis, Hummer's modified method for the synthesis of graphene oxide (GO) and reduced graphene oxide (r-GO).
Languages	○ Reading, writing and speaking competencies for English, Hindi and Urdu.
Programming	○ FORTRAN and C++
Scientific software	○ Origin, FullProf, XPSPEAK$_4$, Powder X, SRIM, MS Word, L^{A}T$_E$X formatting.

Research Publications

1. **Afroz Khan***, F. Rahman, Razia Nongjai and K. Asokan, *"Role of Deposition Temperature and Sn Content on Structural, Optical & Electrical Properties of In_2O_3 Thin Films"*, **Current Applied Physics, 38 (2022) 49-58.**
2. **Afroz Khan**, Adil Abass Shah, and Ameer Azam, *"Visible Light Driven Photocatalytic and Dielectric Properties of Zinc Oxide Nanorods Decorated on Graphene Oxide*", **Under Review (2022).**
3. **Afroz Khan***, F. Rahman, Razia Nongjai and K. Asokan, *"Optical Transmittance and Electrical Transport Investigations of Fe Doped In_2O_3 thin films"*, **Applied Physics A: Materials Science & Processing, 127, 5 (2021), 339**.
4. **Afroz Khan***, F. Rahman, Razia Nongjai and K. Asokan, *"Structural, Optical and Electrical Transport Properties of Sn Doped In_2O_3"*, **Solid State Sciences 109 (2020) 106436**.
5. **Afroz Khan***, F. Rahman, Abdul Ahad and P.A. Alvi, "*Investigation of Transport Phenomenon and Magnetic Behavior of Fe Doped In_2O_3*", **Physica B: Physics of Condensed Matter 592 (2020) 412282**.
6. **Afroz Khan***, F. Ameen, F. Khan, Abdullah Al-Arfaj and Bilal Ahmed, *"Fabrication and antibacterial activity of nanoenhanced conjugate of silver (I) oxide with graphene oxide"*, **Materials Today Communications 25 (2020) 101667**.
7. **Afroz Khan**, F. Khan, Moyad Shahwan, Mohd Shahnawaz Khan, Fohad Mabood Husain, Md Tabish Rehman, Md Imtaiyaz Hassan, Asimul Islam, Anas Shamsi, *"Mechanistic insight into the binding of graphene oxide with human serum albumin: Multispectroscopic and molecular docking*

approach", **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 256 (2021) 119750**.

8. **Afroz Khan*** and F. Rahman, "*Study of microstructural and optical properties of nanocrystalline indium oxide: A transparent conducting oxide (TCO)*", **AIP Conference Proceedings-2115, 030091 (2019)**.
9. Abhishek Kumar, F. Rahman and **Afroz Khan***, *"Fabrication and Characterization of VO2 Nanoparticles: A Simple and Low-Cost Combustion Method"*, **AIP Conference Proceedings- 2369 (2021)**.
10. Bilal Ahmad, Asad Syed, Khursheed Ali, Abdallah E. M., **Afroz Khan**, Jintae Lee, Hind A. A., *"Synthesis of gallotannin capped iron oxide nanoparticles and their broad spectrum biological applications"*, **RSC Advances 11, 17 (2021), 9880**.
11. Gulwaiz Akhter, **Afroz Khan***, Syed Ghazanfar Ali, Tabreiz Ahmad Khan, Khwaja Salahuddin Siddiqi and Haris M. Khan, *"Antibacterial and nematicidal properties of biosynthesized Cu nanoparticles using extract of holoparasitic plant"*, **SN Applied Sciences 2 (2020) 1268**.
12. Aadil Abass Shah, **Afroz Khan**, Sourabh Dwivedi, Javed Musarrat and Ameer Azam, *"Antibacterial and Antibiofilm Activity of Barium Titanate Nanoparticles"*, **Materials Letters 229 (2018) 130–133**.

Academic References

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