

# Mayur Khan

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## Education

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<b>Inter-University Accelerator Centre</b> affiliated with <b>J.N.U. Delhi</b> Ph.D., Physics (Materials Science), PhD Supervisor: Dr. Ambuj Tripathi	New Delhi Aug 2019- Aug 2024 submitted
<b>University of Delhi</b> Department of Physics and Astrophysics, M.Sc. Physics – specialization in “Experimental Solid-State Physics”	New Delhi July 2017–July 2019
<b>University of Delhi</b> Deshbandhu College, B.Sc. (Hons.) – Physics	New Delhi July 2014–June 2017

## Publications

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1. **Khan, M.**, Tripathi, M.N. and Tripathi, A., 2024. Comparative study of electronic band gap tuning in 1L-MoSe<sub>2</sub> and 1L-WSe<sub>2</sub> by heterostructuring (MoSe<sub>2</sub>/WSe<sub>2</sub>), alloying (Mo<sub>x</sub>W<sub>(1-x)</sub>Se<sub>2</sub>) and biaxial straining, **Materials Science in Semiconductor Processing**, 108339, <https://doi.org/10.1016/j.mssp.2024.108339>. (I.F. 4.2).
2. **Khan, M.**, Meena, R.C., Avasthi, D.K., Tripathi, A., 2023. Study of ion velocity effect on the band gap of CVD-grown few-layer MoS<sub>2</sub>. **ACS Omega**, 8 (49), 46540–46547 <https://doi.org/10.1021/acsomega.3c05240>. (I.F. 4.1).

3. **Khan, M.**, Kedia, S.K., Mishra, A., Avasthi, D.K. and Tripathi, A., 2023. Investigation of the annealing temperature for few-layer MoS<sub>2</sub> and ion beam-induced athermal annealing/purification behavior by in-situ XRD. *Applied Surface science*, p.158106. <https://doi.org/10.1016/j.apsusc.2023.158106>. (I.F. 6.7).
4. **Khan, M.**, Tripathi, M.N. and Tripathi, A., 2022. Strain-induced structural, elastic, and electronic properties of 1L-MoS<sub>2</sub>. *Journal of Materials Research*, 37(20), pp.3340-3351. <https://doi.org/10.1557/s43578-022-00714-y>. (I.F. 3.0).
5. **Khan, M.**, Kumar, S., Mishra, A., Sulania, I., Tripathi, M.N. and Tripathi, A., 2022. Study of structural and electronic properties of few-layer MoS<sub>2</sub> film. *Materials Today: Proceedings*, 57, pp.100-105. <https://doi.org/10.1016/j.matpr.2022.01.361>. (I.F. 1.2).
6. Roy, S., Singh, S., **Khan, M.**, Chamanehpour, E., Sain, S., Goswami, T., Roy, S.S., Mishra, Y.K. and Mathur, A., 2024. Electrochemistry at 2D and 3D nanoelectrodes: The interplay between interface kinetics and surface density of states. *Electrochimica Acta*, 477, p.143762. <https://doi.org/10.1016/j.electacta.2024.143762>. (I.F. 6.7).
7. Sarma, L., Kalita, K., Rashid, H.A., Deb, N.K., Bhuyan, M., **Khan, M.**, Abhilash, S.R. and Kabiraj, D., 2024. Fabrication and Characterization of Highly Enriched Thin <sup>176</sup>Yb Targets for the Reaction Dynamic Studies on Fission Mass Distribution. *Vacuum*, 224, 113131. <https://doi.org/10.1016/j.vacuum.2024.113131>. (I.F. 4.0).
8. Bareth, B.K., **Khan, M.**, Tripathi, A. and Tripathi, M.N., 2024. Ion-irradiation induced structural, electronic, and optical properties modification in a few layered MoS<sub>2</sub>. *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms*, 554, p.165436. <https://doi.org/10.1016/j.nimb.2024.165436>. (I.F. 1.4).

## Research interest and expertise

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- Thin Film Growth by CVD and PVD, especially 2D TMD Materials
- RF-sputtering target synthesis (Alloying and Heterostructuring)
- CVD Set-up designing
- Density Functional Theory (DFT)
- Materials modelling
- Ion-matter interaction
- Beam-line handling
- Plasma immersion chamber handling
- Microscopy (TEM, SEM, AFM and Optical)
- Spectroscopy (PL, Raman, and UV-Vis)
- Spectrometry (RBS)
- Diffractometry (XRD, Synchrotron based XRD)

## Hands on experience with a major instrument and Softwares

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### Softwares

- **Density Functional theory (DFT):** Quantum Espresso, Material Studio, CASTEP, SIESTA.

- **Material Modelling:** VESTA, BURAI, XCrysden.
- **Ion Beam matter interaction simulation Skills:** Thermal Spike Model (TSM Code), SRIM/TRIM, CASINO.
- **Analysing Software:** Origin, ImageJ, Gwyddion, Nanoscope, RUMP, SIMNRA.

## Instruments

• Chemical Vapour Deposition (CVD), RF-Sputtering (PVD), Plasma exposure chamber, Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM), Optical Microscope (OM), X-Ray Diffraction (XRD), Ultraviolet-Visible (UV-Vis) spectroscopy, Photoluminescence (PL), Fast-Fourier infra-red spectroscopy (FTIR), , Rutherford backscattering spectrometry (RBS),

## Student Grants

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- Awarded a student grant by the organizer under the sponsorship of the participating Asian institutes (NSRRC, ANSTO, IHEP, KEK, NSRL, PAL, SLRI, SSRF, Spring-8), for attending the “International Particle Accelerator Conference (IPAC-2024)” in Nashville, TN, United States (19 May 2024 to 24 May 2024).
- Awarded an international travel grant by Dept. Science and Technology (DST) SERB under the ITS for attending the “International Conference on the Strongly Correlated Electron Systems (SCES-2023), Incheon (02 July 2023 to 07 July 2023)”.
- Awarded an international travel grant by Dept. Science and Technology (DST) SERB under the ITS for attending the “26th International Conference on the Application of Accelerators in Research and Industry (CAARI), USA (31 October 2022 to 03 November 2022)”.
- Awarded traveling financial support against the submitted proposal for accessing the MCX beamline of Elettra Synchrotron Facility, Italy (19-24 September 2022) by Dept. Science and Technology (DST) under the Indo-Italian Program of Cooperation.

## Technical-Skills

- **Programming Skills:** C/C++, MATLAB, SCILAB.
- **Writing Skills:** LATEX/BEAMER, MICROSOFT OFFICE.

## Languages

- **HINDI:** writing, reading, speaking
- **ENGLISH:** writing, reading, speaking

## International Visits

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- From July 01 to 10, 2023, I visited **Incheon, South Korea**, to attend and present the poster at the Strongly Correlated Electron Systems (SCES-2023) conference.
- From September 19 to 23, 2022, I visited the MCX lab and user support lab at the **Elettra Synchrotron Facility in Trieste, Italy**, to perform the synchrotron radiation sources-based XRD measurement experiment.

## Invited Talks in Schools, workshops, and conferences

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- **Talk on Demonstration Hands-on Session-I (RUMP/SIMNRA)** in International School on Ion Beams in Materials Science (**IBMS-2022**) Inter-University Accelerator Centre (**IUAC**), New Delhi, from 10.30-11.30 pm on 12 Nov 2022.
- **Talk on Introduction / Installation of software's (RUMP/SIMNRA) and (SRIM/TRIM)** in International School on Ion Beams in Materials Science (**IBMS-2022**) Inter-University Accelerator Centre (**IUAC**), New Delhi, from 14.30-15.30 pm on 11 Nov 2022.

## Participated Research training Programs

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- **“Hands on training on thin film deposition techniques: Sputtering Pulsed laser deposition”** from June 13-19, 2022 at National Physical Laboratory (NPL), New-Delhi (India).
- **“Synergistic Training Programme Utilizing the Advanced Research Instrumentation (STUTI)”** sponsored by DST, Govt. of India. Organised by Department of Physics, AMU, Aligarh (India), A hands-on training and sensitization of cutting-edge equipment from May 06–12, 2022.

## Oral Talks/Presentations in National and International conferences/ Workshop/ Seminar/Symposium

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- **Oral presentation** on the topic of **“Evidence of S-atom sputtering in few-layer MoS<sub>2</sub> under 70-keV ion-beam irradiation”** in the **“67<sup>th</sup> DAE Solid State Physics 2023”**. Organised by the **GITAM, Vishakhapatnam A.P., India** from Dec 20-24, 2023.
- **Oral presentation** on the topic of **“Study of ion-beam induced athermal annealing in few-layer MoS<sub>2</sub> using a thermal spike model”** in the **“7<sup>th</sup> International Conference on Nanostructuring by Ion Beams (ICNIB 2023)”**. Organised by the **UPES, Dehradun UK, India** from Nov 2-4, 2023.
- **Oral presentation** on the topic of **“Study of strain-induced electronic band structures in MoS<sub>2</sub> monolayer using DFT and DFT+U”** in the **“National e-Conference on Recent Advances in Engineering, Technology and Applied Sciences - 2023”**. Organised by the **Society Towards Advancement of Rural Education (STARE)**, India on Sept 05, 2023.
- **Oral presentation** on the topic of **“Study of structural and electronic properties of few-layer MoS<sub>2</sub> film”** in **“Young Research Colloquium”** on 20 Nov 2021 at Pandit Deendayal Energy University, Gandhinagar, Gujarat, India.
- **Oral presentation** on the topic of **“Study of strain induced band gap engineering in monolayer MoS<sub>2</sub>”** in the **“International Conference on Mathematical Modelling and Simulation in Physical Sciences” (MMSPS-2021)** held during 17-18 April 2021, organized by SVNIT Surat.

## Poster Talks/Presentations in National and International conferences/ Workshop/ Seminar/Symposium

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- **A poster is presented** entitled “**Evidence of S-atom sputtering in few-layer MoS<sub>2</sub> under 70-keV ion-beam irradiation**” in the “**67<sup>th</sup> DAE Solid State Physics 2023**”. Organised by the **GITAM, Vishakhapatnam A.P., India** from Dec 20-24, 2023.
- **A poster is presented** entitled “**Study of Electronic Band Gap Tuning in 1L-MoSe<sub>2</sub> and 1L-WSe<sub>2</sub> by Heterostructuring (MoSe<sub>2</sub>/WSe<sub>2</sub>) and Biaxial straining**”. in the International Conference on Strongly Correlated Electron Systems (SCES-2023) at Incheon, South Korea, Organized by the Korean Physical Society at Songdo ConvensiA from on July 02-07, 2023.
- **A poster is presented** entitled “**Band gap modification of few-layer MoS<sub>2</sub> by Swift heavy ion irradiation**”. in the 8th Edition of the International Conference on Nanotechnology for Better Living NBL-2023 hosted at the National Institute of Technology (**NIT Srinagar, J & K**), on May 25-29, 2023.
- **A poster is presented** entitled “**Influence of biaxial strain on the band structures characteristics of 1L-MoSe<sub>2</sub>, 1L-WSe<sub>2</sub>, and MoSe<sub>2</sub>/WSe<sub>2</sub> heterostructure**”. in the International Winter School-2022 on the “Frontiers in Materials Science”, hosted at the Jawaharlal Nehru Centre for Advanced Scientific Research (**JNCASR**), Jakkur P.O., Bangalore 560 064, on December 05, 2022.
- **A poster is presented** entitled “**Ion-beam induced band gap modification in few-layer MoS<sub>2</sub>**” in the 7th International Conference on Ion Beams in Materials Engineering and Characterization (**7th IBMEC 2022**) which held at IUAC, New Delhi on Nov 16-19, 2022.
- **A poster is presented** entitled with “**Biaxial strain-induced band gap engineering in monolayer MoS<sub>2</sub> using DFT**” at the **Abdus Salam International Centre for Theoretical Physics (ICTP)**, Trieste, Italy from 22 August 2022 to 02 September 2022.
- **A poster is presented** entitled with “**Biaxial strain-induced band gap engineering in monolayer MoS<sub>2</sub>: A theoretical study using DFT**” at the **IWAM 2022**, organized by the Ras Al Khaimah Center for Advanced Materials (RAK CAM), UAE from February 20-22, 2022.
- **Poster presented** on topic of “**Study of structural and electronic properties of few-layer MoS<sub>2</sub> film**” in the “International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (**MMETFP2021**)” from November 19-21, 2021. organized by PDEU, Gandhinagar, India with Materials Research Society of India (MRSI).
- **Poster presented** in the International Conference on “Ion Beams in Materials Engineering and Characterization (IBMEC-2020)” held during 08-11 Dec 2020, organized by IUAC New Delhi.
- **Poster Presented** on the topic of **Transparent Gel Electrolyte for Electrochromic Application** on National Science Day (28 Feb) 2019 at Department of Physics and Astrophysics, University of Delhi, New Delhi.

## Membership

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- Member of Ion Beam society of India
  - A member of the library stock verification committee (a three-member committee) at IUAC, New Delhi. 27 May 2022
  - Appointed as a **Reviewer** of the International Journal of Materials Science and Applications (IJMSA), 28 Nov 2022.

- Nominates as a student representative in the IUAC Annual Report Editorial Committee and Publication Committee, 15 Feb 2023.

## During Master's (M.Sc.) Research Projects

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Department of Physics and Astrophysics  
University of Delhi

New Delhi  
Jan 2019–June 2019

- \* Final Project Report Submitted and Report presentation on the topic of “**SYNTHESIS AND CHARACTERIZATION OF POLYMER GEL ELECTROLYTE FOR ELECTROCHROMIC DEVICES**”.
- \* Final Group Project Report Submitted and Group presentation of Project Report on the topic of “**CHARACTERISTIC FEATURES OF EXOTIC NUCLEI**”.

## Awards and fellowships

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- Senior Research Fellowship (SRF) from Sep-2021 to Aug 2024, awarded by CSIR, India.
- Junior Research Fellowship (JRF) from Aug-2019 to Aug 2021 date, awarded by CSIR, India.
- Science Quiz - 3<sup>rd</sup> position,  
Secured 3<sup>rd</sup> position among all the training participants in Science Quiz under “Synergistic Training Programme Utilizing the Advanced Research Instrumentation (STUTI)” sponsored by Department of Science and Technology (DST), Govt. of India. Organised by Department of Physics, Aligarh Muslim University (AMU), Aligarh (India),  
10-May –2022
- CSIR NET/JRF (Physical Science),  
Indian National Level exam qualified with All India Rank (AIR) -173  
Dec–2018
- IIT-JAM (Physics) Feb –2017

## Hobbies and Extracurricular Activities

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- User support (in some characterization techniques, ion beam experiments)
- Worked as a Resource person in the conferences, school, and workshops organized by IUAC.
- Volunteer in almost all the IUAC facility visiting (from Aug 2019 to till date) programs organized by IUAC
- Volunteer at Foundation Day of IUAC 2019
- Cricket & Badminton