

Md Anamul Hoque, PhD
Nanotechnology Researcher
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Short Bio

I pursued postdoctoral research at Chalmers University of Technology after completing my PhD, specializing in quantum transport properties in nanomaterials for logic, memory, and sensor applications. I have a cross-border employment record, which includes PhD in Nanoscience and Nanotechnology at Chalmers University, three years of teaching experience at a reputed university in Bangladesh, and a short internship at Walter Schottky Institute in Munich, Germany. I have almost ten years of research and teaching experience specializing in the fields of condensed matter physics, device physics, photonics, electrical and electronic engineering, nano-device fabrication processes and material science. Besides, I am experienced and proficient in new material technology and device physics with new two-dimensional materials like graphene, transition metal dichalcogenides, and numerous device characterization methods. For the last few years, I have collaborated internationally with about 10 research groups in several international universities and worked with people across many different educational and cultural backgrounds. Furthermore, I supervised and mentored several bachelor's and master's thesis students in original research projects. In addition, I communicated science through different platforms, such as research publications, group meetings, and conference presentations. I have authored more than 20 journal articles, including publications in Nature Communications, Nano Letters, ACSNano and Physical Review Research, and about 950 Google Scholar citations, reflecting my enthusiasm to conduct original work.

Education

Doctor of Philosophy in Microtechnology and Nanoscience

Chalmers University of Technology, Sweden

05/2018 – 12/2022



CHALMERS

- Doctoral Thesis: “Charge-Spin Conversion and Electronic Transport in Two-Dimensional Materials and Van der Waals Heterostructures.”
- Awarded 2D TECH PhD prize for the contribution to 2D material-based technology during my doctoral research work.
- Fabricated nano-scale devices in a state-of-the-art cleanroom, tested the devices in the lab, analyzed the data to realize and optimize device performance, and wrote manuscripts.
- Co-supervised two master's theses with original research projects and mentored laboratory and problem-solving classes for students.

- Coursework: Nano-processing technologies, Nanomaterials, Semiconductor materials physics, Applied project management, Advanced communication, Managing effect teams.

Master of Science in Nanoscience and Nanotechnology

08/2014 – 08/2016

KU Leuven, Belgium and Chalmers University of Technology, Sweden

KU LEUVEN



- Master's Thesis: "Graphene and Transition Metal Dichalcogenide Heterostructures: A New Platform for Spin-Orbit Physics".
- Specialization: Nanoelectronics | Graduated *Magna Cum Laude* (79.98%).
- Coursework: Electronic Transport, Materials and Devices for PV applications, Materials Physics and Technology for Nanoelectronics, Semiconductor Devices and Physics, Technology of Integrated System, Quantum Physics, Chemistry at Nanometer Scale.

Bachelor of Science in Electrical and Electronic Engineering

09/2009 – 12/2012

BRAC University, Bangladesh



- Thesis: "Electrically assisted hybrid vehicle" (published in IEEE).
- Double major in Electronics and Power.
- Graduated with Highest Distinction with CGPA 3.95/4.
- Awarded Performance-Based Scholarship (80% tuition fee waiver) for academic excellence.
- Undergraduate tutor and peer mentor for Electrical Engineering students (2 years).
- Coursework in major: Optoelectronic Devices, VLSI Design, Digital System Design, Power System, Power System Reliability.

Professional Experience

Post-Doctoral Researcher (2 Years)

01/2023-01/2025

Chalmers University of Technology, Sweden

- Research to engineer device performance for electronic, photovoltaic, and magnetic sensor applications using new materials.
- Adapt different design and fabrication processes and test the device performance in the electronic laboratory with different measurement tools and analysis processes.
- Ideated and mentored master's degree theses on performance analysis of semiconductor devices and collaborated with leading research groups.

Doctoral Researcher (4.5 Years)

05/2018 – 12/2022

Chalmers University of Technology

- Ideated the scope and aims of many research projects in several materials science and device

physics fields to optimize nanodevice performance for sensor, memory, and logic applications.

- Calibrate and optimize device fabrication methods to enhance device yielding and performance.
- Fabricated nano-scale devices by combining different materials in the clean room with state-of-the-art machines, test those devices in the lab, analyzed the test results to realize device working principles, and reported manuscripts.
- Collaborated with international universities and research groups within Sweden.
- Coordinated procurement and assisted installation of laboratory equipment from global vendors.
- Coordinated the master's thesis projects, laboratory training and problem-solving classes.

Lecture (3 Years)

BRAC University

01/2013 – 08/2014

09/2016 – 05/2018

- Conducted theory and lab courses of the Bachelor of Science in Electrical and Electronic Engineering program.
- Supervised few thesis groups on understanding condensed matter physics in nano-scale devices.
- Contributed to the curriculum development of the B.Sc. courses and engaged with the undergraduate admission test committee, ensuring high standard of integrity and diligence in the selection process.

Summer Internship at Walter Schottky Institute (2 Months)

Ludwig Maximilian University and Technical University of Munich, Munich, Germany

06/2016 – 08/2016



- Designed and carried out syntheses extensive experimental exploration of solution-gated graphene field effect transistor (SGFET) for bio-sensor applications. This internship was funded by Nanosystem Initiative Munich.

Research Assistant at IMEC (2 Months)

Leuven, Belgium

02/2015 – 04/2015



- Worked as a research assistant at IMEC as a part of a coursework during the Master's degree program at KU Leuven. We analyzed the size of the thin film grain boundaries of noble metals for interconnects in microchips.

Undergraduate Teaching Assistant (2 years)

BRAC University, Bangladesh

09/2010 – 08/2012

- My duties were to check the quiz papers, assignments and give consultation to the students regarding course materials.

Special Competencies and Skills

Device physics	Transistors, solar cells, materials' interface engineering.
Material science	Metals, semiconductors, superconductors, insulators, acids, bases, solvents, developers.
Fabrication	Lithography (E-beam, optical), thin-film material deposition techniques, new material synthesis, high-temperature processes, etching techniques (RIEB, chemical, plasma, ion), ALD, Dicing Si wafer.
Characterization	Scanning electron microscope, optical microscope, atomic force microscope.
Computing	Matlab, Python (NumPy, Scikit-learn, OpenCV), OriginLab, Blender, COMSOL, AutoCAD, Labview, Microsoft Office Suite, Electronics circuit simulator (PSpice, Proteus), Microwind suite.
Electronics	Source measurement unit (SMU) for electrical measurements. Physical property measurement system (PPMS) and cryostats for electrical and magnetic measurements. High voltage motors, generators, batteries, microcontroller.
Personal skills	Problem-solving, critical thinking, project management and organization, communication and presentation skills, collaboration and teamwork, leadership, adaptability & resilience.
Languages	English (Advanced), Swedish (Beginner and studying), Bengali (Native).

Teaching and Supervision Experiences

I instructed almost all the laboratory courses of the Bachelor of Electrical and Electronic Engineering (EEE) program during my first tenure at BRAC University from 2013-2014. I also instructed some bachelor's level theory courses both in Physics and EEE programs during my second tenure at BRAC University from 2016-2018. I was a lab tutor of graduate-level courses at Chalmers University of Technology during my Ph. D. program. These attributes highlight my experiences in pedagogical practice. A few course names are given in the following.

- [Electronics Circuits II](#) (Bachelor's course), Lecturer and Examiner (2016-2018).
- [Semiconductor Devices and Materials](#) (Bachelor's course), Lecturer and Examiner (2016-2018).
- [Science and Technology of Two Dimensional Materials](#) (Bachelor's course designed by me), Lecturer and Examiner (2016).
- [Advanced Solid State Physics](#). Bachelor's course, Lecturer and Examiner (2017).
- [Semiconductor Materials Physics](#). I was a teaching assistant in this course during my PhD degree and post-doctoral research, which was instructed by Saroj Prasad Dash at Chalmers University of Technology. I conducted exercise sessions, laboratory experiments, guided the students in the clean room, and prepared the assignments.
- [Co-supervision of Master's degree thesis](#). I have co-supervised five master's degree thesis

projects at Chalmers. All of the projects were completed successfully, and I have already published three manuscripts on those projects related to charge- and spin-transport in two-dimensional materials. I am currently preparing two new manuscripts on nanotransistors with two-dimensional semiconductors with the results from the recently finished master's thesis projects.

- I supervised a few bachelor's theses at BRAC University, Bangladesh on graphene-based biosensors, grooved solar cells, synthesis of nanoparticles.

Training

- I participated in the Teaching & Learning Workshop dedicated to interactive teaching methods, at BRAC University in May 2013.
- I followed the Teaching, learning, and evaluation course during my Ph.D. degree and learned some information on effective teaching techniques, like the flip classroom method.

Conferences and Activities

- I was a member of the MC2 PhD Student Council.
We conducted monthly meetings to discuss the benefits of all Ph.D. students, i.e., academic, social, bureaucratic, or any other kind of issues.
- Attended several international conferences to present research outcomes through oral and poster presentations.
2D Transition Metal Dichalcogenides 2023, Cambridge, UK
ATC-ATG, 2020 IEEE MAGNETICS SOCIETY, IEEE (online)
SPICE-Workshop on 2D van der Waals Spin Systems (online)
- As a voluntary work, I introduced high school students to nano-device fabrication and testing processes for their school projects, providing hands-on guidance to help them gain practical insights into advanced semiconductor technologies.

Awards and Certificates

- 2D TECH PhD prize for opening prospects for high-performance and energy-efficiency logic and memory technologies with two-dimensional semiconductors.
- I was positioned 'magna cum laude' in my master's degree in Nanoscience and Nanotechnology.
- Rotary International Student House Scholarship (RISH), Goteborg, Sweden.
- Received the "Vice Chancellor's List"/"Dean's List" Award in all semesters of my undergraduate program for excellent academic results.

Publications

More than 20 first-class publications in physics, chemistry, and material science journals with h-index 14 and i10 index 18. Details are available on my Google Scholar page. My ORCID is: <https://orcid.org/0000-0002-2117-7177>. A few selective publications are given in the following.

- **MA Hoque**, et al. "Ultranarrow Semiconductor WS₂ Nanoribbon Field-Effect Transistors.", Nano Letters 2025 25 (5), 1750-1757.
- **MA Hoque**, et al. "Large Spin Signal with Amplification and Rectification in Graphene Nanoribbon", submitted to ACSNano.
- **MA Hoque**, et al. "All-2D CVD-grown Semiconductor Field-Effect Transistors with van der Waals Graphene Contacts", npj 2D Materials and Applications 8.1 (2024): 55.
- **MA Hoque**, et al. "Room temperature nonlocal detection of charge-spin interconversion in a topological insulator". npj 2D Materials and Applications 8.1 (2024): 10.
- **MA Hoque**, et. al. "Spin-valley coupling and spin-relaxation anisotropy in all-CVD Graphene- MoS₂ van der Waals heterostructure". Physical Review Materials 7.4 (2023): 044005.
- **MA Hoque**, et al. "Charge to spin conversion in van der Waals metal NbSe₂." Applied Physics Letters 121.24 (2022).
- **MA Hoque**, et al. "All-electrical creation and control of spin-galvanic signal in graphene and molybdenum ditelluride heterostructures at room temperature." Communications Physics 4.1 (2021): 124.
- K Dmitrii, **MA Hoque**, et al. "Gate-tunable spin-galvanic effect in graphene-topological insulator van der Waals heterostructures at room temperature." Nature communications 11.1 (2020): 3657.
- **MA Hoque**, et al. "Charge-spin conversion in layered semimetal TaTe₂ and spin injection in van der Waals heterostructures." Physical Review Research 2.3 (2020): 033204.
- KK, Zoltán, **MA Hoque**, et al. "Electrically controlled spin injection from giant Rashba spin-orbit conductor BiTeBr." Nano Letters 20.7 (2020): 4782-4791.
- Z Bing, **MA Hoque**, et al. "Observation of charge to spin conversion in Weyl semimetal WTe₂ at room temperature." Physical Review Research 2.1 (2020): 013286.
- Z Bing, **MA Hoque**, et al. "Unconventional charge-spin conversion in Weyl-semimetal WTe₂." Advanced Materials 32.38 (2020): 2000818.

References

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