Samiul Hossain Sajal

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Summary

Physics master's candidate at the University of Cologne with research experience in microscopy data analysis and computational materials physics. Interested in experimental and computational materials science, using programming, simulation and machine learning as tools to investigate materials and support research. Open to learning new experimental techniques and computational methods.

Education

MSc Physics Oct 2022 – present

University of Cologne *Germany*

- Primary specialization: Condensed Matter Physics.
- Secondary specialization: Solid State Theory / Computational Physics.
- Expected completion: early 2027.

MSc Physics Jun 2019 – Nov 2021

Shahjalal University of Science and Technology *Bangladesh*

- Thesis topic: molecular dynamics of aluminium nanoparticle formation and oxidation during pulsed laser ablation in liquids.

BSc Physics Mar 2015 – Apr 2019

Shahjalal University of Science and Technology *Bangladesh*

Research Experience

MSc Thesis Researcher / Student Research Assistant Nov 2025 – Oct 2026

Institute for Materials Data Science and Informatics (IAS-9), Forschungszentrum Jülich *Germany*

Machine Learning-Based Analysis of Grain Growth in Nanocrystalline Metals

Supervisors: Dr.-Ing. Bashir Kazimi; Prof. Dr. Stefan Kesselheim (University of Cologne).

- Implemented MatSAM segmentation and morphological refinement for in-situ TEM grain-growth videos; trained U-Net with synthetic labels and experimental images using MatSAM pseudo-labels.
- Tested EBSD-derived boundary maps as reference data and Hungarian assignment for tracking; identified TEM–EBSD mismatch and inconsistent frame segmentation as key limitations.
- Developed a prompted temporal mask-selection pipeline using overlap, area and centroid consistency; compare SAM models and existing native SAM3 video propagation as an alternative.
- Created manually annotated validation data with persistent grain identities and region-aware evaluation. Quantitative segmentation, tracking and grain-area analysis remain ongoing.

MSc Thesis Researcher – Computational Materials Physics Oct 2019 – Nov 2021

NLO Research Laboratory, Shahjalal University of Science and Technology *Bangladesh*

- Studied aluminium nanoparticle formation and oxidation using LAMMPS/ReaxFF, comparing cooling from 5000 K to 300 K under five conditions.
- Analyzed cluster size, atomic structure and oxidation using Python, OVITO and VMD in HPC workflows.

Thesis: doi:10.13140/RG.2.2.21838.43845.

Presentations

Poster – Bangladesh Physical Society 2021
Atomic-scale investigation of the formation of Al nanoclusters in the Pulsed Laser Ablation Technique.

Technical and Research Skills

Languages	:	Python, Julia
Scientific libraries	:	NumPy, SciPy, Pandas, Matplotlib, OpenCV, scikit-image
Deep learning	:	PyTorch, U-Net, MatSAM, SAM, SAM2, SAM3
Computer vision	:	Image and instance segmentation, video tracking, Hungarian matching
Materials analysis	:	LAMMPS, ReaxFF, OVITO, VMD, EBSD data exploration
Research tools	:	Napari, TensorBoard, Linux, GPU/CUDA workflows, HPC, Git/GitHub, LaTeX

Selected Academic Coursework

- Computational Many-Body Physics; Deep Learning and Physics.
- Scientific Programming with Python; Intensive Week Coding (Julia); Statistics with R.
- Condensed Matter Physics I and II; Superconductivity; Scanning Probe Microscopy; Correlations in 2D.
- Practical training in condensed matter and atomic and molecular physics.

Research Interests

- Materials science and microstructure evolution
- Computational and experimental materials science and simulation
- Machine learning and deep learning for materials
- Computer vision for electron microscopy

Professional Training

Deep Learning with PyTorch Image Segmentation 2025
Coursera Project Network
Python for Everybody 2025
University of Michigan via Coursera
Google Data Analytics Professional Certificate 2022
Google via Coursera

Awards and Recognition

National Science and Technology Fellowship 2020–2021
Ministry of Science and Technology, Bangladesh

Languages

Bangla: native | English: fluent (C1) | German: A1.2, currently studying

Additional Employment

Restaurant Employee Jan 2024 – Sep 2025
Atawich, ATACO GmbH
Sortation Associate Jun – Sep 2023
Amazon Deutschland Service GmbH