

Sadiq Shahriyar Nishat

U.S. Permanent Resident

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SUMMARY

Ph.D. in Materials Engineering (**SRC Scholar**) with 4+ years of experience in semiconductor technology development and **FEOL/BEOL integration** for copper-alternative interconnects at sub-10 nm nodes, focusing on mitigating electron surface scattering. Expertise in **epitaxial thin films, metal deposition**, device/process characterization (**XRD, XPS, FIB-SEM, TEM**) and metrology. Proficient in **cleanroom fabrication, DFT-based simulation**, and data analysis (**Python**) with strong knowledge of **MOSFET** and **DRAM** device physics and characterization methods.

EDUCATION

Doctor of Philosophy in Materials Engineering <i>Rensselaer Polytechnic Institute (RPI), Troy, NY</i> <i>Semiconductor Research Corporation (SRC) Scholar</i>	Aug 2021 – Expected: March 2026
Master of Science in Physics (CGPA: 3.80/4.0) <i>University of Dhaka, Dhaka, Bangladesh</i>	2018 – 2019
Bachelor of Science in Physics (CGPA: 3.53/4.0) <i>University of Dhaka, Dhaka, Bangladesh</i>	2014 – 2017

SKILLS

• Material Deposition & Growth	DC/RF magnetron sputtering, UHV PVD, ALD, ALE
• Semiconductor Process	Dry etching, photolithography, Thin films, EBL, 300mm wafer handling
• Characterization	XRD, XRR, XRF, XPS, EDS, SEM, AFM, electrical I-V/C-V
• Process & Quality Control	DOE, Root Cause Analysis, failure analysis, Process Optimization, and SPC
• Simulation & Modeling	VASP, Wannier90, Phonopy, Quantum Espresso
• Programming & Data Analysis	Python (Scikit-learn, Pandas, NumPy), C/C++, Bash, LaTeX (Overleaf)
• Lab Automation & Setup	UHV System Design & Automation, Student Mentoring & SOP Development

INTERNSHIP EXPERIENCE

Process Engineering Intern <i>Applied Materials</i>	May 2024 – Aug 2024 <i>Santa Clara, California</i>
• Optimized a plasma etch process for TiN/TiSi , improving etch selectivity by 80% through XPS-guided DOE.	
• Resolved a customer (TSMC) RF plasma instability in tungsten gradient oxidation through root-cause analysis and SiO _x dome insulation.	
• Contributed to 300mm process module optimization and cross-site SPC integration via DOE.	
• Trained a full-time engineer on advanced XPS data analysis workflows using CasaXPS, improving team efficiency.	

RESEARCH & TECHNICAL EXPERIENCE

Graduate Research Assistant Rensselaer Polytechnic Institute (RPI)	Aug 2021 – Present
<i>Interface-Driven electron Surface Scattering in Directional and Conventional Conductors: (funded by Semiconductor Research Corporation (SRC))</i>	
• Led the research and synthesis of novel materials, developed processes for highly crystalline 7 nm epitaxial Ru , AlN, Mo ₂ N, and topological NbAs thin films using UHV PVD.	
• Implemented Ti capping layers on Ru thin films for electron surface scattering demonstration.	
• Established experimental protocols for measuring electron specularly, enabling the detection of (1%) variations in sheet resistance from capping and oxidation.	
• Interpreted transport behavior in layered oxide conductors (PtCoO ₂ , PdCoO ₂) and Ru.	

Epitaxial Growth and Anisotropic Transport in CoSn Thin Films: (funded by Tokyo Electron (TEL))

- Researched and developed the synthesis of epitaxial CoSn thin films, developed the use of a 2 nm Ru buffer as a novel integration solution for advanced material growth.
- Pioneered a new transport measurement methodology for CoSn by designing and fabricating out-of-plane devices using SEM-FIB, EBL, and GIS techniques.

Fabrication and Characterization of N-Channel MOSFET (A course project):

- Fabricated NMOS devices with self-aligned process reaching 2 μm feature size on 3 inches wafers.
- Mastered 50+ processing steps in 9 weeks including four lithography steps, implantation, and metal deposition.
- Characterized device performance with I-V, C-V, contact resistance, and breakdown measurements.

UHV PVD System Automation and Laboratory Development:

- Implemented research equipment by designing, programming, and implementing Arduino-based control and data collection systems for a UHV PVD chamber.
- Project-managed the complete assembly and commissioning of a new UHV PVD system and led the control system upgrade for legacy chambers.

TECHNICAL LEADERSHIP & SERVICE

Chief Manager (DFT trainer and Server management) Volunteering

Dec 2019 — Present

Center for Integrated Studies in Nanoscience and Nanotechnology, SUNY-Buffalo State

Buffalo, NY

- Mentored and trained 15+ of undergraduate students in Density Functional Theory (DFT) methods, enabling contributions to multiple independent and collaborative research projects.
- Directed the operation and maintenance of the center's computational cluster, supporting over 20 researchers and ensuring high availability for research workflows

PRESENTATION & AWARDS

- Presented talk and poster at **SRC TECHCON** at Austin, TX Sep 2025
- Semiconductor Research Corporation (SRC) Scholar 2023-2026
- **UPWARDS** Graduate Student Workshop at Boise State University April 2025
- **Best Poster Presentation Award (1st Place)** | 2024 Albany Nanotechnology Symposium Nov 2024
- **Best Poster Presentation Award** | ASM International Eastern NY Student Poster Contest Feb 2024

PUBLICATIONS

Co-authored over **40 peer-reviewed** articles with **1200+ citations**. A complete list is available at: [Google Scholar](#)

- **S. S. Nishat**, and D. Gall, "[Electron scattering at Ru\(0001\) surfaces: Effect of Ti caps and oxygen exposure](#)," *Applied Physics Letters* 127(18), (2025).
- Y. Li, G. Zhou, M. M. Kelley, **S. S. Nishat**, S. Bey, M. A. Karim, X. Liu, B. A. Assaf, D. Gall, R. Sundaraman, C. L. Hinkle "[PtCoO₂ for Scaled Interconnects](#)," *The Journal of Small Structure*, 2025.
- MYE, Azoff-Slifstein, A. Thakral, **S. S. Nishat**, M. R. Islam, P. E. Hopkins, D. Gall "[Mechanical Properties of Compositionally Modulated Epitaxial VN \(001\)/VC \(001\) Films](#)," *Acta Materialia*, 121135, 2025.
- **S. S. Nishat**, M.J. Hossain, F.E. Mullick, A. Kabir, S. Chowdhury, S. Islam, M. Hossain, "[Performance Analysis of Perovskite Solar Cells Using DFT-Extracted Parameters of Metal-Doped TiO₂ Electron Transport Layer](#)," *The Journal of Physical Chemistry C*, vol. 125, no. 24, pp. 13158–13166, 2021.
- N. Hasan, **S. S. Nishat**, S. Sadman, M.R. Shaown, M.A. Hoque, M. Arifuzzaman, A. Kabir, "[Magnetic, optoelectronic, and rietveld refined structural properties of Al³⁺ substituted nanocrystalline Ni-Cu spinel ferrites: An experimental and DFT based study](#)," *The Journal of Magnetism and Magnetic Materials*, vol. 573, 2023.