

# Asir Intisar Khan

Graduate Student (PhD)  
Electrical Engineering  
Stanford University

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## Education

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**PhD Candidate in Electrical Engineering**, Stanford University Sept. 2018 – Present  
(**Expected Graduation:** Dec 2023)  
Research Supervisor: *Prof. Eric Pop* (Electrical Engineering)  
GPA: **4.215/4.00**

**M.Sc. in Electrical and Electronic Engineering** May 2018  
Bangladesh University of Engineering and Technology (BUET)  
CGPA: **3.92/4.00**

**B.Sc. in Electrical and Electronic Engineering (EEE)** March 2016  
Bangladesh University of Engineering and Technology (BUET)  
CGPA: **3.95/4.00**

## Current Research Interests

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Superlattice-like Phase Change Memory (PCM) | Neuromorphic Computing | Flexible Memory | 2D Sensors | Thermoelectric Engineering of PCM | Low-power Solid State Reflective Display | Area Selective Resistive Random Access Memory

## Research Experience

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**Stanford University** | [Pop Lab](#) Sept. 2018 – Present  
Principal Investigator: *Prof. Eric Pop*

- **Design and performance optimization of superlattice-like Phase Change Memory (PCM):** Fabrication and characterization of Superlattice films for low power memory application
  - ❖ Developed growth and fabrication for ultralow power non-volatile memory devices
- **Interfacial thermoelectric engineering of PCM:** Realization of ~2x reduction in the switching current density in conventional PCM using thermoelectric material
  - ❖ Conceptualized and implemented the novel idea of incorporating interfacial thermoelectric heating in a conventional phase change memory
- **Low power flexible nonvolatile memory:** Fabrication and characterization of low power non-volatile memory on a flexible platform
  - ❖ Demonstrated record-low switching power in flexible non-volatile memory devices
- **Towards fast temperature sensing using ultrathin 2D materials:** Design, fabrication and characterization of temperature sensors using 2D materials
  - ❖ Demonstrated record-high temperature coefficient of resistance in atomically-thin 2D materials
- **Low-power solid state reflective display:** Working on the optimization of low power solid state reflective display using novel phase change heterostructures

**Bangladesh University of Eng. & Tech. (BUET)** Jan. 2015 – Aug. 2018  
Principal Investigator: *Prof. Samia Subrina*

- **Thermal transport in novel 2D materials:** Graphene nanoribbons, hexagonal boron nitride ribbons, graphene/stanene heterobilayers
- **Electronic modeling of novel 2D nanomaterials:** Stanene, stanene/h-BN, stanene/silicene

## Journal Publications ([Google Scholar Profile](#))

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- (9) A. I. Khan, P. Khakbaz, K. Brenner, K.K.H. Smithe, M. Mleczko, D. Esseni, and E. Pop, "Large Temperature Coefficient of Resistance in Atomically Thin Two-Dimensional Semiconductors" *Applied Physics Letters*, 116, 203105 (2020)
- (8) M. Noshin, A. I. Khan, and S. Subrina, "Thermal transport characterization of stanene/silicene heterobilayer and stanene bilayer nanostructures", *Nanotechnology* 29, 185706 (2018)
- (7) I. A. Navid, A. I. Khan and S. Subrina, "Impact of tensile strain on the thermal transport of zigzag hexagonal boron nitride nanoribbon: An equilibrium molecular dynamics study", *Materials Research Express* 5, 025015 (2018)
- (6) A. I. Khan, T. Chakraborty, N. Acharjee, and S. Subrina, "Stanene-hexagonal boron nitride heterobilayer: Structure and characterization of electronic property" *Scientific Reports* 7, 16347 (2017)
- (5) A. I. Khan, R. Paul, and S. Subrina, "Characterization of thermal and mechanical properties of stanene nanoribbons: A molecular dynamics study", *RSC Advances* 7, 50485-50495 (2017)
- (4) A. I. Khan, I. A. Navid, M. Noshin, and S. Subrina, "Thermal Transport Characterization of Hexagonal Boron Nitride Nanoribbons Using Molecular Dynamics Simulation" *AIP Advances* 7, 105110 (2017)
- (3) A. I. Khan, R. Paul, and S. Subrina, "Thermal transport in graphene/stanene hetero-bilayer nanostructures with vacancies: An equilibrium molecular dynamics study", *RSC Advances* 7, 44780-44787 (2017)
- (2) M. Noshin\*, A. I. Khan\*, I. A. Navid, H. M. A. Uddin, and S. Subrina, "Impact of vacancies on the thermal conductivity of graphene nanoribbons: A molecular dynamics simulation study", *AIP Advances* 7, 015112 (2017) [\* Equal Contribution]
- (1) A. I. Khan, I. A. Navid, M. Noshin, H. M. A. Uddin, F. F. Hossain, and S. Subrina, "Equilibrium Molecular Dynamics (MD) Simulation Study of Thermal Conductivity of Graphene Nanoribbon: A Comparative Study on MD Potentials", *Electronics: Special issue Two-Dimensional Electronics- Prospects and Challenges* 4, 1109-1124 (2015)

## Selected Articles in International Conference

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- (6) A. I. Khan, A. Daus and E. Pop, "Flexible Low-Power Superlattice-Like Phase Change Memory," *IEEE Device Research Conference (DRC)*, Jun 2020, Columbus OH
- (5) A. I. Khan, K. Brenner, K.K.H. Smithe, M.J. Mleczko and E. Pop, "Large Temperature Coefficient of Resistance in Atomically Thin 2D Devices", *IEEE Device Research Conference (DRC)*, pp. 125-126, Jun 2019, Ann Arbor MI
- (4) M. Noshin, A. I. Khan, I. A. Navid, and S. Subrina, "Thermal Transport in Defected Armchair Graphene Nanoribbon: A Molecular Dynamics Study", 2017 IEEE Region 10 Conference (TENCON), Penang, Malaysia, pp. 2600-2603 (2017)
- (3) S.A. Fattah, M. Rahman, N. Mustakin, M. T. Islam, A. I. Khan, C. Shahnaz, "Wrist-Card: PPG Sensor based Wrist Wearable Unit for Low-Cost Personalized Cardio Healthcare System", GHTC 2017, IEEE Global Humanitarian Technology Conference, October 2017
- (2) A. I. Khan, I. A. Navid, F. F. Hossain, M. Noshin, and S. Subrina, "A Molecular Dynamics Study on Thermal Conductivity of Armchair Graphene Nanoribbon", 2016 IEEE Region 10 Conference (TENCON), Singapore, pp. 2775-2778 (2016)
- (1) A. Bhattacharjee\*, A. I. Khan\*, M. Z. Haider, S. A. Fattah, D. Chowdhury, M. Sarkar, and C. Shahnaz, "Bangla voice controlled robot for rescue operation in noisy environment", Region 10 Conference (TENCON), 2016 IEEE, 3284-3288 (2016) [\* Equal Contribution]

## Manuscripts in Preparation

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- (4) A. I. Khan, H. Kwon, R. Islam, C. Perez, M. Chen, M. Asheghi, K.E. Goodson, H.-S. P Wong, and E. Pop, "Large Reduction of Switching Current Density in Phase Change Memory Using Bi<sub>2</sub>Te<sub>3</sub> Thermoelectric Interfacial Layer" (2020)
- (3) A. I. Khan, H. Kwon, C. Neumann, M. Chen, H.-S. P Wong, M. Asheghi, K.E. Goodson, and E. Pop, "Thermal, Electrical and Atomistic Insights into the Superlattice-like Phase Change Heterostructures with Record-low Switching Current Density", (2020)

- (2) **A. I. Khan**, A. Daus, H. Kwon, and E. Pop, "Superlattice-Like Phase Change Memory with Record-low Switching Power on a Flexible Platform", (2020)
- (1) Il-Kwon Oh<sup>†</sup>, **A. I. Khan**<sup>†</sup>, R. Islam, M. Chen, H.-S. P Wong, E. Pop and S. Bent, "Resistive Random Access Memory Devices by Area-Selective Atomic Layer Deposition Method" (2020) [<sup>†</sup>Equal Contribution]

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## Relevant Coursework

### Graduate Courses (Stanford University)

Principles and Models of Semiconductor Devices | Integrated Circuit Fabrication Processes (Autumn 2018-2019);  
Fundamentals of Heat Conduction (Winter 2018-2019) | Advanced Integrated Circuit Technology (Spring 2018-2019)  
| New Methods in Thin Film Synthesis (Autumn 2019-2020) | Applied Quantum Mechanics II (Winter 2019-2020) |  
Energy in Electronics | Electronic and Optical Properties of Solids (Spring 2019-2020)

### M.Sc. Courses and Undergraduate Courses:

Semiconductor Characterization Technology | Quantum Phenomena in Nanostructures | Compound Semiconductor  
Devices | Electrical Properties of Materials | Solid State Devices | Optoelectronics | Analog Integrated Circuits

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## Professional Experience

**Grader** (EE 216, Principles and Models of Semiconductor Devices) Winter 2019  
Department of Electrical Engineering  
Stanford University, Stanford, CA

**Lecturer** Oct. 2016 – Aug. 2018  
Department of Electrical and Electronic Engineering (EEE)  
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

**Summer Internship (to be completed)** Summer 2020  
Taiwan Semiconductor Manufacturing Company (TSMC)  
San Jose, CA

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## Fabrication and Characterization Skills

Multilayer Thin Film Growth, Sputtering, Electron Beam Evaporation, Photolithography, Etching, Scanning  
Electron Microscopy, X-ray Diffraction, Electrical Characterization and Measurement

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## Computer Skills

MATLAB, Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS), Quantum Espresso, ATK-  
Virtual Nanolab, SPICE, KLayout

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## Academic Honors and Achievements

- **Stanford Graduate Fellowship**, Stanford University (2020-2022)
- **The Lewis M. and Barbara C. Terman Graduate Fellowship**, EE, Stanford University (2018-2019)
- **Dean's List Award** for academic excellence at all levels of undergraduate study
- **University Merit Scholarship** for academic excellence at undergraduate study
- **Champion, Robotics Category, Bangladesh ICT-EXPO 2016**, organized by Ministry of ICT, Bangladesh

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## Synergistic and Leadership Activities

- **Secretary, Executive Committee 2018**, IEEE EMBS Bangladesh Chapter
- **Treasurer, Executive Committee 2017**, IEEE EMBS Bangladesh Chapter
- **Member, Technical Committee**, 9<sup>th</sup> International Conference on Electrical and Computer Engineering 2016