Asif Billah

Ph.D. Student | Georgia Tech

abillah3@gatech.edu linkedin.com/in/asifbillah Atlanta, GA

Education

Present – Aug 2024 **Georgia Institute of Technology, Ph.D. in ECE**

- Focus : Ultra-Wide Bandgap Semiconductors
- Supervisor : Dr. P. Douglas Yoder
- Topic : Electronic structure and charge transport within impurity bands in ultra-wide bandgap semiconductors
- CGPA : 4.00/4.00

Work Experience

Nov 2024 – Nov 2024 **Guest Lecturer, ECE, Georgia Tech.**

- Course Taught : ECE 3040 | Microeletronic Circuits

Present – Aug 2024 **Graduate Research Assistant, Computational Electronics and Photonics Lab**

- Developed theoretical models for shallow donor and deep acceptor impurity bands in ultra-wide bandgap materials.
- Working on Monte Carlo charge transport model based on the obtained impurity band dispersions.
- Support for the works are offered by Defense Advanced Research Projects Agency (DARPA).

Research Experience

Present – Aug 2024 **Ultra-Wide Bandgap Semiconductors** | Dr. P. Douglas Yoder

- Developed theoretical model for shallow donor impurity bands in ultra-wide bandgap materials. **Manuscripts are in preparation.**
- Developing a novel model for deep acceptors in ultra-wide bandgap materials.
- Will build a Monte Carlo framework to investigate the carrier dynamics, using the calculated band structures as input.

Jul 2024 – Apr 2021 **Nanophotonics Research Group** | Dr. Muhammad Anisuzzaman Talukder

- Explained how element doping, graphene integration, and plasmonic (SPR/LSPR) strategies can overcome absorption, charge-transport, and kinetic limits in transition-metal-oxide photoelectrodes, outlining key performance metrics and future directions for scalable PEC water splitting to produce green hydrogen. [Adv. Energy Mater. (2025)]
- Looked into placing an ultra-thin iridium layer on standard electrodes to improve the efficiency of photoelectrochemical cells' hydrogen evolution reaction using DFT. [I. J. of Hydrogen Energy (2024)]
- Studied enhancing solar hydrogen generation efficiency in PECs by examining the effects of activation overpotential on solar energy conversion to fuel and the choice of suitable photo-absorbing materials and suitable electrode pairs to optimize the process. [Heliyon (2023)]

Selected Publications (Google Scholar)

2025 A. A. Mamun, A. H. Chowdhury, ***A. Billah***, Jawadul Karim, Auronno Ovid Hussain, Faysal Rahman, Muhammad Anisuzzaman Talukder, "*Advancing Transition Metal Oxide Photoelectrodes for Efficient Solar-Driven Hydrogen Generation : Strategies and Insights*", **Adv. Energy Mater. (2025)**. [Paper]

2024 A. A. Mamun, ***A. Billah***, Muhammad Anisuzzaman Talukder, "*Enhancing hydrogen evolution reaction using iridium atomic monolayer on conventional electrodes : A first-principles study*", **International Journal of Hydrogen Energy (2024)**. [Paper]

2023 A. A. Mamun, ***A. Billah***, Muhammad Anisuzzaman Talukder, "*Effects of activation overpotential in photoelectrochemical cells considering electrical and optical configurations*", **Heliyon (2023)**. [Paper]

Technical Skills

- Programming Languages : C/C++, MATLAB, Python, System Verilog
- Simulation Software : Quantum espresso, VESTA, Lumerical, Ansys, MEEP, COMSOL Multiphysics, Cadence, ModelSim, PSpice, Proteus, AutoCAD, PSAF
- ML Frameworks and Libraries : Deep Neural Network (using TensorFlow and Keras), Image processing (using OpenCV)
- Hardware Skills : Arduino, ATMEGA32, FPGA

Relevent Coursework

- Microelectronics Technology
- Advanced Logic Transistor
- Nano-electronics and Nanotechnology, Processing, and Fabrication Technology
- VLSI Circuits and Design
- Engineering Electromagnetics
- Power Electronics
- Optoelectronics
- Gigascale Integration
- Theory of Microelectronics
- Analog Integrated Circuits and Design
- Solid State Devices
- Compound Semiconductor Devices
- Microelectronic Circuits
- Electrical Properties of Materials
- Digital Electronics
- Photonic Devices and Materials

Honors and Awards

Gold Medal in the 2019 International University Physics Competition
Research grant received from RISE, BUET as an undergrad student
Dean's List Award for academic excellence at undergraduate study
University Merit Scholarship for academic excellence at undergraduate study