# Md. Rayid Hasan Mojumder

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## Professional Summary

Ph.D. student in Electrical Engineering at Penn State, researching photonic interconnects for heterogeneous integration and packaging. My specialization resides in pulsed-laser direct write lithography, fabrication of waveguides inside glass substrate, waveguide characterization, and photonic simulation using Lumerical and COMSOL (Wave Optics). In addition, I completed a few projects related to transistor modeling in Sentaurus TCAD. During undergrad, I used to do DFT simulation of materials in VASP and Quantum Espresso. Interested in jobs related to photontics and/or electronics.

## Education

**The Pennsylvania State University** — State College, PA

*Ph.D. in Electrical Engineering, Focus - Semiconductor Packaging/Optical Interconnects* — *Aug 2023 – Dec 2028*

- **Thesis**: Through Light Photonic Interconnect Vias for Advanced 3D Heterogeneous Integration

## Skills

**Nanofabrication** - Pulsed Laser Direct Write Lithography, Photolithography; Wet and Dry Etching; **Characterization** - Optical Microscope, Ellipsometry, Profilometer, SEM; **Measurement** - Optical testbed, Semiconductor Measurement Units.
**Photonic Simulation** - COMSOL, Lumerical; **Electronic Simulation** - Sentaurus TCAD; **Materials Simulation** - VASP, Quantum Espresso; **Programming** - Python, Bash, Matlab; **CAD Tools** - Autocad (2D), Solidworks (3D); **Data Analysis** - Spotfire, JMP.

## Work Experience *(1.5 years)*

**The Pennsylvania State University** — State College, PA

*Graduate Research Assistant, Dept. of Electrical Engineering* — *Jun 2024 – Date*

- Modeling, Fabrication, and Characterization of Through-glass Photonic Waveguide for 3D Heterogeneous Integration of Microelectronic System and Semiconductor Packaging.
- Tools Used: Type-100 Cleanroom, Femto-second Laser, Lithography, Santauras TCAD, COMSOL Multiphysics

**The Pennsylvania State University** — State College, PA

*Graduate Research/Teaching Assistant, Dept. of Engineering Science and Mechanics* — *Aug 2023 – May 2023*

- Fabrication and Characterization of Flexible Organic Synaptic Transistors Using P3HT Semiconductor.
- Tools Used: Spin-coater, Keithley Semiconductor Measurement Station, Optical Microscope.

## Research Projects

- **Jun 2024 - Date: Heterogeneous Integration of Microelectronic Systems Using Through Light Vias**:
  **- Skills:** COMSOL, WOP Laser Tool, Optical Waveguide Fabrication and Characterization, Type-100/1000 Cleanroom, Lithography, Etching, 3D Heterogeneous Integration
- **Jan 2024 - May 2024: Point Defect Formation Energy Calculation of GaN Using VASP (DFT)**:
  **- Skills:** VASP Suite, PyDefect Package, SLURM package, HPC System, Shell Programming.
- **Aug 2023 - Dec 2023: Soft Organic P3HT Neuromorphic Transistor Fabrication and Characterization**:
  **- Skills:** Neuromorphic Transistor Fabrication and Characterization, Spin-coating, Optical Microscopy
- **Sep 2021 - Nov 2022: Power System Stability Classification Using Deep Neural Network**:
  **- Skills:** Python programming, Machine Learning, DNN, Sci-kit learn and Keras frameworks, Matlab Simulink
- **May 2019 - Aug 2021: DFT Investigation of 2D Nanomaterials and Van der Waaals Heterostructures**:
  **- Skills:** Quantum Espresso, Shell Programming, Matlab Programming, Parallel Computation

## Honors & Awards

- **Sept. 2024 - Date: SRC Research Scholar**: Working under Semiconductor Research Corporation (SRC) JUMP 2.0 Center for Heterogeneous Integration of Micro Electronic Systems (CHIMES) at Penn State, under the supervision of Prof. Madhavan Swaminathan.
- **April 2023: Best Research Award**: In Recognition of Outstanding Quality Journal Publication. Placed within the top three raising faculty members who have shown exceptional research outputs during 2022. Issued By - Faculty of Graduate Studies (FGS), Daffodil International University, Bangladesh.
- **2022: IEEE Conference Best Paper Award - Second Place**: For an outstanding presentation of the submission titled "Effect of Dataset Size and Hidden Layers on the Stability Classification of IEEE-14 Bus System Using Deep Neural Network" in 2022 International Conference on Energy and Power Engineering (ICEPE-2022) held from 24th to 26th November, 2022. Issued By – ICEPE-2022, BRAC University, Dhaka, Bangladesh.

## Leadership

- **2023-2024**: Logistics Secretary, Bangladesh Students Association (BSA) - Penn State

## Relevant Courseworks

- **Academic Courseworks:**: Low-dimensional Nanoelectronics, Power Semiconductor Devices, Laser & Optical Electronics, Electro-optics: Principles and Devices, Advanced Transmission Electron Microscopy, Semiconductor Packaging, Engineering Electromagnetics
- **Certified Online Courseworks:**: Semiconductor Fabrication 101 Course - Purdue University, Nanotechnology: A Maker's Course - Duke University, Machine Learning Specialization - Standford University

## Publications

Key Publications:


- Md. R. H. Mojumder, C. Yu, and S. Kim, "Soft Artificial Synapse Electronics," Research, vol. 8, p. 0582, Dec. 2024, doi: 10.34133/research.0582.
- Md. R. H. Mojumder, Md. S. Islam, and J. Park, "Germanene/2D-AlP van der Waals heterostructure: Tunable structural and electronic properties," AIP Adv., vol. 11, no. 1, p. 015126, Jan. 2021, doi: 10.1063/5.0023448.


Total Number of Citations - 500 (h-index: 12)
Total Number of Publications - 20 (Journal Articles - 15, Conferences - 5)
Detailed Publications List : Google Scholar Profile