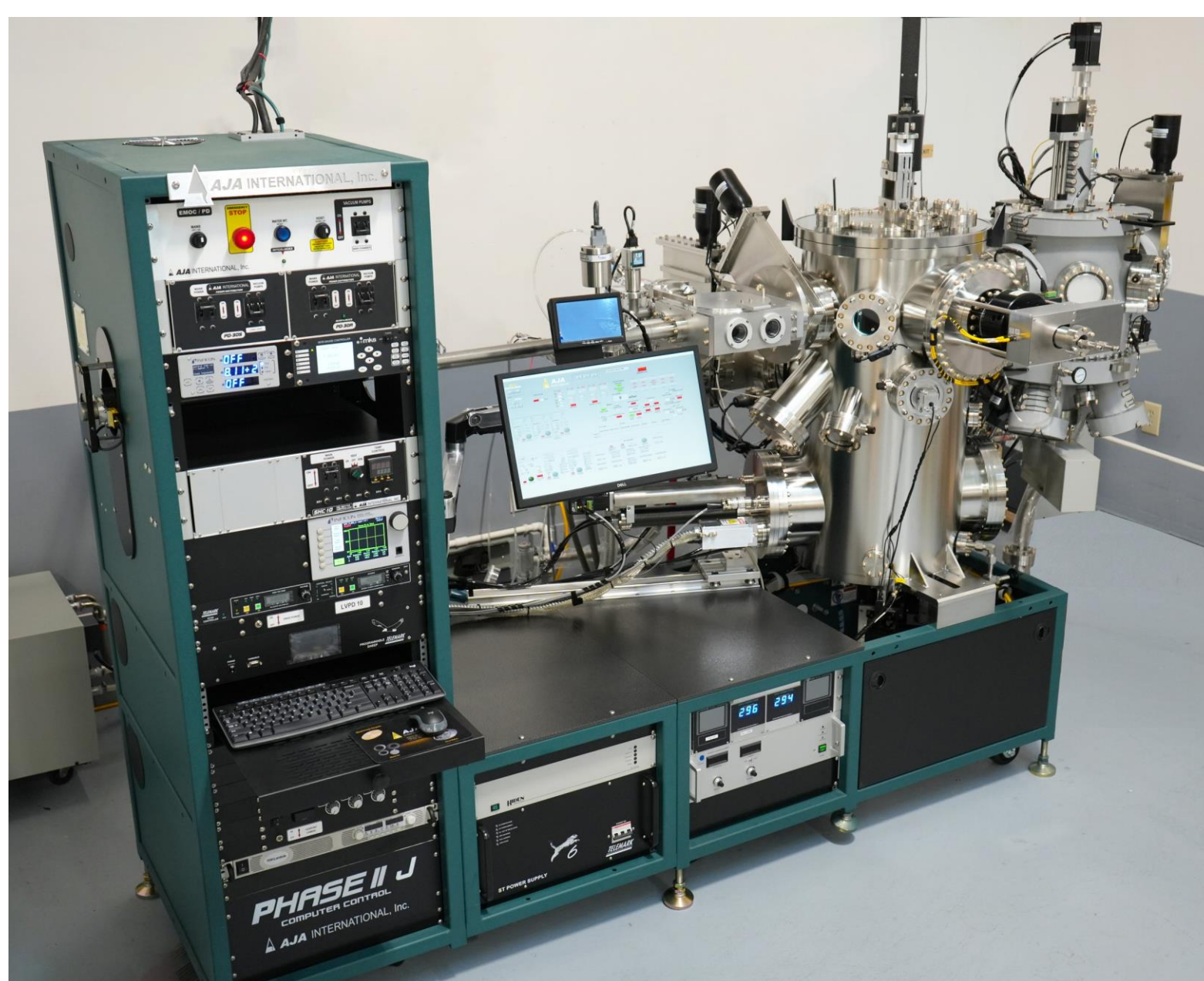


# NANOFABRICATION LABORATORY

## LAB OVERVIEW

Electronic and Photonic devices are serving as the key components in the field of carbon emission reduction, energy efficiency, electro-mobility, information technology, renewable energy, smart electricity distribution, wearable technology, and IoT-enabled sensing in health and agriculture. The establishment of the Nanofabrication Lab at the Department of Electrical and Electronic Engineering, BUET, is going to play a significant role in research and development in the field of electronic and photonic nanodevice and nanosystem fabrication and characterization. This lab will have the capabilities for the fabrication of full-scale electronic, optoelectronic, photonic, bioelectronic, biophotonic, and electromechanical devices. This lab will act as a hub for the academic and industrial research communities by providing services, training, and access to research facilities for nanoscale fabrication. Developing cost-effective and ingenious solutions for solving technological and engineering challenges of national importance will be the primary focus of the lab to attain SDGs and Smart Bangladesh Vision 2041.

## ILLUSTRATION



## Lab Directors

- Dr. Ahmed Zubair (ahmedzubair@eee.buet.ac.bd)
- Dr. Nadim Chowdhury (nadim@eee.buet.ac.bd)

## PRIMARY RESEARCH AREA

- **Nanoelectronics:** Semiconductor devices with enhanced performance and reduced power consumption; Quantum bits (qubits) for quantum computers; Flexible and wearable electronic devices using nanoscale materials
- **Nanophotonics:** Nanoscale LEDs, lasers, and photodetectors; plasmonics for sensing and imaging; Optical communication systems.
- **Nanomaterials:** Nanowires and nanoparticles; Nanocomposites; Metamaterials
- **Nanobiotechnology:** Biosensors; Drug delivery systems; Tissue engineering; Diagnostic devices
- **Energy Applications:** Photovoltaics; Batteries and Supercapacitors, Fuel Cells
- **Nanomechanics:** NEMS; Molecular Machines
- **Environmental Nanotechnology:** Pollution remediation; Sustainable materials development
- **Advanced Fabrication Techniques:** 3D nanoprinting; Self-assembly

## MISSION OF THE LAB

- 1. Innovative Research on Electronic and Photonic Nanomaterials:**  
To conduct extensive research on different electronic and photonic materials and devices for different applications through fabrication.
- 2. Nanodevice Fabrication:**  
To run different semiconductor front-end processes to fabricate the most optimized nanoscale device for suitable applications.
- 3. Educational Excellence and Training:**  
To provide comprehensive hands-on experience and training in micro and nanotechnologies, preparing students and researchers for leadership roles in the field of semiconductor materials and devices.
- 4. Prototyping and Production:**  
To turn research concepts into functional prototypes and to fabricate limited quantities of specialized nanodevices.
- 5. Interdisciplinary Collaboration:**  
To foster interdisciplinary collaboration and engage with the different institutes and research centers through workshops and outreach programs, promoting significance and understanding of nanotechnology.

## FACILITIES AND EQUIPMENT

- Cleanroom (ISO6-Class 1000) 2000 sft
- PICOMASTER200 (Mask less Laser Beam Lithography)
- E-beam-AJA ATC-1800-E (Metal and dielectric evaporator)
- Sputter-AJA-LL ATC-2200-UHV (Sputter deposition tool)
- Cambridge Nanotech Savannah 200 (Atomic Layer Deposition)
- PlasmaPro 100 Nano CVD (Growth of 1D/2D nanomaterials and heterostructures)
- Air Control Custom Hotplate Tower (Hotplate tower for pre- and post-baking)
- CEE Apogee Spin Coater (Spinner for user-supplied resist and small samples)
- Yield Engineering YES-310TA (Photo / Bake)
- Thierry Diener Nano-QL-PCCE7 (Photo / Clean)
- Air Control FH-25-SS-6FT (Solvent fume hood for spin coating)
- Acid-Etch-General (Acid hood for general-purpose acid work)
- SAMCO RIE-200iP (Chlorine-based plasma etcher for III-V materials)
- RIE-mixed-Samco-230iP (Broad purpose ICP etcher with  $F_2$ ,  $Cl_2$ ,  $Br_2$  Chemistry)
- RTA-1300C-ASOne150-5Gas ((Rapid Thermal Annealing)
- Diesaw-DAD3240 (Wafer dicing saw)
- KLS 10/12 (Chamber furnace working temperature up to 1200°C)
- Nitrogen Gas Generator (Nitrogen gas supply to desiccators, gloveboxes)
- Negative Pressure & Vacuum Glove Boxes



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