

MD ABDUL MOMIN, Ph.D.

Permanent Resident, USA

Senior Process Engineer - Photolithography | Semiconductor Process & Device Fabrication

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Summary

- > Ph.D.-trained semiconductor process engineer and device fabrication scientist with 8+ years of hands-on R&D experience across photolithography, silicon photonics manufacturing, cleanroom fabrication, thin-film processing, MEMS/NEMS sensors, photovoltaic devices, and advanced materials.
- > Current Senior Process Engineer - Photolithography at Skorpios Technologies, Inc., supporting semiconductor manufacturing through DOE/SPC optimization, overlay/CD control, metrology-driven troubleshooting, defectivity reduction, root-cause analysis, and stable wafer fabrication.
- > Hands-on cleanroom foundation in photolithography, spin coating, sputtering, CVD, thermal evaporation, E-beam lithography, ICP-RIE, wet/dry etching, device packaging, process integration, and equipment/process troubleshooting.
- > Experienced using KLA particle inspection, KLA overlay metrology, Applied Materials CD-SEM, SEM, AFM, profilometry, UV-Vis, J-V/EQE, GIWAXS, Flash-DSC, DSC, and electrical/mechanical testing to connect process conditions with device performance and reliability.
- > Strong data-driven process-development approach using DOE/SPC, Python/MATLAB analysis, defect characterization, failure analysis, process-performance correlation, yield improvement, and cross-functional manufacturing collaboration.
- > Proven ability to translate materials and device research into manufacturable process flows through process-window development, interface engineering, degradation analysis, reliability evaluation, and continuous improvement.

Research and Working Experience

- > **Senior Process Engineer - Photolithography** - Skorpios Technologies, Inc., Temecula, CA (2026-Present)
- > Lead photolithography process engineering for silicon photonics manufacturing, aligning cleanroom process control with yield, reliability, defectivity, and manufacturability objectives.
- > Develop, optimize, and sustain semiconductor process flows using Canon FPA-5500 iZ Stepper, Nikon DUV 193 NSR-S308F Stepper, TEL Clean Track coater/developer, and wafer-level metrology platforms.
- > Apply DOE and SPC methodologies to improve process windows, uniformity, overlay/CD control, defect reduction, wafer-level quality, and device performance across development and manufacturing flows.
- > Analyze KLA particle inspection, KLA overlay metrology, and Applied Materials CD-SEM data to identify defect modes, troubleshoot manufacturing issues, and drive root-cause corrective actions.
- > Collaborate with integration, equipment, metrology, and manufacturing teams to support process transfer, equipment/process troubleshooting, continuous improvement, and stable wafer fabrication.
- > **Postdoctoral Associate** - School of Polymer Science and Engineering, University of Southern Mississippi, Hattiesburg, MS (2025-Present)

Project: Engineering Stable Organic Photovoltaic Materials and Devices funded by Office of Naval Research (ONR)

- > Fabricate and optimize multilayer organic semiconductor photovoltaic devices using structured process splits, DOE-style variable control, and repeatable thin-film processing workflows.
- > Engineer device stacks and interfacial layers (ZnO/MoO₃/PDINN/Ag) to improve charge transport, reduce burn-in loss, and enhance device efficiency and lifetime.
- > Analyze J-V, EQE, UV-Vis, GIWAXS, AFM-IR, SEM, profilometry, Flash-DSC, and DSC data to connect process conditions with optical/electrical performance, morphology, degradation, and failure modes.
- > Develop process-performance correlation models using Python/MATLAB analysis to identify dominant fabrication variables controlling efficiency, reliability, degradation, and yield.
- > Conduct long-term thermal and humidity reliability studies to determine degradation kinetics, root causes of efficiency loss, and corrective process strategies.
- > Mentor graduate and undergraduate researchers in solar-cell fabrication, thin-film processing, metrology, data analysis, and device-reliability workflows.
- > **Postdoctoral Associate** - Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA (2022-2024)

Project: Wireless Finger Worn Ring for On-Demand Measurement of Absolute Blood Pressure funded by NIH

- > Led development of a finger-worn smart ring integrating force, PPG, and IMU sensors for continuous cuffless blood pressure monitoring.
- > Developed MATLAB and Python pipelines for signal processing, feature extraction, model validation, and physiological data analysis from structured sensor datasets.
- > Designed mechanical actuation systems using SolidWorks and 3D printing for controlled artery occlusion and repeatable measurement workflows.
- > Integrated embedded electronics, custom firmware, sensor calibration routines, and DAQ workflows within constrained wearable hardware.
- > Conducted human-subject validation under IRB-approved protocols, correlating device-estimated metrics against conventional cuff-based measurements.
- > **Research Assistant Professor / Postdoctoral Researcher** - Tohoku University, Sendai, Japan (2020-2022)

Project: Nanomechanical Si-polymer based gas sensor funded by Mitsui Chemical Co. Japan

- > Designed and fabricated MEMS/NEMS nanomechanical sensor arrays using photolithography, E-beam lithography, ICP-RIE, CVD, sputtering, and cleanroom process integration.
- > Applied vacuum/thin-film process knowledge, plasma-based etching, and microfabrication controls to improve device uniformity, manufacturability, and performance.
- > Performed defect, failure, and yield analysis across device arrays, using SEM/AFM/metrology feedback to identify root causes and improve process robustness.
- > Built multiphysics FEM models (structural-thermal-fluid coupling) to understand first-principles device interactions, optimize geometry, and guide process decisions.
- > Collaborated with industry partners and material suppliers to translate pilot-process prototypes into deployable sensing platforms.

Education

- > Doctor of Philosophy (Ph.D.) in Engineering Physics / Applied Physics, Shizuoka University, Shizuoka, Japan [2017-2020]
- > Master of Science (M.Sc.) in Physics, Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh [2014-2016]
- > Bachelor of Science (B.Sc.) in Physics, National University, Dhaka, Bangladesh [2008-2014]

Technical & Research Skills

- > Photolithography & Semiconductor Manufacturing: Canon FPA-5500 iZ Stepper, Nikon DUV 193 NSR-S308F Stepper, TEL Clean Track coater/developer, silicon photonics manufacturing, cleanroom process integration, overlay/CD control, process transfer, and equipment/process troubleshooting.
- > Thin-Film & Device Fabrication: Polymer thin films, organic semiconductors, photovoltaic device stacks, interface engineering, ZnO/MoO₃/PDINN/Ag contacts, sputtering, CVD, thermal evaporation, plasma polymerization, and charge-transport optimization.
- > DOE/SPC & Manufacturing Optimization: Process-window optimization, defect-mode analysis, root-cause analysis, failure analysis, process-performance correlation, yield improvement, wafer-level uniformity, corrective action plans, and reliability testing.
- > Metrology & Characterization: KLA particle inspection, KLA overlay metrology, Applied Materials CD-SEM, SEM, TEM, AFM, profilometry, UV-Vis, J-V, EQE, GIWAXS, Flash-DSC, DSC, and electrical/mechanical testing.
- > Micro/Nanofabrication: MEMS/NEMS fabrication, photolithography, E-beam lithography, ICP-RIE, wet/dry etching, packaging, device integration, and cleanroom safety.
- > Modeling, Coding & Data Analysis: Python, MATLAB, COMSOL, ANSYS, DFT/MD simulations, SolidWorks, statistical modeling, multivariate process analysis, signal processing, and feature extraction.

Selected Publications

- > Md Abdul Momin , Xiaodan Gu, **Understanding Molecular Architecture of Non-Fullerene Acceptors: Impacts on Crystallization Kinetics and Thermal Stability in Organic Solar Cells** , (Submitted to "Advanced Energy Materials" this month).
- > Md Abdul Momin , Ramakrishna Mukkamala, **A Finger Worn Ring for On-Demand Measurement of Absolute Blood Pressure** , IEEE Transactions on Biomedical Engineering (Submitted April 2026).

- > [Md Abdul Momin et al., Investigation towards nanomechanical sensor array for real-time detection of complex gases , Microsystems & Nanoengineering \(Nature\), 2025.](#)
- > [Md Abdul Momin et al., CNT- and ZnO nanorod-incorporated nanocomposites for flexible pressure sensors , Journal of Materials Chemistry A, 2025.](#)
- > [Md Abdul Momin et al., Self-Powered Wearable Pressure Sensors for Human Motion Monitoring, Analysis & Sensing , 2024.](#)
- > [Md Abdul Momin et al., Foot pressure sensor system from MWCNT-coated cotton fibers, Surface & Coatings Technology 394, 125749 \(2020\) .](#)
- > [Md Abdul Momin et al., Development of compact load cells using MWCNT/cotton composites for health monitoring, Journal of Nanomaterials \(2019\) .](#)
- > [Md Abdul Momin et al., Molecular dynamics and surface stoichiometry of plasma polymerized cyclohexane thin films, AIP Advances 12\(9\), 095027 \(2022\) .](#)
- > [Md Abdul Momin et al., Microstructural and optical properties of plasma polymerized cyclohexane amorphous thin films, Journal of Polymer Research 26, 88 \(2019\) .](#)

Selected Conference Presentations

- > **ACS Meeting 2026 (Atlanta, GA)**
Understanding Molecular Architecture impacts on Thermal Stability in Organic Solar Cells.
- > **IEEE MEMS, Tokyo, Japan 2022.**
[Development of Nanomechanical Multisensory Arrays for Detection of Hazardous Volatile Materials and Gases](#)