Sabin Baral

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EDUCATION

The University of Southern Mississippi — Hattiesburg, MS
Bachelor of Science in Polymer Science and Engineering | Minor: Chemistry — **May, 2028**
Relevant Coursework: Polymer Rheology, Polymer Mechanics, Spectral Elucidation of Structure, Calculus III
GPA: **4.0/4.0 (President's List)**

RESEARCH AND ENGINEERING EXPERIENCE

Undergraduate Research Assistant & Instrumentation Engineer — **Dec 2024 – Present**
Gu Research Group — Hattiesburg, MS

- **High-Throughput Fabrication:** Operate an automated Nova Robot system to spin-coat thin films with high precision, enabling large-scale sample generation to study block copolymer-homopolymer blends.
- **Closed-Loop Development:** Collaborate on a closed-loop platform integrating fabrication, characterization, and data feedback; develop Python scripts to streamline analysis and accelerate optimization.
- **Material Synthesis:** Prepare polymer blends using optimized solvent systems and selective additives to enhance annealing and nanoscale structural ordering.
- **Advanced Characterization:** Conduct structural analysis using synchrotron X-ray scattering (GIWAXS/GISAXS) at **LBNL (ALS)** and **Brookhaven National Laboratory (NSLS-II)**.
- **Lab Instrumentation (Engineering Lead):** Designed and 3D-printed high-density sample holders using AutoCAD/OpenSCAD, increasing storage capacity by **500% (20 to 100 samples)** within the same footprint.
- **Workflow Optimization:** Fabricated custom load-cell covers and vial holders to secure sensitive instruments and maximize fume-hood efficiency.

Visiting Research Scholar — **Sept 2025**
Lawrence Berkeley National Lab — Berkeley, CA

- **Automated Screening:** Utilized automated Atomic Force Microscopy (AFM) to characterize surface morphology and phase behavior across **500+ high-throughput thin-film samples**.
- **Database Design:** Collaborated with staff scientists to build a comprehensive sample database, creating a massive data repository to facilitate pre-screening by polymer type.
- **Robotic Integration:** Assembled and optimized a multifunctional robotic system for spin coating and thermal annealing; trained collaborators on operation protocols.

Undergraduate Research Assistant — **Oct 2024 – May 2025**
Center for Optoelectronics and Devices — Hattiesburg, MS

- **Device Fabrication:** Fabricated organic solar cells (p-type conjugated polymers/n-type acceptors) in a nitrogen glovebox, achieving power conversion efficiencies in the **15–18% range**.
- **Stability Analysis:** Investigated degradation pathways under heat and light exposure using accelerated heating systems to correlate processing parameters with device stability.
- **Data Interpretation:** Characterized active layers using UV-Vis, AFM, and I-V measurements; interpreted complex datasets using Python to optimize donor-acceptor combinations.

PUBLICATIONS

Upreti, S.; Xu, L.; Moniruzzaman, M.; Wang, Y.; Adhikari, K.; **Baral, S**.; Patton, D.; Ma, B.; Xu, J.; Li, R.; Zhu, C.; Xia, W.; Gu, X. "**A Robotic High-Throughput Grid-Search Platform for Mapping Phase Behavior in Triblock Copolymer–Homopolymer Blends.**" *JACS Au* (Under Review).

SKILLS

Characterization: **GISAXS**, **GIWAXS**, **AFM**, **DLS**, DSC, TGA, FTIR, UV-Vis Spectroscopy.
Programming & Software: **Python**, **MATLAB**, Igor Pro, OriginPro, ChemDraw.
Design & Prototyping: **AutoCAD**, **OpenSCAD**, Cura

HONORS AND AWARDS

Winner, RoboSoccer Tournament – Google Developer Student Clubs, USM — 2025
Valedictorian and Student Body President Scholarship, USM — 2024