Sabin Baral

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EDUCATION

The University of Southern Mississippi — Hattiesburg,MS
Bachelors of Science in Polymer Science and Engineering | Minor: Chemistry — **May, 2028**
Relevant Coursework: Polymer Rheology, Polymer Mechanics,Special Elucidation of Structure,Calc 3
GPA: **4.0/4.0 (President's List)**

SKILLS

Polymer Characterization & Analysis: **GISAXS, GIWAXS, AFM, DLS, DSC, TGA, FTIR**
Programming **: Igor Pro, MATLAB, Python**
Software & Data Processing: **Igor Pro**, **OriginPro, ChemDraw**
3D Modeling: **AutoCAD, OpenSCAD**

EXPERIENCE

Undergraduate Research Assistant — **May 2025 – Present**
Gu Research Group — Hattiesburg, MS
High Throughput Block Copolymer Thin Film Fabrication and Characterization

- Conducted **GIWAXS** and **GISAXS** experiments to analyze nanoscale morphology and domain orientation in block copolymer thin films.
- Developed an automated workflow integrating **spin-coating**, **thermal annealing**, and data acquisition, reducing characterization time by **40%**.
- Processed and visualized scattering data using **IgorPro**, **MATLAB**, and **Python** for quantitative structure analysis.
- Identified processing parameters affecting domain spacing and orientation.

Research Assistant — **Sept 2025**
Lawrence Berkeley National Lab — Berkeley,CA

- Conducted **GISAXS** (Grazing Incidence Small-Angle X-ray Scattering) and **GIWAXS** (Grazing Incidence Wide-Angle X-ray Scattering) to analyze the nanoscale structure of block copolymer thin films.
- Used the latest Automated Atomic Force Microscopy (**AFM**) measurements to characterize **surface morphology** and **phase separation** behavior.
- **Assembled** and **optimized** a multifunctional **robotic system** capable of spin coating and thermal annealing, enabling automated thin film fabrication.
- **Trained** collaborating researchers on robot usage for creating thin films of various polymer samples.

Undergraduate Research Assistant **Oct 2024 – May 2025**
Center for Optoelectronics and Devices Hattiesburg,MS
Fabrication and Thermal Stability Analysis of Organic Solar Cells

- Fabricated **polymer-based solar cells** using spin coating and vacuum deposition, achieving a **15% efficiency improvement** through optimized annealing.
- Conducted **thermal stability testing** using **TGA** and **DSC** to evaluate device degradation under elevated temperatures.
- Performed **AFM** and **UV–Vis spectroscopy** to monitor morphological and optical changes in active layers.
- Analyzed device performance data (J–V curves) with **OriginPro** and **Python**, correlating degradation trends with microstructural evolution.
- Proposed fabrication and post-treatment protocols to enhance operational stability and long-term efficiency.

Independent Project – Design and Prototyping Engineer **Dec 2024 – Present**
Gu Research Group – Additive Manufacturing Initiative Hattiesburg, MS
Real-World Problem Solving Through 3D Printing

- Designed and fabricated **15+ custom 3D-printed solutions** including substrate holders, AFM cantilever mounts, and modular storage systems.
- Utilized **AutoCAD** and **OpenSCAD** for CAD modeling and **FDM 3D printing** using **PLA**, **PETG**, and **ABS** polymers.
- Optimized print parameters to improve strength and material efficiency, reducing lab equipment costs by **$1000+**.
- Collaborated with research groups to tailor designs for experimental setups, enhancing laboratory workflow efficiency.
- Documented and shared designs via **GitHub** and **Thingiverse**, demonstrating applications of polymer engineering in rapid prototyping.

VOLUNTEER EXPERIENCES

Docent, Wallaby Center **Sept 2024 -Present**
Hattiesburg Zoo Hattiesburg, MS

- Educated guests on kunekune pigs, wallabies, and emus, educating and promoting wildlife conservation.
- Ensured visitor safety and supervised interactive experiences with the animals.

HONORS AND AWARDS

Valedictorian/Salutatorian Scholarship, USM ($2,000 annually, 4 years) **Jul 2024**

Student Body President Scholarship, USM ($2,000 annually, 4 years) **Jul 2024**