

# Ph.D. Openings in Bioinspired Materials

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## TOPIC: Memory in a Droplet: Collections of Brain-Inspired Biomolecular Elements

The Biomembranes Engineering Laboratory at the University of Georgia has openings for 2 (3-year, NSF funded) motivated Ph.D. students with interest in soft, bioinspired materials. The lab is highly interdisciplinary, and students holding a B.S. or M.S. degree in mechanical engineering, biological engineering, physics, or any related disciplines are invited to apply. The laboratory contains state-of-the-art custom facilities for conducting studies on lipid membranes, microfluidics, and interfacial chemistry. Graduate students will receive a full tuition waiver, stipends, and funds to attend conferences.

The project involves developing brain-inspired materials built from collections of adhered aqueous droplets coated in lipid membranes. These materials exhibit spike timing-dependent plasticity, volatile analog memory, and long-term plasticity through reconfiguration. The research will be a collaborative effort between a computational and experimental team, developing novel models for interpreting the measured experimental phenomena. Students will be trained in droplet mechanics, membrane biophysics, electrophysiology, instrumentation, microscopy, tensiometry, and numerical methods.

Prospective students are strongly encouraged to email the PI ([ecfreema@uga.edu](mailto:ecfreema@uga.edu)) with any questions. Please be sure to contact the PI prior to application and clearly indicate interest in the laboratory in your application materials to ensure consideration.

### Desired Background and Expertise:

The ideal candidate will have previous research experience, programming abilities (MATLAB, Python, etc), and a general knowledge of soft material mechanics; however, a motivated student with the ability to learn new topics quickly will also be considered. Strong communication skills and the ability to work within a group setting are essential.

### Application Procedure:

Please contact Dr. Eric Freeman by email at [ecfreema@uga.edu](mailto:ecfreema@uga.edu) with the subject "Graduate Student Position – Droplet Memory" with a brief statement of interest and CV. More information about applications may be found at <https://engineering.uga.edu/graduate-programs/admissions>.

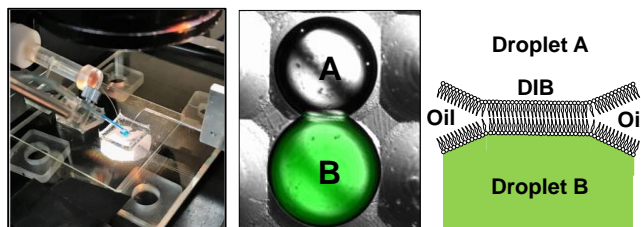


Figure 1 – Collections of microdroplets are printed together to form lipid membranes at their intersections. These are used to create networks of memcapacitors and memristors, fundamental building blocks for neuromorphic architectures. This research will involve both the experimental production and testing of the materials and their simulation.