

Drs. Christine Foreman and Stephan Warnat

Center for Biofilm Engineering

Biology meets Engineering in Snow and Ice

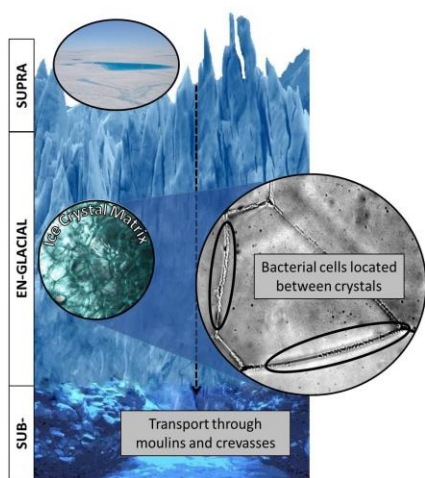
The study of icy habitats on Earth provides important analogs for determining the likelihood of microbial life in extraterrestrial environments. This search for life is a focal point of NASA's Astrobiology research to answer the question if we are alone. Current satellite and lander (robots) missions are unable to detect microorganisms in snow and ice, since microbes are typically 1-2 microns in size. Microfabricated sensors can be integrated/placed inside the ice/snow to probe the environment for bio-signatures. The physical dimensions of the active sensor structure matches microbial dimensions, increasing the likelihood of detecting microbial presence.

Our laboratories work together to investigate a sensor technology that utilizes micro-fabricated structures to detect electrical variations in ice and snow, with and without microbial impact. Sensors are fabricated in the Montana Microfabrication Facility and characterized at iCal before they are tested in the Center for Biofilm Engineering. Our interdisciplinary team of biologist, astrobiologists, material scientists, electrical and mechanical engineers fosters an application driven research program to test our work in laboratory and field settings.

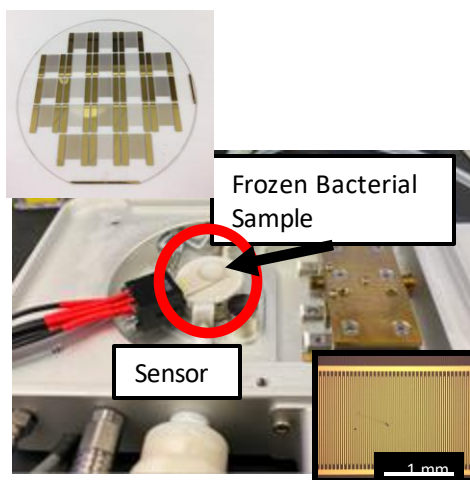
Come and join our lab if you are interested in the interface between biology and engineering.

You will learn the following skills:

- Work and learn in an interdisciplinary team of biologist and engineers
- Apply scientific methods on application driven research
- Work in state-of-the-art laboratories such as the *Montana Microfabrication Facility* and the *Center for Biofilm Engineering*
- Develop effective presentation skills
- Have fun with research that is out of this world!



The glacier biome, including supraglacial, englacial and subglacial environments..



Sensors fabricated on wafer-level in the MMF and tested in the Center for Biofilm Engineering in a temperature-controlled stage (-20 °C).



Our research group testing micro-fabricated sensors in the Beartooth Mountains, WY.