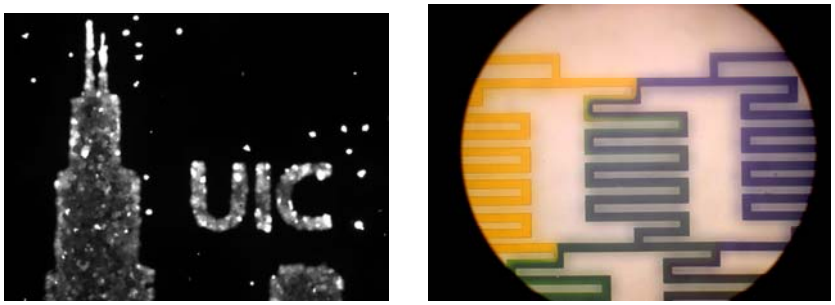
Broad Dissemination of BioMEMS Devices

Over the past 15 years, there have been many successful demonstrations of bioMEMS devices [30-31], yet few have transcended bioMEMS research labs into widely used devices or procedures. Oftentimes the system complexity limits the practicality, as laboratory demonstrations are only successful in the hands of specialized users who designed and developed the devices. However, streamlined microfabricated systems can effectively leverage these beneficial microscale phenomena without becoming overly complex. The mission of the bioMEMS lab is to apply microtechnologies in overcoming experimental bottlenecks or limitations to accelerate scientific discovery while maintaining system simplicity (e.g., see adjacent figure). Some of our projects include the development of a modular microfabricated insert for the standard multiwell plate to independently control oxygen within each well, developing a modular microfluidic add on for perfusion chambers used in electrophysiology preparations, and developing a microfluidic bacterial sieve to separate single bacteria from complex heterogeneous samples.



Example of two BioMEMS projects. A) Micropatterning of cells, cells can be arranged on a surface using micropatterning to study how these cell-cell communication drives function. B) Microfluidic device developed for generating gradients of soluble factors[32].

Specific tasks of the REU fellows include the design, fabrication, and testing of various bioMEMS devices. In addition, the REU fellows will be exposed to other projects, which are mainly focused on disseminating devices to other laboratories. The REU fellow activities will be performed alongside graduate students who are pursuing their PhD degrees in this area.

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