**294f Integrated Cell Lysis and Electrophoresis-Based Immunoassay for Bacteria Detection on a Microfluidic Chip**

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Bacterial cells represent new challenges for microfluidic cell handling due their small sizes. In this presentation, we will report our progress on developing novel microfluidic devices and systems for bacteria pretreatment and subsequently biological assays based on intracellular contents.

Electrolysis offers rapid disruption of membrane structure without introducing outside chemical or biological reagents. In our work, a microfluidic device was developed to electrically lyse the bacterial cells in a locally enhanced DC field with high throughput. Different field strengths and device geometries were tested for lysis efficiency. Green fluorescent protein (GFP) expressing E. coli cells were used as the model system and the lysis was monitored by fluorescence spectroscopy and plate counts. Our results indicated that it was possible to electrically lyse bacterial cells with a reasonable low DC voltage with very high throughput.

We have been also exploring applying electrophoresis-based immunoassay for rapid and ultrasensitive bacteria detection based on intracellular antigens. In this work, microchip electrophoresis coupled with laser-induced fluorescence detection has been used to separate and quantify free antibody/antigen and immunocomplex. We have been testing the idea using an intracellular protein, alcohol acetaldehyde dehydrogenase (Aad) in Listeria monocytogenes, and its antibody.

These portable microfluidic devices and systems will find important applications in the detection of bacteria which are important for environmental, biomedical and food safety issues.