Optical Biosensor
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Plans for the next semester

The main areas of concern for next semester are computer simulation and spectral data. Our main goals are to produce a working simulation of the current microfluidic channel and to compile background information on spectra collection and analysis. Some accomplishments from this semester focused on computer modeling of the fluid flow, electric field and DEP force. Future work needs to finalize and verify the progress completed thus far on the models. Since we can now record spectra, we also need to better understand the spectral data.

The following outlines the process plan for computer modeling of the channel. If we are able to access a specific electrostatic modeling program, we plan to simulate a working DEP force model of our system. We plan to model this and the fluid flow of the channel by the beginning of March. Next, we will verify this using experimental data to compare holding voltage, and flow rates at specific conditions. Once successfully completed, we can design and test another trap until the beginning of April. Otherwise, the focus will shift to correcting the model. From there we will have to decide next steps toward fabrication and testing of the new design.

In addition to modeling, we plan to collect spectra, research spectral shifts, and define interpreting spectral shifts. We will conduct weekly experiments collecting spectra. The frequency of our experiments depends on our access to cells. Using prior research and publications, we will create a database on interpreting spectral data as cancerous versus non-cancerous cells. We will include our corresponding experimental data, spectra, and analysis.
Hopefully, we will attain different types of cancer cells to test. We can include a section comparing spectra shifts from different types of cancer cells.

The deliverables will be documentation on specific accomplishments. By the end of the semester we should have instructional documentation on: electrostatic simulation, DEP force simulation and comparison to actual data, experimental setup and protocol for running experiments with spectra collection, spectral shift expectations and how to analyze spectral shifts.

The goals for next semester aim to improve the accuracy of the Optical Biosensor project through computer modeling, spectral theory and experimental proof. A huge accomplishment would be to have accurate computer modeling of the DEP force and verification of the theoretical calculations through experimental data. We also should have instructions on interpreting spectra and some data to confirm our conclusions.