

Independent Projects

- It is strongly recommended to have a faculty advisor in a CU department for your project. Feel free to set up appointments with YC or Michael if needed.
- **April 3:** Project Definition, five-minute presentation, 5%
- **April 17;** Project reviews, five-minute presentation and 2-page report, 20%
- **April 24 and 29:** Final Presentations, 25%
 - 12-min presentation
- The oral presentations will be graded by a faculty member using students' evaluation as a reference.
- **May 6:** Final report, 50%
 - Word or PDF file to be emailed to leeyc@colorado.edu by 11:59 p.m., May 6.

Project Definition

(5-minute PPT Presentation)

- New concepts to integrate molecular biology and micro/nano-scale engineering.
- A proposal to request funding to conduct a study to demonstrate the concept.
- **Team:** Leader and members
- **Needs:** why is it needed? unique and potentially useful?
- **Problems:** what are the major problems or unknowns to develop a feasible concept?
- **Approaches:** how are you going to solve the problems before the final presentation?

Project Progress Report

(5-minute presentation + 2-page report)

- **Specific Aims.** State the specific purposes of the research proposal.
- **Background and Significance.** Sketch briefly the background to the proposal. State concisely the importance of the research described in this report by relating the specific aims to broad, long-term objectives.
- **Research Design and Methods:** Provide an outline of:
 - Research design and the procedure to be used to accomplish the specific aims;
 - Tentative sequence for the investigation;
 - Statistical procedures by which the data will be analyzed (optional);
 - Potential experimental difficulties should be discussed together with alternative approaches that could achieve the desired aims.
- **Expected Results and Impact on the Field**

Final Report: A Proposal

(12-minute presentation + 10-page report)

- **Specific Aims.** State the specific purposes of the research proposal.
- **Background and Significance.** Sketch briefly the background to the proposal. State concisely the importance of the research described in this report by relating the specific aims to broad, long-term objectives.
- **Research Design and Methods:** Provide an outline of:
 - Research design and the procedure to be used to accomplish the specific aims;
 - Tentative sequence for the investigation;
 - Statistical procedures by which the data will be analyzed (optional);
 - Potential experimental difficulties should be discussed together with alternative approaches that could achieve the desired aims.
- **Expected Results and Impact on the Field**

Teaming

- Four color papers are given to each student.
- 8 teams will be formed with each team consisting of 4 students with different colors. Each team must have “red” color who is a bio major or ME with good bio knowledge. Three teams will have only 3 students.
- Each team should write its team members on a paper to be collected soon.
- Team members will have its first discussion before the end of the class.
- We will check with each team during the discussion session.

Development of a Lab-on-a-Chip Device for packaging in food products to Detect Botulism

Project Advisor: Professor Y.C Lee

Presented By: Kris Schneider¹, Paul Rice¹, Caleb Trujillo²

¹The Department of Mechanical Engineering

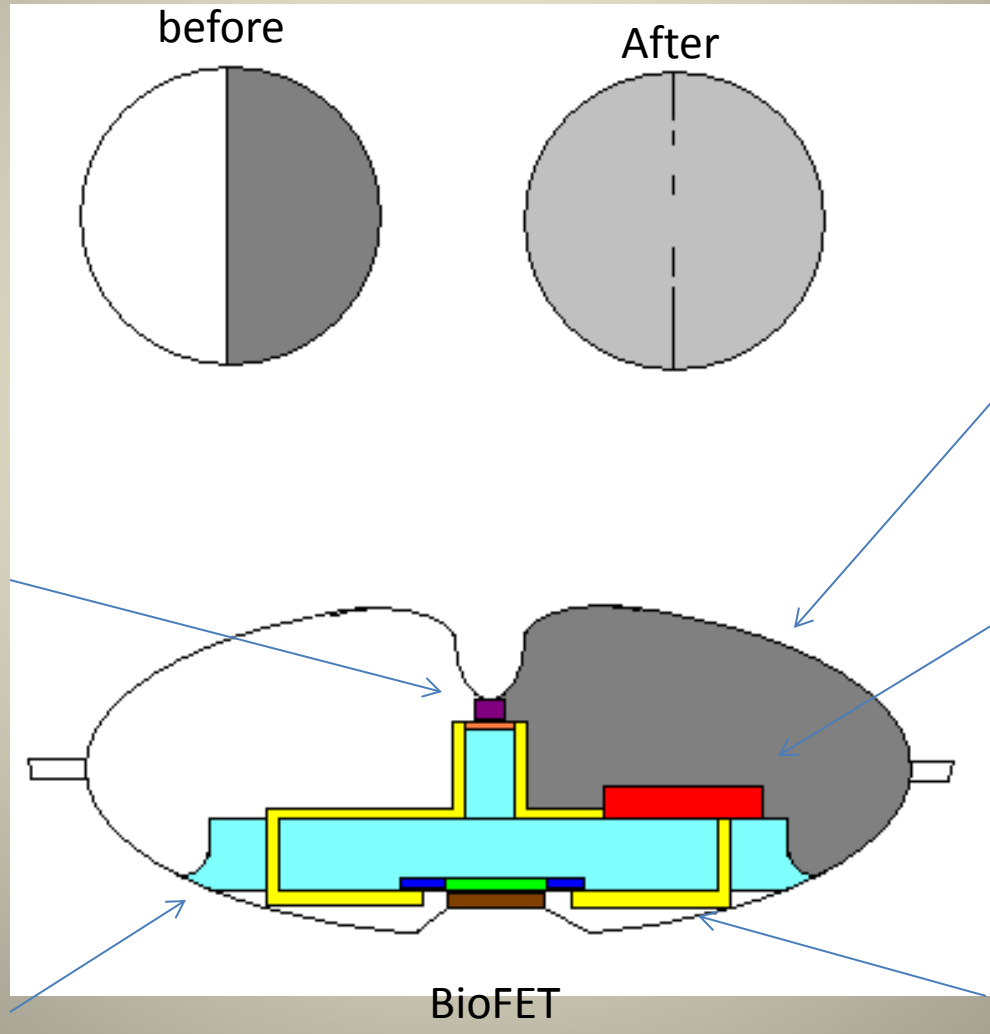
²The Department of Molecular, Cellular and Developmental
Biology

University of Colorado at Boulder

12/2/2008

Sensor bubble

When BioFET is triggered current flows through heater melting wax seal releasing dark dye into clear side



Dark food safe dye inside polyethylene bubble

Lithium Ion thin-film battery



Paraffin seal on top of Ti heater

Package mounting

Si substrate

BioFET

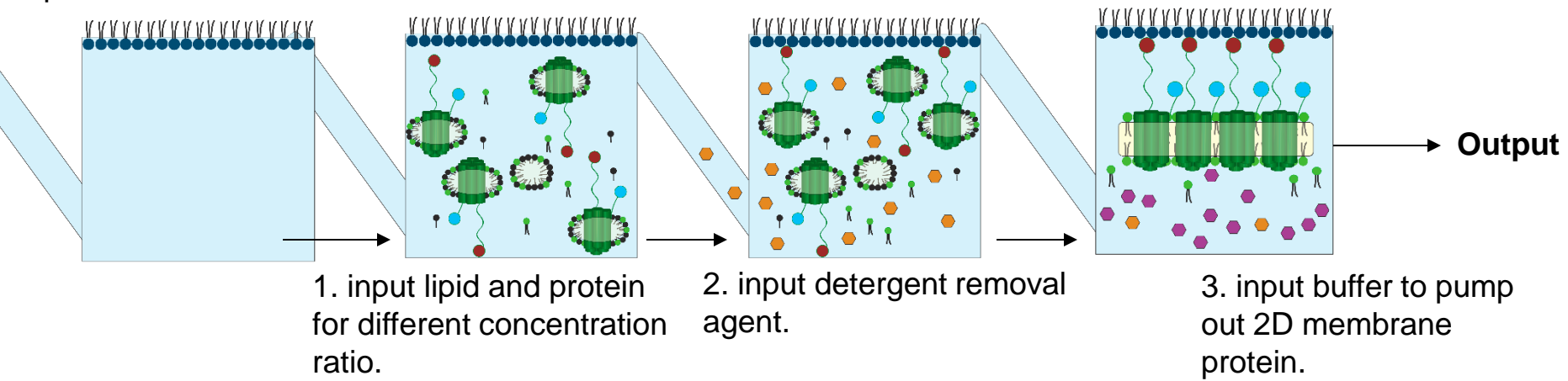
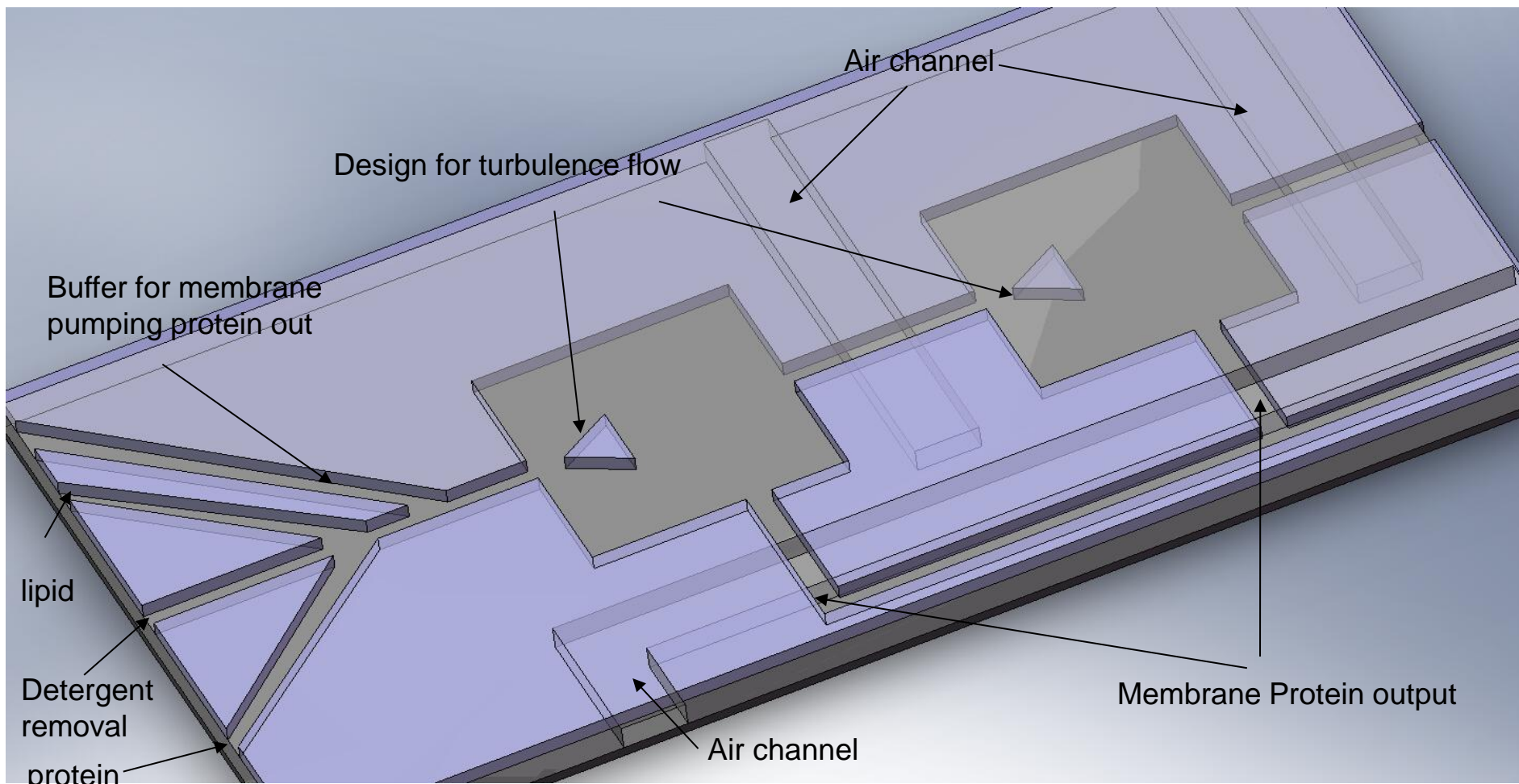
Electrical leads

2D Electron Crystallography of Membrane Proteins in Micro-fluidic Device

Miguel Gonzalez (Leader)

Benjamin Hunter

Ray (Hsin-jui)Wu



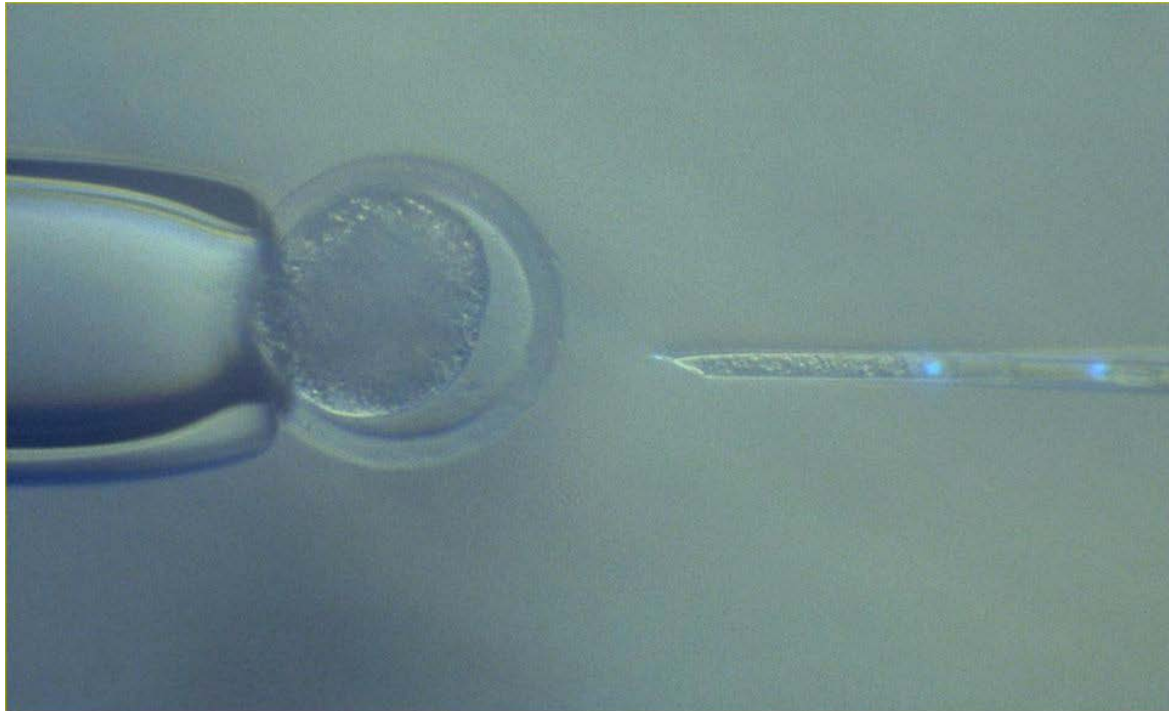
Cellular Surgery Using Gallium Nitride Nanowires

Team lead: Devin Rourke

Scott Macdonald

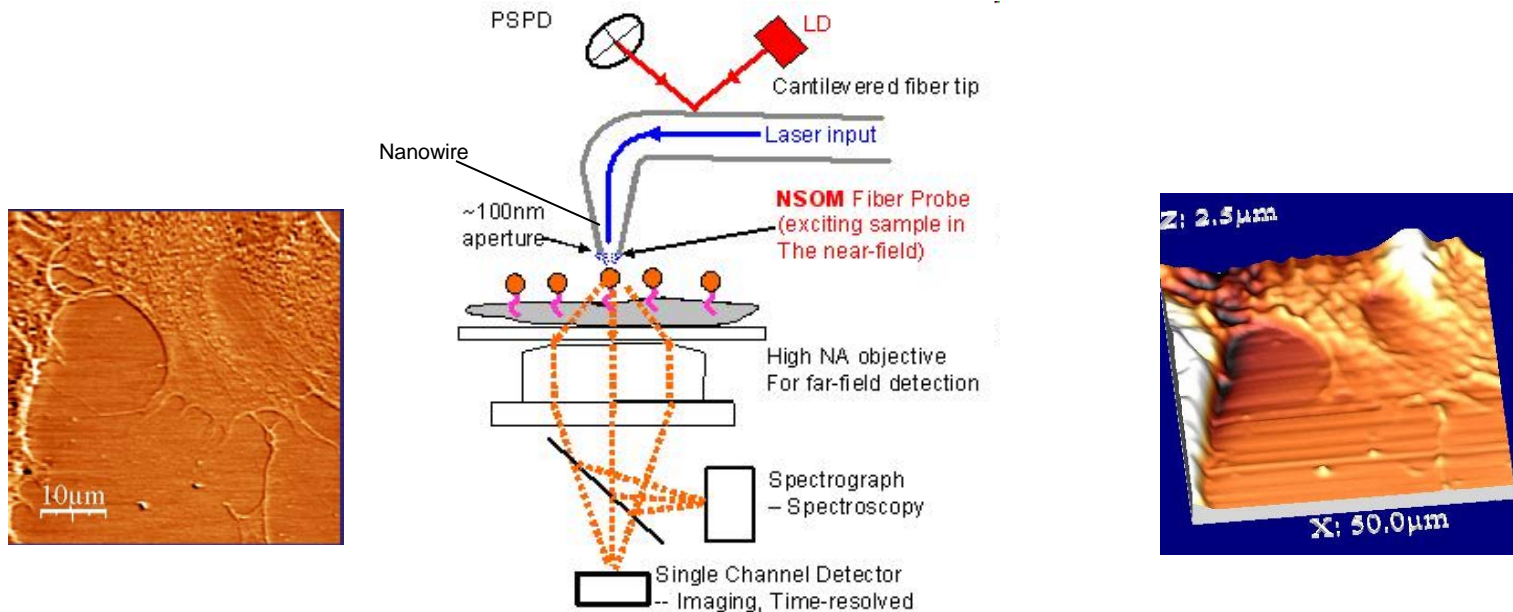
Robert Montgomery

December 11, 2008



Nanowires as part of the microscope

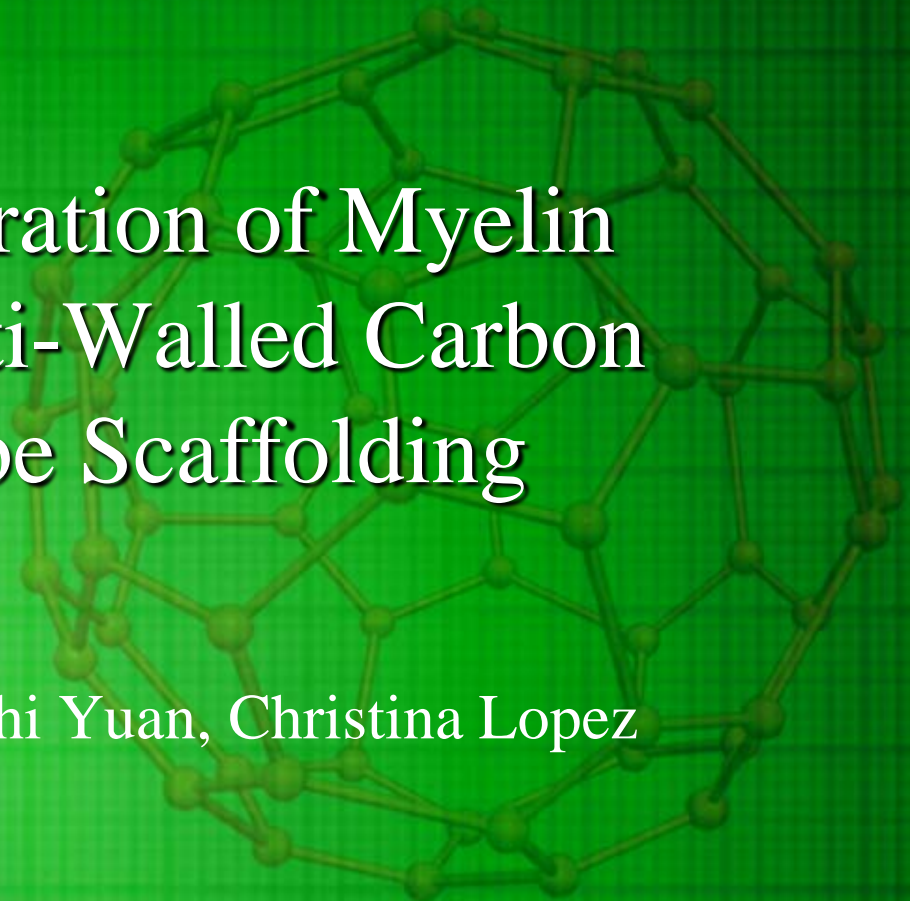
- Nanowire aperture
 - Replace with detector aperture with NW
 - Use ALD deposition to provide metal coating and insulate image
 - Achieve real-time nanoscale optical and topographical images



The Restoration of Myelin Using Multi-Walled Carbon Nanotube Scaffolding

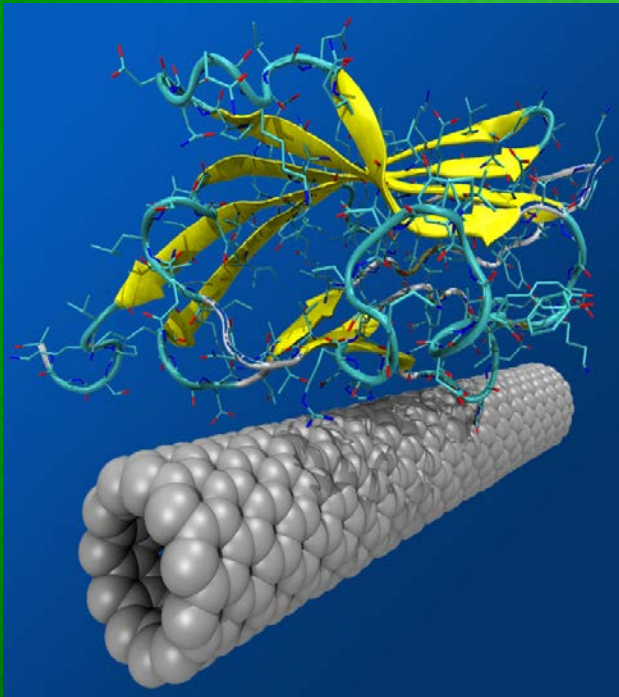
Adam Kolnik, Zhi Yuan, Christina Lopez

Project Advisor: Professor Conrad Stoldt
MCEN 5228/4228 and MCDB 4100



Interfacing Nanotube to Neuronal Tissue

- Binding via Myelin Associated Glycoprotein (MAG) Receptors
 - MAG recognizes specific nerve cell surface functional ligands (GD1a and GT1b) onto which it binds and inhibits neurite growth (Vyas et. al. 2002)
 - design a protein with a binding site similar to that of MAG which recognizes GD1a and GT1b which could be used to target the nanotubes onto the neuron cell surface



Assay for the detection of phosphorylated proteins

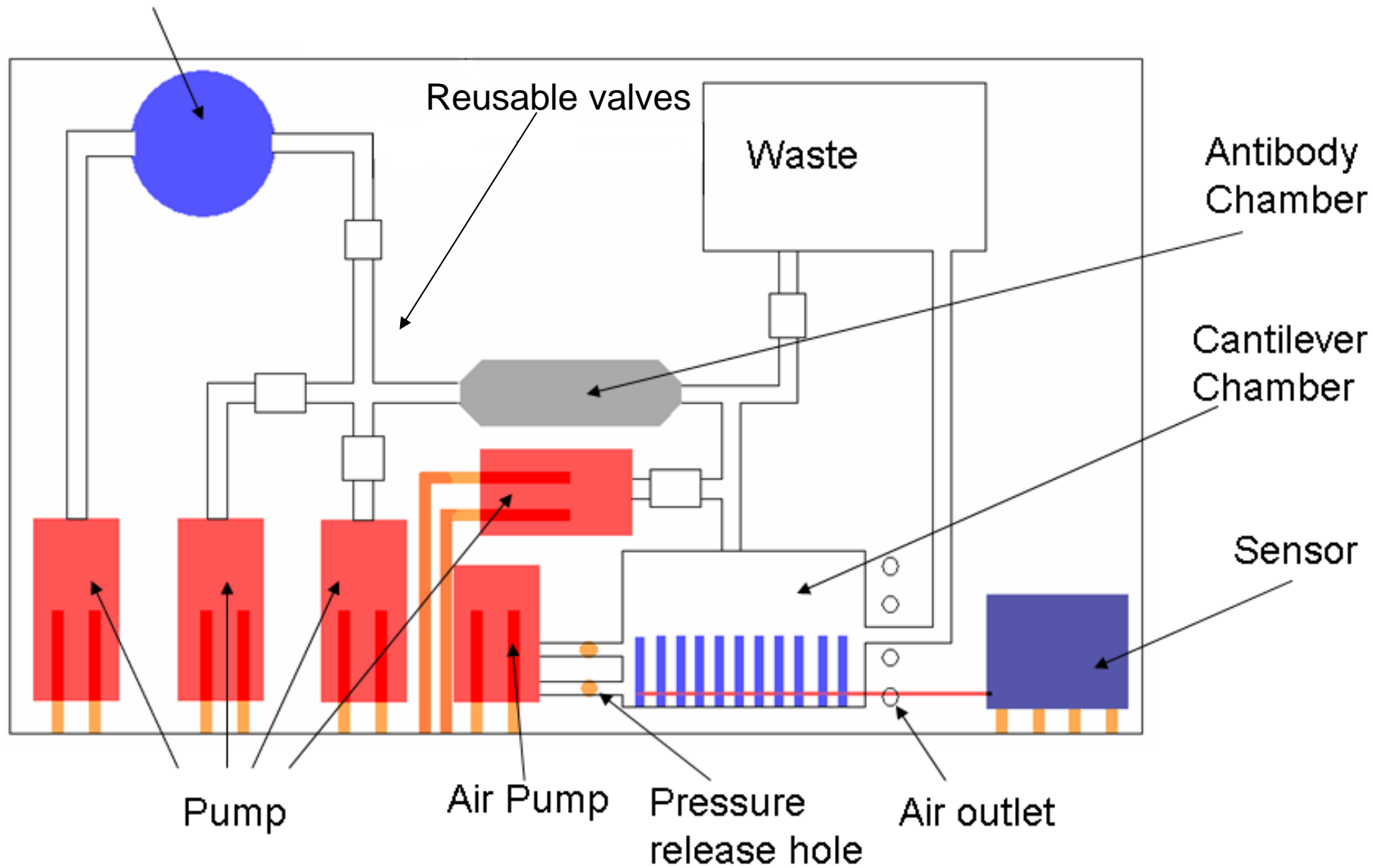
Team A

Joseph Duggan

Alex Farris

Jian Wang

Lysing Chamber



Teaming

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Students with red color?

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