

Project Descriptions

ME 4054, SPRING SEMESTER 2008

Note that industry sponsored projects may require that you sign an intellectual property (patent) or confidentiality agreement. See course coordinator or project advisor for details.

Project No. 3: Keyword "BIOSENSOR"

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| TITLE | Microfluidics Interface Design and Manufacturability |
| SPONSOR | Diagnostic Biosensors, LLC |
| Advisor | Mark Tondra |
| Address | Diagnostic Biosensors, LLC 1712 Brook Ave. SE Minneapolis, MN 55414 |
| Phone | 612 331-3584 |
| Fax | |
| E-Mail Address | Mark@DiagnosticBiosensors.com |

Project Background:

We are developing micro-scale biosensors that combine silicon-based detectors with plastic microfluidic components. The consumable sensor will plug into a non-consumable reader instrument. Our company plans to sell these sensors first as an off-the-shelf component that can be inserted into other companies' biosensor sample handling cartridges, and then as a component within our own full cartridge product. In both cases, an automated means to fluidically connect the sensor to the external plastic cartridge is needed. This is usually provided by robotic microassembly machines that are operated by external service providers. Planned materials are PMMA and Tygon tubes; existing biosensor prototypes and cartridges will be available for inspection.

Helpful Expertise:

It would be good if our team had at least one student who did well in ME 5344 Thermodynamics of Fluid Flow with Applications. Students interested in these areas will likely find this project interesting: CAD, test assembly design, robotic assembly, microfluidics, biosensors, micromagnetics, micromolding.

The Sponsor Advisor will be working with the Project Team on a regular basis.

Funding: Up to \$2,000 is available for micromolding, components, and other supplies.

Project Objectives:

- 1) Explore possible sensor – tube and sensor – cartridge bonding methods (e.g. solvent, laser, heat, snap).
- 2) Identify possible vendors for automated assembly, and document their capabilities in precision and throughput of microscale parts, bonding methods, adhesive dispensing, etc..
- 3) Design a tube – sensor attachment process which encompasses the following aspects: a) mechanical design of both parts, b) automated assembly machinery, c) bonding method, d) evaluation of seal and structural integrity of bond, e) flow path integrity, f) enables optimal flow rate.
- 4) Procure a few components, and assemble them in-house, and/or using external service provider.
- 5) Perform a test of the fluidic seal and structural integrity of the tube – sensor interface.
- 6) Deliver CAD files and recommendations for higher volume manufacturing.