

Biomedical Engineering

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Jeffrey Zahn

Address: 599 Taylor Road (Bldg# 3893)
Piscataway, NJ 08854

Room: BME-311

Phone: 732 - 445-4500 x6311

Email: jd Zahn@rci.rutgers.edu

Microfluidic devices for medical therapeutics and diagnostics: Dr. Zahn has expertise in microfluidics, microdevice design and fabrication as well as experience in molecular biology and biological preparation techniques. Dr. Zahn also has several ongoing research projects related to medical diagnostics. The first project created miniaturized microfluidic microdialysis arrays for continuous glucose sensing applications with higher recovery rates over current microdialysis probes. These microdialysis systems have had a very rapid response time showing an equilibration time of less than 2 minute lag from a glucose solution whose concentration continuously fluctuates. An organic-aqueous two phase flow system for a miniaturized DNA extraction module is also being developed. The system is based upon miniaturizing the standard molecular biology technique of liquid-liquid phenol extraction. The ability to use the large conductivity gradient between the two fluid phases to promote an electrohydrodynamic instability to disperse the two fluid phases to increase interfacial area over which extraction occurs, and the adsorption of biological molecules to the organic-aqueous interface under flow conditions have been demonstrated. Finally, a blood handling device to continuously separate blood plasma from blood cells coupled with an immunosensing system for continuous monitoring of systemic inflammation during cardiopulmonary bypass (CPB) procedures has been developed. The blood skimming device has shown tremendous promise, and has been successfully integrated with a heart-lung machine CPB pump. These projects are currently supported by the ADA, NSF, Coulter Foundation and NIH.



Recent Papers:

1. Hsieh, Y.C. and J.D. Zahn, 2007. On-chip Microdialysis System with Flow-



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December 01, 2009

BME graduate student and IGERT

through glucose sensing capabilities, Journal of Diabetes Science and Technology 1(3):375-383

2. Yang, S., A. Sood and J.D. Zahn, 2007. Continuous cytometric bead processing within a microfluidic device for bead based sensing platforms Lab on a Chip 7:588-595.

3. Yang, S., A. Sood and J.D. Zahn, 2006. A Microfluidic Device for continuous, real time blood plasma separation Lab on a Chip 6(7):871-880.

[Dr. Zahn's Laboratory website](#)

fellow, **Jeffrey Barminko**, has been awarded a predoctoral fellowship from the New Jersey Commission on Spinal Cord Research for his project entitled [Encapsulated MSCs...](#)

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