

HENRY C. ZERINGUE

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EDUCATION

Pursuing **Doctor of Philosophy** in Biomedical Engineering
University of Wisconsin – Madison May 2003 (expected)
Advisors: Profs. D. J. Beebe & J. J. Rutledge
Thesis topic: Performing IVP procedures with microfluidics
Major areas: Microfluidic systems, Biological MEMS, Embryology techniques
Minor area: Bioinformatics
Relevant courses: Bioinformatics, Cellular and Molecular Biology, Molecular biology techniques, Cellular signal transduction mechanisms

Master of Science in Electrical Engineering
University of Illinois at Urbana-Champaign October 2000
Advisors: Profs. D. J. Beebe & M. B. Wheeler
Thesis: Mammalian Embryos in Microchannels: porting embryology to microfluidics
Relevant courses: Electromagnetic lines fields and waves, Automated 1 microwave measurements

Bachelor of Science in Biomedical Engineering
Louisiana Tech University August 1996
Senior Project: Eye driven GUI pointer for a personal computer
Relevant courses: VLSI design (2 quarters), C++, Bioinstrumentation

RESEARCH AND PROFESSIONAL EXPERIENCE

2000-present Research Assistant, Biomedical Engineering, UW–Madison
• 2002 - Reviewed for NIH, PNAS, Lab on a Chip

Fall 2001 Set up an embryology lab

Summer 2001 Internship at Cytometry Services Inc., Urbana, IL
• performed writing and literature review for a research proposal

1997-1999 Research Assistant, Electrical Engineering, UIUC
• designed and fabricated microfluidic devices for embryo culture

1995-1996 Undergraduate researcher, Louisiana Tech University, Ruston, LA
• helped develop protocols for anodic bonding of Si/glass

Winter 1994 Engineering Intern, Monroe VA Hospital, Monroe, LA
• performed preventive maintenance and repair on hospital equipment
• held workshops to teach nurses to use a new blood gas analyzer

PROFESSIONAL AWARDS

2002-2003 Computation and Informatics in Biology and Medicine Traineeship
Topic – Computational investigation of deletions in mammalian mtDNA

RESEARCH INTERESTS

General research interests

- application of micro technologies to developmental biology
- application of micro technologies to cellular and molecular biology
- computational bioinformatics

Current projects

- perform embryo biopsy using chemical and mechanical manipulation on the micro scale
- characterization of chemical zona pellucida removal and drilling using microfluidics
- effects of channel size on embryo culture in microfluidic devices
- effects of *corona radiata* in early development of bovine embryos
- creation of a mouse chimera using an integrated microfluidic device

Former projects

- investigate the differences in cumulus cell removal from bovine zygotes via microfluidic vs. vortexing techniques
- microfluidic devices for *in vitro* embryo culture
- development of processing protocols for SU-8 (Microchem Corp., MA) thick film resist

RESEARCH RECORD

Journal articles

- Beebe, D. J., M. Wheeler, H. Zeringue and E. Walters (2002) "Microfluidic technology for assisted reproduction," *Theriogenology*, **56**(1): in press.
- Zeringue, H. C., D. J. Beebe and M. B. Wheeler (2001) "Removal of cumulus from mammalian zygotes using micro fluidic techniques," *Biomedical Microdevices*, **3**(3): 219-224.
- Glasgow, I., H. C. Zeringue, D. J. Beebe, S-J. Choi, J. Lyman, N. G. Chan and M. Wheeler (2001) "Handling individual mammalian embryos using microfluidics," *IEEE Trans Biomed Eng*, **48**(5): 570-578.

Conference papers (presenting author underlined)

- Zeringue, H. C., M. B. Wheeler and D. J. Beebe (2002) "Development of bovine in vitro produced embryos after cumulus cell removal with a microfluidic microchannel device," 2001 Annual Meeting of the International Embryo Transfer Society, Omaha, Nebraska, USA, in *Theriogenology* **56**(1): 533
- Zeringue, H. C., I. K. Glasgow, S. Raty, K. R. King, M. B. Wheeler and D. J. Beebe (2000) "Embryo manipulation and zona pellucida removal in a polydimethylsiloxane microfluidic system," *World Congress on Med Phys and Biomed Engr*, Chicago, IL.
- Zeringue, H. C., M. B. Wheeler and D. J. Beebe (2000) "Removal of cumulus cells from mammalian oocytes in a microfluidic system," *Solid-State Sensor and Actuator Workshop*, Hilton Head, SC.
- Zeringue, H. C., K. R. King, I. K. Glasgow, S. Raty, M. B. Wheeler and D. J. Beebe (2000) "Zona pellucida removal of mammalian embryos in a microfluidic system," *micro Total Analysis Systems 2000*, Enschede, the Netherlands (accepted for poster presentation, acceptance rate of 60%).

- Balberg, M., M. Mau, D. Frigon, K. Hristova, H. C. Zeringue, D. Brady, D. Beebe and L. Raskin (2000) "Multi-color fluorescence detection of ribosomal RNA in micro-channels," *Micro- and Nanotechnology for Biomedical and Environmental Applications*, part of SPIE's BiOS 2000, San Jose, CA.
- Zeringue, H. C., I. K. Glasgow, J. T. Lyman, M. B. Wheeler and D. J. Beebe (1999) "Micro fluidic single embryo culture systems in PDMS," *21st Ann Int'l Conf of the IEEE Eng in Med and Bio Soc and the 1999 Ann Fall Meeting of the Biomed Eng Soc*, Atlanta, GA.
- Chan, N. G., J. T. Lyman, S.-J. Choi, H. C. Zeringue, I. K. Glasgow, D. J. Beebe and M. B. Wheeler (1999) "Development of an embryo transport and analysis system: material biocompatibility," *Theriogenology*, **51**(1): 234.
- Glasgow, I. K., H. C. Zeringue, D. J. Beebe, S. J. Choi, J. T. Lyman and M. B. Wheeler (1998) "Individual embryo transport on a chip for a total analysis system," *Third Conference on Micro Total Analysis Systems*, Banff, CA.
- Zeringue, H. C., I. K. Glasgow, S. J. Choi, J. T. Lyman, M. B. Wheeler and D. J. Beebe (1998) "Impedance-based detection of individual embryos," *Biomedical Engineering Society Meeting*, Cleveland, OH.
- Choi, S. J., I. Glasgow, H. C. Zeringue, D. J. Beebe and M. B. Wheeler (1998) "Development of microelectromechanical systems to analyze individual mammalian embryos: embryo biocompatibility," *Biol Reprod* (Suppl. 1).

TEACHING EXPERIENCE

- Teaching Assistant, University of Illinois at Urbana-Champaign – 3 semesters
Biomedical Instrumentation Lab (ECE 315) – Senior/Grad level
- course intended to teach students the practical aspects of interfacing transducers and electronics with the body to obtain medically relevant signals
 - lab intended to teach students practical design and fabrication of representative biomedical circuitry
 - integrated course material with a web-based interface to allow immediate feedback on homework and direct access to course material
- Lectured for Bioinstrumentation classes at UW-Madison and UIUC when the instructor was unable to lecture
- composed and graded exam questions for lecture sections

PROFESSIONAL ORGANIZATIONS

- Institute of Electrical and Electronic Engineers (since 1998)
– Engineering in Medicine and Biology Society
- International Embryo Transfer Society (since 2001)

INVITED LECTURES (OFF CAMPUS)

- June 2002 University of Utah, Department of Bioengineering
Topic: Microfluidics in *In Vitro* Embryo Production

REFERENCES

These persons are familiar with my professional qualifications and my character.

Assoc. Prof. David J. Beebe – (major advisor)

Biomedical Engineering Phone: 608-262-2260
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Prof. Matthew B. Wheeler

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Prof. Jack J. Rutledge

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