David T. Eddington

ADDRESS

David T. Eddington
851 S. Morgan St.
Chicago, IL 60607
http://www.uic.edu/labs/bml

Phone: 312-355-3278
Fax: 312-996-5921
E-mail: dte@uic.edu

APPOINTMENTS

2006 – Assistant Professor, Department of Bioengineering, University of Illinois at Chicago

EDUCATION

2004-2006 **Postdoctoral Fellow** in Tissue Engineering
UCSD Department of Bioengineering & Harvard-MIT Division of Health Sciences and Technology
Advisor: Prof. Sangeeta N. Bhatia
Projects: Developing Microscale Models of Living Systems

2001-2004 **Doctor of Philosophy** in Biomedical Engineering
University of Wisconsin-Madison
Advisor: Prof. David J. Beebe
Thesis Title: Characterization and Development of a Non-electronic Open-Loop Drug Infusion System: A first step towards closed-loop control
Minor: Mechanical Engineering

2000-2001 **Master of Science** in Biomedical Engineering
University of Wisconsin-Madison
Advisor: Prof. David J. Beebe
Thesis Title: pH Regulation and Pumping at the Microscale

1996-2000 **Bachelor of Science** in Materials Science and Engineering
University of Illinois at Urbana-Champaign
Specialization: Polymer Science

RESEARCH TRAINING

2005-2006 NIH-NRSA Postdoctoral Fellow, Division of Health Sciences and Technology, Harvard-M.I.T., Cambridge, MA
PI: Sangeeta N. Bhatia, M.D., Ph.D.

2004-2005 Postdoctoral Associate, Department of Bioengineering, University of California at San Diego, La Jolla, CA
PI: Sangeeta N. Bhatia, M.D., Ph.D.

2000-2004 Research Assistant, Biomedical Engineering, UW-Madison, Madison, WI
PI: David Beebe, Ph.D.

EXTRAMURAL FUNDING (TOTAL: PI of $1,188,999, Co-PI of $401,000)

NRSA Postdoctoral Fellowship: NIH Ruth L. Kirschstein National Research Service Award, *Probing Combinatorial Hepatocellular Microenvironments*

PI DARPA: Cnidocytes as Microscale Drug Synthesis and Delivery Modules, $321,000, 5/07-4/08

PI Alfred P. Sloan Foundation: Microfluidic Microbial Sieve, $248,000, 5/07-5/09

PI Illinois Department of Public Health: High Throughput Hypoxia, $50,000 7/08-7/09

PI NSF DUE 0814375 Collaborative Research: Microfluidics for Multiple Engineering Disciplines, $59,999 12/08-12/11

PI NSF DBI 0852416: IDBR: Microfabricated Add-On for Multiwell Plates, $500,000, 8/09-8/12

Co-PI NSF: Supplement to CCLI: Integrating microfluidics into the undergraduate curriculum, $10,000 12/07-12/08 (PI: Ian Papautsky, University of Cincinnati)

Co-PI NIH: μBSD: Spatiotemporal Control of neurochemical tone in the brain slice using microfluidics, $401,000 (PI: Chris Fall, UIC)

RESEARCH RECORD

Journal Articles (h-index:: 7)

Higgins, J.M., **Eddington, D.T.**, S. N. Bhatia, and L. Mahadevan (2009) "Statistical Dynamics of Flowing Red Blood Cells" *PLoS Computational Biology,* 5(2): e100288. doi:10.1371/journal.pcbi.1000288

Mohammed J.S., Wang Y., J.Oberholzer, and **Eddington D.T**., (2009) "Microfluidic Device for Multi-Modal Characterization of Pancreatic Islets," *Lab on a Chip,* 9(1): 97-106

Caicedo H.H., Mohammed J.S., Fall C.P., and **Eddington D.T**., (2008) "Microfluidic Add-On for Standard Electrophysiology Chambers," *Lab on a Chip,* 8(6): 1048-1055

Tek P., Chiganos T., Ift P., Mohammed J.S., **Eddington D.T**., Fall C.P., and Rousche P.R., (2008) "Rapid Prototyping for Neuroscience and Neural Engineering" *Journal of Neuroscience Methods,* 172: 263-269

Higgins J.M., **Eddington D.T.**, Bhatia S.N., Mahadeven L.,(2008) "Review of Collective Hydrodynamics and Kinetics of Sickle Cell Vaso-Occlusion and Rescue in a Microfluidic Device", *Transfusion Clinique et Biologique*, 15 12-13

Mohammed, J.S., Caicedo, H., Fall, C.P., and **Eddington D.T**. (2007) "Brain Slice Stimulation Using a Microfluidic Device and Standard Perfusion Chamber." *J. Visualized Exp.;* 8 <http://www.jove.com/index/Details.stp?ID=302〉

Eddington D.T. (2007) "Applying Microfluidics to Electrophysiology." *J. Visualized Exp.;* 8 <http://www.jove.com/index/Details.stp?ID=301〉

Higgins J.M., **Eddington D.T.**, Bhatia S.N., Mahadeven L.,(2007) "Collective Hydrodynamics and Kinetics

of Sickle Cell Vaso-Occlusion and Rescue in a Microfluidic Device", *Proceedings of the National Academy of Sciences*, **104**(51), pp. 20496-20500

Eddington, D.T., J.P. Puccinelli, D.J. Beebe, (2006). "Extended curing and reduced hydrophobic recovery of Polydimethylsiloxane" *Sensors and Actuators: B* **114**: 170-172

Eddington, D.T., D.J. Beebe, (2005). "Development of a disposable infusion system for the delivery of protein therapeutics" *Biomedical Microdevices* **7**(3): 223-230

Eddington, D. T. and D. J. Beebe (2004). "Flow control with hydrogels." *Advanced Drug Delivery Reviews* **56**(2): 199-210

Eddington, D. T. and D. J. Beebe (2004). "A valved responsive hydrogel microdispensing device with integrated pressure source." *Journal of Microelectromechanical Systems* **13**(4): 586-593

Moorthy, J., G. A. Mensing, D. Kim, S. Mohanty, **D.T. Eddington**, W.H. Tepp, E.A. Johnson, D.J. Beebe (2004), "Microfluidic tectonics platform: A colorimetric, disposable botulinum toxin enzyme-linked immunosorbent assay system." *Electrophoresis* **25**(10-11): 1705-1713

Lee, S. H., **D. T. Eddington**, Y.M Kim, W.S. Kim, D.J. Beebe (2003). "Control mechanism of an organic self-regulating microfluidic system." *Journal of Microelectromechanical Systems* **12**(6): 848-854

Eddington, D. T., R. H. Liu, J.S. Moore, D.J. Beebe (2001). "An organic self-regulating microfluidic system." *Lab on a Chip* **1**(2): 96-99

Journal Articles In Review or Preparation

Nam, K., Oppegard, S., and **Eddington, D.T.**, "High Throughput Hypoxia", Submitted to Nature

Oppegard S., Anderson P., and Eddington D.T. "Cnidocytes as a functional material" Submitted to Journal of Biological Engineering

Nam, K. and **Eddington, D.T.,** "Size based Separation of microparticles in a microfluidic device" Submitted to Journal of Microelectromechanical Systems

Conference Proceedings

J.S. Mohammed, Y. Wang, T.A. Halvert, J. Oberholzer, and **D.T. Eddington** (2008) "Microfluidic Device for Multiple Functional Assays to Improve Pretransplant Islet Quality Assessment" microTAS, San Diego, CA

H.H. Caicedo, J.S. Mohammed, C.P. Fall, and **D.T. Eddington** (2008) "Localized Brain Slice Chemical Stimulation Using a Microfluidic Device and Off-the-Shelf Perfusion Chamber" microTAS, San Diego, CA

S. Oppegard, K. Nam and **D.T. Eddington** (2008) "Independent Control of Oxygen Concentration for Cell Culture in an Add-on Platform for Multiwell Plates" microTAS, San Diego, CA

J.S. Mohammed, Y. Wang, T.A. Halvert, J. Oberholzer, and **D.T. Eddington** (2008) "Microfluidic Device for Multiple Functional Assays to Improve Pretransplant Islet Quality Assessment" BMES, St. Louis, MO

S. Oppegard, P.A. Anderson, and **D.T. Eddington** (2008) "Jellyfish Nematocysts as Part of an All-In –One Therapeutic Manufacture and Injection Platform" BMES, St. Louis, MO

K.Nam and **D.T. Eddington** (2008) "Size-Based Separation in a Multilayered Microfluidic Device" BMES, St. Louis, MO

H.H. Caicedo, J.S. Mohammed, C.P. Fall, and **D.T. Eddington** (2008) "Microfluidic Substrate Integrated with a Standard Electrophysiology Set-Up" BMES, St. Louis, MO

S. Oppegard, K. Nam and **D.T. Eddington** (2008) "Device for the Control of Oxygen Concentration in Multiwell Cell Culture Plates" BMES, St. Louis, MO

I. Papautsky, C. Maltbie, **D.T. Eddington**, A.S. Bhagat, H.H. Caicedo, (2008) "Introducing Microfluidics in a Problem Based Learning Course", ASEE, Pittsburgh, PA

Oppegard S., Anderson P.A., and **Eddington D.T.**, (2008) "Cnidocytes as a functional material in microfabricated systems ", Institute of Biological Engineering, Raleigh, NC

Eddington D.T., (2008) "High Throughput Hypoxia", Lab Automation, Palm Springs, CA

Nam K., **Eddington D.T.**, (2007) "Independent control of gas concentrations in a multiwell-format", Student Research Forum, University of Illinois at Chicago

Nam K., **Eddington D.T.**, (2007) "High Throughput Hypoxia", Catalyzing Collaboration between Industry and Academia in the Life Sciences, Baxter Healthcare, Round Lake, IL

Caicedo H.H., Mohammed J.S., Fall C.P.**, Eddington D.T.**, (2007) "Spatiotemporal brain slice stimulation using a microfluidic network and standard perfusion chamber",10th Annual Illinois Louis Stokes Alliance for Minority Participation Student Research Symposium in Science, Technology, Engineering, and Mathematics, Glenview. Illinois

Caicedo H.H., Mohammed J.S., Fall C.P.**, Eddington DT.**, (2007) "Spatiotemporal brain slice stimulation using a microfluidic network and standard perfusion chamber",BMES, Los Angeles

Eddington, D.T., Higgins, J., Bhatia, S.N, Mahadeven, L., (2007) "Collective hydrodynamics and kinetics of sickle cell vaso-occlusion and rescue in a microfluidic device", BMES, Los Angeles

Eddington, D.T., and S.N. Bhatia (2005). "Microfluidic hepatocyte bioreactors". BMES Conference 2005, Baltimore, MD

Eddington, D. T., W. C. Crone, D. J. Beebe (2003) "Stiffness optimization and accelerated life testing of polydimethylsiloxane for microfluidic systems," Micro Total Analysis Systems, Lake Tahoe, CA

G.A. Mensing, D. Kim, J. Moorthy, J. Basset, **Eddington, D. T.**, D. J. Beebe (2003) "A reconfigurable integrated device for bioassay development," Micro Total Analysis Systems, Lake Tahoe, CA

Eddington, D.T., and D. J. Beebe (2002). "A hydrogel actuated microdispensing device". 2nd Joint EMBS-BMES Conference 2002, Houston, TX, IEEE

Eddington, D.T., R.H. Liu, J.S. Moore, D.J. Beebe(2001), "Regulation of pH in a Microfluidic Stream," Micro Total Analysis Systems 2001, Monterey, CA

J.A. Davis, S. Raty, **D.T. Eddington**, I.K. Glasgow, H.C. Zeringue, M. B. Wheeler, D. J. Beebe, "Development of Microfluidic Channels for the Culture of Mammalian Embryos," 1st Annual International IEEE-EMBS Special Topic Conference on Microtechnologies in Medicine and Biology,

Lyon, France, October 2000

Patents

Pending	**D.T. Eddington**, S. Oppegard, and K. Nam, "Insert for Multiwell Plate", Submitted February 2008
Pending	L.Mahadevan, S.N. Bhatia, J.M. Higgins, and **D.T. Eddington**, "An In Vitro Microfluidic Model of Microcirculatory Diseases, and Methods of Use Thereof" Submitted February 2008
Pending	S.N. Bhatia and **D.T. Eddington** "Multiwell Micropatterning by ablation", Submitted October 2007
Pending	S.N. Bhatia, C. Flaim, and **D. T. Eddington** "Cellular Microarrays for Screening Differentiation Factors", submitted January 2005
Pending	D. J. Beebe, M. J. MacDonald, and **D. T. Eddington**, "Feedback regulated drug delivery device", WARF P03120US, submitted February 2003
Pending	D. J. Beebe, G. M. Mensing, and **D. T. Eddington**, "Dispenser for the selective release of microparticles", WARF P03265US, submitted June 2003
6,5523,489	D. J. Beebe, J. S. Moore, R. H. Liu, and **D. T. Eddington**, "Self-regulating microfluidic device and method of using the same,"

SERVICE

2009	Session Chair "Tissue Engineering of Islets" and Neural Microsystem Technologies", BMES Pittsburgh, PA, 2009
2008	Session Chair "Micro and Nanofluidics: Advances in Device Design II" and "Neural Microsystem Technologies", BMES St. Louis, MO, 2008
2007-	Faculty Advisor for UIC chapter of BMES
2007-	Faculty Advisor for UIC chapter of AEMB and Secured 3 scholarships (out of 10 awarded nationally) for UIC students of AEMB to attend BMES 2007 in Los Angeles, CA
2007	NSF Panelist, Instrument Development for Biological Research
2007	AIMBE Federal Symposium, September 10-11, Washington DC, Spoke with congressional offices regarding the state of federal funding of biomedical research. Met with congressional staff from the offices of Sen Durbin-IL, Sen Obama-IL, Congressman Davis-IL 7th, Congresswoman Schakowsky-IL 9th, and Congressman Roskam-IL 6th
2006-	Ad Hoc Reviewer: Journal of Experimental Mechanics, Journal of the American Chemical Society, American Journal of Transplantation, Biotechnology and Bioprogress; Lab on a Chip, Journal of Colloid and Interfacial Science

OUTREACH ACTIVITIES

Dec, 2008	Organized "Science and Engineering", 12/8/07, 43 junior girl scouts visited my lab and conducted interactive lab activities
July, 2007	Organized, "Day at UIC", Upward Bound Program 7/23-7/26, 27 underrepresented high school students visited my lab and conducted interactive lab activities

June, 2007 Organized "Day at UIC", Downers Grove North High School, 7 high school students visited my lab and conducted interactive lab activities

---

INVITED COLLIQUIA

2009 EMBS Annual Meeting, Minneapolis, MN, USA, Stem Cell Tissue Engineering Track, *Oxygen Delivery for Tissue Engineering Studies*

2008 University of Illinois at Chicago, Chicago, IL, USA, Interdisciplinary Science and Engineering Materials Research Group Workshop

2008 Northwestern University, Evanston, IL, USA, Department of Chemical and Biological Engineering, Invited Lecture for Course "Advances in Biotechnologies": *Microfabricated Biotechniques*

2008 University of Illinois at Chicago, IL, USA, Department of Molecular and Cell Biology: *Microfluidics for Experimental Biology*

2008 US-Taiwan Workshop on Simulation-Based Engineering and Science (SBE&S) in Enabling Transforming Technology, Tainin, Taiwan: *Tiny Transforming Technologies*

2007 University of Wisconsin, Madison, WI, USA , Department of Biomedical Engineering Lunch Seminar Series: *Microfabricated Models of Living Systems*

2007 Northwestern University, Evanston, IL, USA, Department of Biomedical Engineering Seminar Series: *Leveraging the Microscale; New Models and Devices*

2007 University of Cincinnati, Cincinnati, OH, USA, Department of Electrical Engineering: *Leveraging the Microscale; New Models and Devices*

2007 University of Illinois at Chicago, Chicago, IL, USA, College of Pharmacy Seminar Series: *Microfabricated Models of Living Systems*

2007 University of Illinois at Chicago, Chicago, IL, USA, MSTP Dinner Seminar: *Microsystems for Medicine and Biology*

TEACHING EXPERIENCE

Spring 2009 Tissue Engineering Laboratory, enrollment 43, assessment TBD

Fall 2008 Bioengineering 460: Materials in Bioengineering, enrollment 51, Assessment 4.0/5.0

Spring 2008 Microfluidic Biochip Laboratory, enrollment 8, assessment 4.8/5.0

Spring 2008 Tissue Engineering Laboratory, enrollment 43, assessment 4.0/5.0

Fall 2007 Bioengineering 460: Materials in Bioengineering, enrollment 83, Assessment 4.3/5.0 overall

Fall 2007 Microfluidic Biochip Laboratory, enrollment 15, assessment 4.5/5.0