

# Thomas A. Zangle

1472 S. Barrington Ave. Apt 6  
Los Angeles, CA 90025

tzangle@mednet.ucla.edu

---

## Education

### Stanford University

Stanford, CA  
2007-2010

### Ph.D. in Mechanical Engineering

*Thesis:* Concentration Polarization at Microfluidic-Nanofluidic Interfaces. *Ph.D. Coursework:* Advanced Transport, Molecular Biology, Biochemistry, Cell Physiology, Biological Macromolecules, Advanced Imaging Laboratory in Biophysics.

### Stanford University

Stanford, CA  
2005-2007

### Master of Science in Mechanical Engineering

GPA: 4.14/4.0

*M.S. Coursework:* Fluid Mechanics, Microfluidics, Biochemical Engineering, Linear Algebra, Partial Differential Equations, Heat Transfer, Compressible Flow, Experimental Methods.

### Thayer School of Engineering

Hanover, NH  
2004-2005

### Bachelor of Engineering

GPA: 3.96/4.0

*Focus:* Fluid Mechanics and Thermodynamics

### Dartmouth College

Hanover, NH  
2001-2005

### Bachelor of Arts, summa cum laude

GPA: 3.92/4.0

*Major:* Engineering Sciences

## Research and Professional Experience

### Teitell Laboratory, UCLA

Professor Michael A. Teitell  
2010-present

*Research Topics:* Development of high-throughput, longitudinal, live cell interferometer to study cell mass dynamics. Development of plasmonic laser surgery tool to generate and study unique cellular models of translocation-driven cancers

### Stanford University

#### Microfluidics Laboratory

Professor Juan G. Santiago  
2005-2010

*Research Topics:* Experimental study of microchannel-nanochannel interface physics. Optical study of electrically gated nanopore translocation. Development of novel microchannel-nanopore protein detection device.

### Eaton Laboratory

Professor John K. Eaton  
January-March 2006

*Research Topic:* Magnetic resonance velocimetry assisted design of a diffuser section for study of three-dimensional separated flow.

### Creare Inc.

Hanover, NH  
2003-2005

*Project topics:* Experimental study of aircraft carrier deck crew helmets for attenuation of bone conducted sound. Structural and reliability analysis of equipment for aerospace applications.

### Space Physics Laboratory

Professor Marc R. Lessard  
June-September 2003

*Project Topic:* Design of wind turbine tower for use at an autonomous Antarctic space physics monitoring station.

## Journal Articles

- Reed, J., J. Chun, T.A. Zangle, S. Kalim, J.S. Hong, S.E. Pefley, X. Zheng, J.K. Gimzewski and M.A. Teitell, "Rapid, massively parallel single-cell drug response measurements via live cell interferometry," *Biophysical Journal* 2011, 101. 1025-1031.
- Suss, M.E., A. Mani, T.A. Zangle and J.G. Santiago. "Electroosmotic pump performance is affected by concentration polarizations of both electrodes and pump," *Sensors and Actuators A: Physical* 2011, 165. 310-315.
- Zangle, T.A., A. Mani and J.G. Santiago, "Effects of constant voltage on time evolution of propagating concentration polarization," *Analytical Chemistry* 2010, 82. 3114-3117.
- Zangle, T.A., A. Mani and J.G. Santiago, "Theory and experiments of concentration polarization and ion focusing at microchannel and nanochannel interfaces," *Chemical Society Reviews* 2010, 39. 1014-1035.
- Strickland, D.G., M.E. Suss, T.A. Zangle and J.G. Santiago. "Evidence shows concentration polarization and its propagation can be key factors determining electroosmotic pump performance," *Sensors and Actuators B* 2010, 143. 795-798.
- Zangle, T.A., A. Mani and J.G. Santiago, "On the propagation of concentration polarization from microchannel-nanochannel interfaces. Part II. Numerical and experimental study," *Langmuir* 2009, 25. 3909-3916.
- Mani, A., T.A. Zangle and J.G. Santiago, "On the propagation of concentration polarization from microchannel-nanochannel interfaces. Part I. Analytical model and characteristic analysis," *Langmuir* 2009, 25. 3898-3908.

## Presentations

- Zangle, T.A., A. Mani and J.G. Santiago, "Experimental and theoretical studies of microchannel-nanochannel interface effects," invited presentation at Pittcon 2011, Atlanta, GA, March 13-17, 2011.
- Zangle, T.A., R. Kant, R.T. Howe and J.G. Santiago, "Microfluidic device with integrated nanopores for protein detection," presented at the Thirteenth International Conference on Miniaturized Systems for Chemistry and Life Sciences ( $\mu$ TAS2009), ICC Jeju, Korea, November 1-5, 2009.
- Zangle, T.A., A.H. Talasaz, and J.G. Santiago, "Nanopore Concentration Polarization," presented at the ASME International Mechanical Engineering Congress and Exposition (IMECE) 2008, Boston, MA, October 31-November 6, 2008.
- Zangle, T.A., A. Mani, and J.G. Santiago, "Concentration Polarization at a Microchannel-Nanochannel Interface," presented at the Thermal & Fluid Sciences Affiliates Conference 2008, Stanford University, Stanford, CA, February 7, 2008.

Zangle, T.A., A. Mani, and J.G. Santiago, "Experimental Study of Microchannel-Nanochannel Interface Effects," presented at the ASME International Mechanical Engineering Congress and Exposition 2007, Seattle, WA, November 11-15, 2007.

Zangle, T.A., A. Mani, and J.G. Santiago, "Novel Device for Electrophoretic Focusing and Separation at a Microchannel-Nanochannel Interface," presented at the Eleventh International Conference on Miniaturized Systems for Chemistry and Life Sciences ( $\mu$ TAS2007), Paris, France, p. 1204-1206., October 7-11, 2007.

Zangle, T.A., S. Pennathur, J.G. Santiago, "Micro-Nano Channel Interface Sample Stacking," Presented at Sandia National Laboratory, Livermore, CA, August 24, 2006.

Zangle, T.A., L.E. Padilla, X. Shao, "Micro Air Vehicle Design and Stability Investigation," Presented at the 2005 American Institute of Aeronautics and Astronautics Northeast Region I Student Paper Conference, Princeton, NJ, April 22-23, 2005. (Awarded first place in the design team category.)

## Conferences

Zangle, T.A., R. Kant, R.T. Howe and J.G. Santiago, "Microfluidic device with integrated nanopores for protein detection," Thirteenth International Conference on Miniaturized Systems for Chemistry and Life Sciences ( $\mu$ TAS2009), ICC Jeju, Korea, November 1-5, 2009.

Zangle, T.A., A. Mani and J.G. Santiago, "The effects of concentration polarization on the concentration inside a nanochannel," Gordon Research Conference on Microfluidics, Physics & Chemistry Of, Lucca (Barga), Italy, June 28–July 3, 2009.

Kant, R., T.A. Zangle, J.G. Santiago and R.T. Howe , "Batch fabrication compatible integration of 3D nanopores with microfluidic devices using silicon migration," 15th International Conference on Solid-State Sensors, Actuators, and Microsystems 2009, Denver, CO, June 21-25, 2009.

Strickland, D.G., T.A. Zangle and J.G. Santiago, "Visualization of concentration polarization generated by electroosmotic pumps," 215<sup>th</sup> Meeting of the Electrochemical Society, San Francisco, CA, May 24-29, 2009.

Suss, M.E., M.A. Lewis, T.A. Zangle and J.G. Santiago, "Concentration polarization in electroosmotic pumps," 215<sup>th</sup> Meeting of the Electrochemical Society, San Francisco, CA, May 24-29, 2009. *ECS Transactions* 2009, 19. 25-35.

Mani, A., T.A. Zangle and J.G. Santiago, "Identification of concentration polarization regimes in microchannel-nanochannel interfaces using method of characteristics," Meeting of the American Physical Society Division of Fluid Dynamics. San Antonio, TX, Nov. 23-25 2008.

Zangle, T.A., A.H. Talasaz and J.G. Santiago, "Nanopore Concentration Polarization," ASME International Mechanical Engineering Congress and Exposition (IMECE) 2008, Boston, MA, October 31-November 6, 2008.

Zangle, T.A., A.H. Talasaz, R.W. Davis and J.G. Santiago, "The Effects of Concentration Polarization on Molecule Translocation in a Nanopore Device," Proceedings of the Twelfth International Conference on Miniaturized Systems for Chemistry and Life Sciences ( $\mu$ TAS2008), San Diego, CA, p. 212-214., October 12-16, 2008.

Zangle, T.A., A. Mani and J.G. Santiago, "Concentration Polarization and Focusing at a Microchannel-Nanochannel Interface," Gordon Research Conference on Microfluidics, Physics & Chemistry Of, Waterville Valley, NH, July 15-20, 2007.

Zangle, T.A., A. Mani and J.G. Santiago, "Experimental Study of Microchannel-Nanochannel Interface Effects," ASME International Mechanical Engineering Congress and Exposition 2007, Seattle, WA, November 11-15, 2007.

Zangle, T.A., A. Mani and J.G. Santiago, "Novel Device for Electrophoretic Focusing and Separation at a Microchannel-Nanochannel Interface," Proceedings of the Eleventh International Conference on Miniaturized Systems for Chemistry and Life Sciences ( $\mu$ TAS2007), Paris, France, p. 1204-1206., October 7-11, 2007.

Talasaz, A.H., T.A. Zangle, C. Tropini, F. Pease, R.W. Davis and J.G. Santiago, "Real-Time Control of Nanopore Wall Potential for Single-Molecule Analysis," Proceedings of the Eleventh International Conference on Miniaturized Systems for Chemistry and Life Sciences, Paris, France, p. 1592-1594., October 7-11, 2007.

## **Awards and Honors**

2010-2011	UCLA T32 Tumor Cell Biology training program
2005-2009	Regina Casper Stanford Graduate Fellowship
2008	Stanford Bio-X Travel Subsidy Award
2005	Thayer School Faculty Award for Academic Excellence
2005	Richard W. Olmsted 1932 (Thayer 1933) Prize
2005	First place design team category presentation, AIAA Student Conference
2005	AIAA northeast region college achievement award
2004	Phi Beta Kappa honor society
2004	Tau Beta Pi honor society (elected as Cataloguer)
2004	Order of Omega Class Scholar Commendation
2003	Golden Key International honor society
2003-2005	Rufus Choate Scholar (awarded to top 5% of class)
2002	National Society of Collegiate Scholars honor society
2002	Philip Jackson Prize for best Introduction to Engineering design project