

Tyler Ray

2355 Engineering II Building University of California, Santa Barbara Santa Barbara, CA 93106
tylerray@protonmail.com • (803) 454-9612

EDUCATION

University of California, Santa Barbara, Santa Barbara, CA
Doctor of Philosophy (Ph.D.) in Mechanical Engineering, Candidate Sep 2010 – Oct 2015
Adviser: Professor Sumita Pennathur

University of South Carolina, Columbia, SC
Master of Science (M.S.) in Mechanical Engineering May 2008 – May 2010
Bachelor of Science (B.S.) in Mechanical Engineering Aug 2004 – May 2008
Graduated with Honors from the University of South Carolina Honors College
Magna Cum Laude

RESEARCH EXPERIENCE

Doctoral Projects, Professor Sumita Pennathur May 2010 – Sep 2015
Developing diagnostic tools for the detection of blood-borne pathogens using microfluidic-based plasmonic nanomaterial biosensors

- Established new method for characterizing nanoparticle colloidal stability
- Developed method to characterize nanoparticle surface properties using microfluidics with greater accuracy than gold standard techniques
- Developing on-chip microfluidic integrated plasmonic detection platform for real-time sensing of pathogens in solution
- Developing plasmonic biosensors for real-time detection of *S. pneumonia* in whole blood

Research Projects, Professor Matthew Begley Oct 2011 –
• Developed composite polymer / magnetic material for use as a novel, non-contact oscillating pump for microfluidic circuits
• Developed acoustophoresis microfluidic device for the alignment of anisotropic particles for bio-inspired 3D printed materials
• Developing novel DNA purification device for forensic applications

Research Projects, Professor Andrew Cleland Oct 2011 – Dec 2014
Developed an aggregation-based biodiagnostic platform for the real-time detection of targets of interest using plasmonic nanoparticles

Masters Thesis, Professors Sarah Baxter and Thomas Crawford Aug 2008 – Sep 2010
Development of plasmonic nanocomposite materials

- Developed a Total Internal Reflection Microscope to measure the alignment of gold nanorods using electric fields
- Developed a statistical method using darkfield microscopy to analyze degree of gold nanorod alignment
- Implemented a Kelvin Probe microscopy system on the lab AFM to improve images of both gold nanorods and magnetic nanoparticles

PATENTS

U.S. Provisional Patent Application 62/141,053. “System and method for tunable patterning and assembly of particles via acoustophoresis.” R. Collino, **T. Ray**, M. Begley. 2015.

PUBLICATIONS

R. Collino, **T. Ray**, R. Flemming, J. Cornell, B. Compton, M. Begley “Deposition of ordered two-phase materials using microfluidic print nozzles with acoustic focusing,” *under review*.

N. Rajan, S. Rajauria, **T. Ray**, S. Pennathur, A. Cleland “Multiplexed Serum Protein Quantification using an Aggregation Assay Platform Based on an Electrical Microfluidic Nanoparticle Analyzer,” *Biosensors and Bioelectronics*, 2016.

R. Collino, **T. Ray**, R. Flemming, C. Sasaki, H. Haj-Hariri, M. Begley “Microfluidic masonry: tunable patterning and assembly of anisotropic particles via acoustophoresis,” *Extreme Mechanics Letters*, 2015.

T. R. Ray, B. Lettiere, J. de Rutte, S. Pennathur, “Quantitative Characterization of the Colloidal Stability of Metallic Nanoparticles using UV-Vis Absorbance Spectroscopy,” *Langmuir*, 2015.

T. R. Ray, C. J. Murphy, S. Baxter, “Diffusion Linked Solidification Model of Axisymmetric Growth of Gold Nanorods,” in *Advances in Mathematical Modeling and Experimental Methods for Materials and Structures*, 2009.

R. Mahtab, S. M. Sealy, S. E. Hunyadi, B. Kinard, **T. Ray**, C. J. Murphy, “Influence of the Nature of Quantum Dot Surface Cations on Interactions with DNA,” *Journal of Inorganic Biochemistry* 2007, 101 (4), 559-564.

TALKS

”A Microfluidic-based Separation Device for the Accurate Characterization of Metallic Nanoparticles.” **T.R. Ray**, S. Pennathur, *2nd Annual SoCal Microfluidics Symposium*, Los Angeles, CA Apr 2012

”A Microfluidic-based Separation Device for the Accurate Characterization of Metallic Nanoparticles.” **T.R. Ray**, S. Pennathur, *6th Southern California Symposium on Flow Physics*, University of California, Santa Barbara Apr 2012

”A Microfluidic-based Separation Device for the Accurate Characterization of Metallic Nanoparticles.” **T.R. Ray**, S. Pennathur, *27th International Symposium on MicroScale Bioseparations and Analyses*, Geneva, Switzerland Feb 2012

”Gold Nanorods: Exploration of the Growth Mechanism through Cellular Automata Modeling” **T.R. Ray**, S. Baxter, *University of South Carolina Discovery Day*, Columbia, SC Apr 2008
Awarded Best Oral Presentation

POSTERS

”Acoustically Enhanced Aggregation: a Microfluidic Assay Platform for Point-of-Care Diagnostics.” **T.R. Ray**, R. R. Collino, M. R. Begley, *Gordon Conference on the Physics & Chemistry of Microfluidics* Jun 2015

”Microchannel Acoustophoresis for Particle Manipulation and Deposition.” R. R. Collino, **T.R. Ray**, R. C. Fleming, C. H. Sasaki, H. Haj-Hariri, M. R. Begley, *Gordon Conference on the Physics & Chemistry of Microfluidics* Jun 2015

”Detection of Pathogenic Bacteria in Whole Blood using Microfluidics-Based Plasmonic Biosensing for Rapid Point-of-Care Diagnostics.” **T.R. Ray**, S. Pennathur, *Gordon Conference on the Physics & Chemistry of Microfluidics* Jun 2013

”Nanofluidic-based Characterization of Gold Nanoparticles.” **T.R. Ray**, S. Pennathur, *Gordon Conference on the Physics & Chemistry of Microfluidics* Jun 2011

”Force Handles for Alignment of Metallic Nanoparticles” **T.R. Ray**, T.M. Crawford, and S. Baxter, *Materials Research Society Fall Meeting*, Boston, MA Nov 2009

HONORS

Mechanical Engineering Grad Slam – First Place Oct 2015

Elected Co-Chair for 2017 Gordon Research Seminar on Microfluidics Jun 2015

Discussion Leader – Gordon Research Seminar on Microfluidics Jun 2015

Honorable Mention in the 2nd Annual Art of Science Competition, UCSB 2015

Institute for Collaborative Biotechnology Graduate Fellow 2014–2015

Best TA Award in Mechanical Engineering 2014

Discussion Leader – Gordon Research Seminar on Microfluidics Jun 2013

UCSB Excellence Fellowship in Mechanical Engineering 2012

California NanoSystems Institute Graduate Research Fellow 2010 – 2014

University of California Regents Special Fellow 2010 – 2014

National Defense Science and Engineering Graduate Fellowship 2008 – 2010

National Science Foundation Graduate Fellowship
Honorable Mention 2008, 2009

	Barry M. Goldwater National Scholarship for Science and Engineering Honorable Mention	2007
	Caroliniana Award for Excellence in Student Leadership and Service Recipient	2008
	Outstanding Senior in Mechanical Engineering, University of South Carolina	2008
	Magellan Scholar Fellowship for independent undergraduate research	2007
	Robert McNair Scholarship Recipient Awarded to top 25 out-of-state undergraduate students at the University of South Carolina	2004–2008
SELECTED TEACHING	University of California, Santa Barbara Lecturing - Laboratory Classes: Introduction to Fabrication Methods Spring 2013, 2014 <ul style="list-style-type: none"> • Instructed 20–25 students in a weekly lab section on cleanroom fabrication techniques • Designed three labs to teach basic cleanroom fabrication processes using research-relevant MEMS devices • Mentored teaching experience, 4 opportunities to lecture (full-length) in the main section University of South Carolina Lecturing - Numerical Methods Fall 2009 <ul style="list-style-type: none"> • Instructed 75 students in a weekly lab section on programming techniques in MathCad • Prepared course material to supplement and reinforce concepts taught in the primary section • Mentored teaching experience, opportunities to lecture in the main section 	
ASSOCIATIONS	Tau Beta Pi, Omicron Delta Kappa, Pi Tau Sigma, Pi Mu Epsilon, American Society of Mechanical Engineers, Materials Research Society	
CAMPUS SERVICE	Appointed by the Chancellor to the <i>Coordinating Committee on Budget Strategy</i> as the Graduate Student Body Representative 2013–2015 Graduate Student Representative on the <i>Student Fee Advisory Committee</i> 2012–2015	