Mark W. Tibbitt, Ph.D. Candidate
Department of Chemical and Biological Engineering
University of Colorado Boulder
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Education

Ph.D. (in progress), Chemical and Biological Engineering, University of Colorado Boulder Aug. 2012
GPA: 4.0; Certificate in Molecular Biophysics; Certificate in College Teaching
B.A., Integrated Science and Mathematics, Northwestern University, June 2007
GPA: 3.86 *Magna Cum Laude*, Phi Beta Kappa, Pi Mu Epsilon

Honors and Awards

Student Award for Outstanding Research – PhD Candidate, Society for Biomaterials, 2012
Excellence in Graduate Polymer Research Award, American Chemical Society, 2012
Max S. Peters Outstanding Ph.D. Graduate Award, University of Colorado, 2012
American Institute of Chemists Graduate Student Award, University of Colorado, 2012
Lindau Fellow (U.S. Delegation); 61st Nobel Laureate Meeting, 2011
Graduate Student Faculty Leadership Award, University of Colorado, 2011
Teets Family Endowed Doctoral Fellowship, University of Colorado, 2010 - 2012
Best Should Teach Silver Award, University of Colorado, 2010, 2011
Outstanding Graduate Teaching Award, University of Colorado, 2010
NIH Molecular Biophysics Training Grant, University of Colorado, 2009-2011
DoEd GAANN Fellowship, University of Colorado, 2008-2010
Dean's Outstanding Merit Fellowship, University of Colorado, 2007-2008
Inductee of Phi Beta Kappa and Pi Mu Epsilon, Northwestern University, 2007
NOAA Ernest F. Hollings Scholarship, NOAA, 2006-2007
NASA Summer Research Fellowship, NASA, 2005
Dean's List, Northwestern University, 2003-2007
Robert C. Byrd Scholarship, United States Department of Education, 2003-2007
Semi-Finalist, United States Physics Team, 2003

Publications

1. **Tibbitt MW**, Shah A, Kloxin AM, Toner M, Oakey J, and Anseth KS, "Selective capture and release of individual cells with photoactive capture films," **In Preparation**
2. Shenoy R, **Tibbitt MW**, Anseth KS, and Bowman CN, "Formation of core-shell particles by interfacial radical polymerization initiated by a glucose oxidase-mediated redox system," **In Preparation for submission to Advanced Functional Materials**
3. Kloxin AM, Lewis KJ, DeForest CA, Seersdorf G, **Tibbitt MW**, Balasubramaniam V, and Anseth KS, "Responsive culture platform to examine the influence of microenvironment geometry on cell function," **In Preparation for submission to Integrative Biology**
4. **Tibbitt MW**, Sawicki LA, Kloxin AM, and Anseth KS, "Characterization of material properties and photodegradation in chain and step polymerized hydrogels," **In Preparation for submission to Macromolecules**
5. Kyburz KA, **Tibbitt MW**, and Anseth KS, "Culture and differentiation of MSCs encapsulated in hydrogels," **In Preparation for submission to Soft Matter**
6. **Tibbitt MW**, AM Kloxin, and KS Anseth, "Modeling photodegradation in thick polymer networks for the predictable control of network evolution," **In Review at Macromolecules**
7. Guo Q, Wang X, **Tibbitt MW**, Anseth KS, Montell D, Elisseeff JH, "Light activated cell migration in synthetic extracellular matrices" *Biomaterials* **Accepted**

8. Azagarsamy MA, Alge DL, Radhakrishnan SJ, **Tibbitt MW**, and Anseth KS, "Photocontrolled nanoparticles for on-demand release of proteins," *Biomacromolecules* **Published Online**
9. **Tibbitt MW**, BW Han, AM Kloxin, and KS Anseth, "Synthesis and application of photodegradable microparticles for spatiotemporal control of protein delivery," *J Biomed Mater Res Part A*, **100A** (2012) 1647-1654.
10. Kloxin AM, **MW Tibbitt**, and KS Anseth, "Synthesis of photodegradable hydrogels as dynamically tunable materials for 2D and 3D cell culture," *Nature Protocols*, **5** (2010) 1867-1887.
11. **Tibbitt MW**, AM Kloxin, KU Dyamenahalli, and KS Anseth, "Controlled two-photon photodegradation of PEG hydrogels to study and manipulate subcellular interactions on soft materials," *Soft Matter*, **6** (2010) 5100-5108.
12. Kloxin AM, **MW Tibbitt**, AM Kasko, J Fairbairn, and KS Anseth, "Controlled Degradation of Photolabile PEG-based Hydrogels," *Advanced Materials*, **22** (2010) 61-66.
13. **Tibbitt MW** and KS Anseth, "Hydrogels as extracellular matrix mimics for 3D cell culture," *Biotechnology and Bioengineering*, **103** (2009) 655-663.
14. Aimetti AA, **MW Tibbitt**, and KS Anseth, "Human neutrophil elastase responsive delivery from poly(ethylene glycol) hydrogels," *Biomacromolecules*, **10** (2009) 1484-1489.

Conference Presentations

Tibbitt MW, Han BW, Kloxin AM, and Anseth KS, "Photodegradable microspheres for spatiotemporal control of protein delivery", oral presentation at 9th World Biomaterials Congress, June, 2012, Chengdu, Sichuan, China

Tibbitt MW, and Anseth KS, "Photoresponsive PEG-based hydrogels: Precise and predictable tuning of the mechanical and biochemical nature of the stem cell niche", oral presentation in the Excellence in Graduate Polymer Research Symposium at American Chemical Society Annual Meeting, March, 2012, San Diego, CA

Tibbitt MW, Kloxin AM, Dyamenahalli KU, and Anseth KS, "Spatiotemporal control of cell-ECM interactions with photoactive PEG-based hydrogels", poster presentation at Howard Hughes Medical Institute Science Meeting, May, 2011, Ashburn, VA

Tibbitt MW, Kloxin AM, Han BW, and Anseth KS, "Photodegradable microparticles for spatiotemporal control of growth factor delivery", oral presentation at Society for Biomaterials Annual Meeting, April, 2011, Orlando, FL

Tibbitt MW, Kloxin AM, and Anseth KS, "Two-photon irradiation of photoresponsive hydrogels to control cell-material interactions", oral presentation at 32nd Australasian Polymer Society Meeting, February, 2011, Coffs Harbour, NSW, Australia

Tibbitt MW, Kloxin AM, Dyamenahalli KU, and Anseth KS, "Control of synthetic ECM context to direct cell morphology and cell adhesion in 2D and 3D", oral presentation at American Institute of Chemical Engineering Annual Meeting, November, 2010, Salt Lake City, UT

Tibbitt MW, Kloxin AM, Dyamenahalli KU, and Anseth KS, "Spatiotemporal control of cell-ECM interactions with photoactive PEG-based hydrogels", poster presentation at Gordon Research Conference: Signal Transduction in Engineered Extracellular Matrices, June, 2010, Biddeford, ME

Tibbitt MW, Kloxin AM, and Anseth KS, "Photodegradable hydrogels to investigate the effect of ECM mechanics on cell function," poster presentation at CalTech Soft Materials Workshop, February, 2010, Pasadena, CA

Tibbitt MW, Kloxin AM, Dyamenahalli KU, and Anseth KS, "Photodegradable hydrogels to investigate the effect of network structure on encapsulated cell function," oral presentation at MRS Fall Meeting, December, 2009, Boston, MA

Tibbitt MW, Kloxin AM, and Anseth KS, "Photodegradable hydrogels to investigate the effect of network structure on encapsulated cell function," poster presentation at Photopolymerization Fundamentals Conference, June, 2009, Breckenridge, CO

Tibbitt MW, Kloxin AM, and Anseth KS, "Spatial patterning of structural properties in a photodegradable PEG-based hydrogel for cell culture," oral presentation at Society for Biomaterials Annual Meeting, April, 2009, San Antonio, TX

Tibbitt MW, GT DiDonato, and AF Holland, "Oceans and Human Health: Tracking point source contaminants in tidal creeks," presented at NOAA Hollings Intern Conference, August 2006, Silver Spring, MD

Tibbitt MW, JM Fregeau, and FA Rasio, "Small N-body simulations and extrasolar planetary system stability," presented at NASA Fellows Conference, August 2005, Evanston, IL

Research Experience

Graduate Researcher, University of Colorado Boulder, Anseth Group, Jan. 2008 - current

- "Characterization, synthesis, and application of photodegradable hydrogel networks"
- Model the degradation kinetics and profiles of photolytically degradable poly(ethylene glycol) networks
- Apply this scaffold to cellular systems to study dynamic cell-extracellular matrix interactions, specifically the plasticity of MSC differentiation
- Fabricate photodegradable microparticles for spatiotemporally controlled delivery of trophic factors in cell culture

Lab Rotation, University of Colorado Boulder, Hrenya Group, Fall 2007

- "Towards a proper discretization of a continuous distribution of particle sizes for theoretical simulations"
- Developed MATLAB codes to analyze the efficacy of employing a direct quadrature method of moments to discretize normal and log-normal distributions in a previously derived kinetic theory

Undergraduate Researcher, Northwestern University, Spring 2006 - Fall 2007

- Investigated the efficacy of one-stage and two-stage methane biodigesters for fuel production
- Quantified the microbial populations of biodigesters and related this to the reactors efficacy

Hollings Summer Intern, Hollings Marine Laboratory, Summer 2006

- Collected field samples in coastal tidal creeks for the Oceans and Human Health project
- Analyzed the water samples for fecal contamination and analyzed the data using ANOVA and ANCOVA
- Planned and organized the collection and processing of field samples

Undergraduate and NASA Researcher, Northwestern University, Spring 2004 – Fall 2006

- "Computational simulation of the dynamics of small N-body systems"
- Researched the field of N-body simulations and wrote code to simulate the gravitational dynamics of small N-body systems
- Applied findings to the process of planetary formation, stabilization and evolution about a central massive star as well as stellar evolution about an intermediate mass black hole

Teaching and Mentoring Experience

Lead Teaching Assistant, University of Colorado Boulder, Fall 2010 – Spring 2012

This position serves as the liaison between the Graduate Teaching Program and the Department of Chemical and Biological Engineering. Organize incoming and advanced teaching assistants, train TA's for their positions, and organize and put on several workshops on teaching engineering education in and out of the classroom.

Guest Lecturer, University of Colorado Boulder, Spring 2011
Polymer Physics: prepared and presented 4 lectures during the course that focused on scaling laws in polymer physics, the Flory construction of polymer stretching, and rubber elasticity theory, also helped prepare quiz and test questions pertaining to these materials.

Teaching Assistant, University of Colorado Boulder, Fall 2009
Intermediate Chemical Engineering Thermodynamics: Held multiple recitation sessions each week, gave multiple lectures, and helped write test/homework questions for this graduate course
FCQ: 5.5/6.0, **Outstanding Graduate Teaching Award**

Teaching Assistant, University of Colorado Boulder, Spring 2008
Creative Technology: Held weekly office hours, assisted students in writing various papers on the topics of biotechnology, alternative energy, and nanotechnology

Teaching Assistant, Northwestern University, Fall 2004 – Spring 2006
ISP 101-1,2,3: Helped form the curriculum for this introduction to computing class, ran lab sessions to aid students with project in HTML, C++, Perl, etc., held office hours to offer further assistance in the theory of computing and with projects outside of lab time

Research Mentor, University of Colorado Boulder
Paige Fischer, Undergraduate researcher, University of Wyoming, Summer 2012
Austin Healey, NSF-REU, Univeristy of Pittsburgh (undergraduate), Summer 2011
Dan McKinnon, Graduate Student, Spring 2011 – Fall 2012
Kristen Feaver, Senior Thesis Student, Fall 2010 – Spring 2011
Lisa Sawicki, NSF-REU, University of Florida (undergraduate), Summer 2010
Emily Maginnis, Undergraduate researcher, Fall 2009 – Spring 2011
Bruce Han, Undergraduate researcher, Summer 2009 – Spring 2012
Donna Kuntzler, Undergraduate researcher, Fall 2009
Kayla Culver, NSF-REU, John's Hopkins (undergraduate), Summer 2009
Kiran Dyamenahalli, MSTP Rotation student, Summer 2009
Cara Rahon, Rotation student, Spring 2009
Caroline Szczepanski, NSF REU, Lafayette College (undergraduate), Summer 2008

Service Activities
Lead Graduate TA, Department of Chemical Engineering, University of Colorado, 2010 - 2012
High School Honors Institute, University of Colorado, 2008-2011
StARS Planning Committee, University of Colorado, 2008-10
Science and Math Tutor, La finca del nino, Honduras, 2007-2008
Engineers for a Sustainable World, Northwestern University, 2007
Evanston High School Tutor, Evanston, IL 2005-2007