

Kelly M. Schultz

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EDUCATION

University of Delaware, Newark, DE
Ph.D. in **Chemical Engineering**

May 2011

Northeastern University, Boston, MA
Bachelor of Science in **Chemical Engineering**

January 2006

AWARDS AND HONORS

- Distinguished Young Scholars Summer Seminar Series at University of Washington July 2012
- ACS Excellence in Graduate Polymer Research Symposium March 2010
- Fraser and Shirley Russell Teaching Fellowship February 2010 – May 2010
- National Science Foundation Graduate Research Fellowship September 2006 – September 2009
- Northeastern University Academic Scholarship September 2002 – January 2006

RESEARCH EXPERIENCE

University of Colorado/ Howard Hughes Medical Institute, Boulder, CO June 2011–present
Department of Chemical and Biological Engineering

Postdoctoral Research Associate, Advisor: Professor Kristi S. Anseth

- Use passive microrheological measurements to characterize synthetic hydrogelators during enzymatic degradation.
- Measure how cells degrade a synthetic hydrogel during migration.
- Characterize the reorganization and change in cytoplasm during migration and degradation of the synthetic hydrogel material using intracellular microrheological measurements.

University of Delaware, Newark, DE

January 2007–April 2011

Department of Chemical Engineering

Research Assistant, Advisor: Professor Eric M. Furst

- Developed method for creating maps of assembly conditions in a biocompatible hydrogel system using passive microrheology on equilibrated gels.
- Performed studies to understand the sol-gel transition in multi-functional hydrogels.
- Developed lab-on-chip technology for high-throughput microrheological characterization.
- Correlated rheological properties of a rheologically evolving hydrogel system with the ability to process the scaffold into fibers using electrospinning.

Massachusetts Institute of Technology, Cambridge, MA

January 2004–August 2006

Department of Chemical Engineering

Undergraduate Researcher, Advisor: Professor Patrick S. Doyle

- Research focused on the understanding of dynamics of single molecules of DNA.
- Performed DNA stretching experiments and analysis in UV cross-linked (poly(ethylene glycol) 1000 dimethacrylate (PEGDMA 1000)) gels.

Cambridge Scientific, Inc., Cambridge, MA

January 2004–June 2004

Research Engineer

- Responsible for synthesis of poly(propylene fumarate) for use as a biodegradable bone mass substitute.
- Performed UV spectroscopy characterization of anthrax vaccines.

TEACHING EXPERIENCE AND MENTORING

University of Delaware, Newark, DE
Department of Chemical Engineering
Fraser and Shirley Russell Teaching Fellow

- Heat and Mass Transfer February 2010 – May 2010
- Introduction to Chemical Engineering February 2009 – May 2009
- Heat and Mass Transfer February 2008 – May 2008

Undergraduate Research Advisor

- **Nicholaus Lacock**, University of Delaware, January 2010 – May 2010
Project: “Optimization and design of microfluidics devices for microrheology sample preparation”
- **Matthew Dion**, University of Delaware, NSF REU student June 2010 – August 2010
Project: “Microfluidic devices and hydrogel beads”
- **Alexandra V. Bayles**, University of Delaware January 2010 – April 2011
Project: “Microfluidic four-roll mills for development to control flow type”
- **Austin Lin**, University of Colorado at Boulder June 2012 – present
Project: “Overlap concentration of multi-arm PEG molecules measured using passive microrheology”

PUBLICATIONS

1. **K. M. Schultz**, K. Kyburz and K. S. Anseth, “Microstructural evolution during cell-mediated degradation,” *in preparation*.
2. J. Leight, **K. M. Schultz** and K. S. Anseth, “Microstructural hydrogel characterization: combining FRET and passive microrheology,” *in preparation*.
3. **K. M. Schultz** and K. S. Anseth, “Enzymatic degradation of biocompatible PEG-peptide hydrogels measured using multiple particle tracking microrheology,” *Soft Matter*, DOI: 10.1039/C2SM27303A, 2012.
4. **K. M. Schultz**, “Microscale rheology,” in *Nano- and Micro-Mechanics of Soft Condensed Matter*, John Wiley and Sons, Y. T. Cheng, H. Lu, M. R. VanLandingham and K. Van Vliet (eds.), *submitted*.
5. **K. M. Schultz**, L. Campo-Deaño, A. D. Baldwin, K. L. Kiick, C. Clasen and E. M. Furst, “Electrospinning cross-linking PEG-heparin hydrogels,” *Polymer*, DOI: 10.1016/j.polymer.2012.09.060, 2012.
6. **K. M. Schultz**, A. D. Baldwin, K. L. Kiick and E. M. Furst, “Measuring the modulus and reverse percolation transition of a degrading hydrogel,” *ACS Macro Letters*, **1**, 706-708, 2012.
7. **K. M. Schultz** and E. M. Furst, “Microrheology of biomaterial hydrogelators,” *Soft Matter*, invited review, **8**, 6198-6205, 2012.
8. **K. M. Schultz**, A. V. Bayles, A. D. Baldwin, K. L. Kiick and E. M. Furst, “Rapid, high resolution screening of biomaterial hydrogelators by μ^2 rheology,” *Biomacromolecules*, **12**, 4178-4182, 2011.
9. **K. M. Schultz** and E. M. Furst, “High-throughput rheology in a microfluidic device,” *Lab on a Chip*, **11**, 3802-3809, 2011.
10. **K. M. Schultz**, A. D. Baldwin, K. L. Kiick and E. M. Furst, “Gelation of covalently cross-linked PEG-heparin hydrogels,” *Macromolecules*, **42**, 5310-5316, 2009.
11. **K. M. Schultz**, A. D. Baldwin, K. L. Kiick and E. M. Furst, “Rapid rheological screening to identify conditions of biomaterial hydrogelation,” *Soft Matter*, **5**, 740-742, 2009.
12. T. H. Larsen, **K. M. Schultz** and E. M. Furst, “Hydrogel microrheology near the liquid-solid transition,” *Korea-Australian Rheology Journal*, **20**, 165-173, 2008.
13. G. C. Randall, **K. M. Schultz** and P. S. Doyle, “Methods to electrophoretically stretch DNA: microcontractions, gels, and hybrid gel-microcontraction devices,” *Lab on a Chip*, **6**, 516-525, 2006.

INVITED PRESENTATIONS

1. **K. M. Schultz**, E. M. Furst and K. S. Anseth “Microrheological characterization for biological

- applications and soft materials design,” Distinguished Young Scholars Summer Seminar Series at the University of Washington, July 23, 2012, Seattle, WA.
2. **K. M. Schultz** and E. M. Furst “Microrheological screening over a large material composition space,” Procter and Gamble Corp., January 25, 2011, Cincinnati, OH.

CONFERENCE PRESENTATIONS

1. **K. M. Schultz** and K. S. Anseth “Characterization of enzymatic degradation in a thiol-ene hydrogel using multiple particle tracking microrheology,” The American Institute of Chemical Engineering 2012 Annual Meeting, October 28- November 2, 2012, Pittsburgh, PA.
2. **K. M. Schultz** and K. S. Anseth “High-throughput microrheology in a microfluidic device,” The American Institute of Chemical Engineering 2012 Annual Meeting, October 28- November 2, 2012, Pittsburgh, PA.
3. **K. M. Schultz** and K. S. Anseth “Microrheological characterization techniques for biological applications and soft material design,” Poster presentation, The American Institute of Chemical Engineering 2012 Annual Meeting, October 28- November 2, 2012, Pittsburgh, PA.
4. **K. M. Schultz** and K. S. Anseth “Measuring hydrogel degradation near the gel-sol transition using multiple particle tracking microrheology,” The 16th International Congress on Rheology meeting, August 5-10, 2012, Lisbon, Portugal.
5. **K. M. Schultz** and K. S. Anseth “Characterization of hydrogel degradation using multiple particle tracking microrheology,” Poster presentation, Keystone Symposium on Regenerative Tissue Engineering and Transplantation, March 31- April 5, 2012, Breckenridge, CO.
6. **E. M. Furst** and K. M. Schultz, “High-throughput rheology in a microfluidic device,” The American Institute of Chemical Engineers 2011 Annual Meeting, October 16-21, 2011, Minneapolis, Minnesota.
7. **E. M. Furst** and K. M. Schultz, “High-throughput rheology using a microfluidic device,” The 83rd Society of Rheology meeting, October 9-13, 2011, Cleveland, Ohio.
8. **K. M. Schultz** and E. M. Furst, “High-throughput microrheology of therapeutic hydrogelators,” Poster presentation, The American Institute of Chemical Engineers 2010 Annual Meeting, November 7-12, 2010, Salt Lake City, Utah.
9. **K. M. Schultz**, A. D. Baldwin, L. Campo Deaño, C. Clasen, K. L. Kiick and E. M. Furst, “Nano-structured PEG-heparin hydrogel characterization by high-throughput microrheology,” The American Institute of Chemical Engineers 2010 Annual Meeting, November 7-12, 2010, Salt Lake City, Utah.
10. **K. M. Schultz** and E. M. Furst, “Microrheological screening over a large composition space,” The 82nd Society of Rheology meeting, October 25-29, 2010, Santa Fe, New Mexico.
11. **K. M. Schultz**, A. D. Baldwin, L. Campo Deaño, C. Clasen, K. L. Kiick and E. M. Furst, “High-throughput screening of PEG-heparin hydrogels using multiple particle tracking microrheology,” The American Chemical Society Spring 2010 Meeting and Exposition, March 21-25, 2010, San Francisco, CA.
12. **K. M. Schultz**, L. Campo Deaño, A. D. Baldwin, K. L. Kiick, C. Clasen and E. M. Furst, “Electrospinning cross-linking PEG-heparin hydrogels,” Poster presentation, Gordon Research Conference on Colloidal, Macromolecular, and Polyelectrolyte Solutions, February 21-26, 2010, Ventura, CA.
13. **K. M. Schultz**, A. D. Baldwin, K. L. Kiick and E. M. Furst, “High-throughput microrheology of biocompatible hydrogelators,” The 81st Society of Rheology meeting, October 18-22, 2009, Madison, WI.
14. **K. M. Schultz**, A. D. Baldwin, K. L. Kiick and E. M. Furst, “Material assembly and gelation kinetics of PEG-heparin hydrogels using high-throughput microrheology,” The American Chemical Society Fall 2009 Meeting and Exposition, August 16-20, 2009, Washington, D. C..
15. **K. M. Schultz**, K. L. Kiick and E. M. Furst, “Material assembly and gelation kinetics of PEG-heparin hydrogels using multiple particle tracking microrheology,” The 15th International Congress on Rheology meeting, August 3-8, 2008, Monterey, CA.
16. **K. M. Schultz**, K. L. Kiick and E. M. Furst, “Material assembly and gelation kinetics of PEG-heparin hydrogels,” Poster presentation, Gordon Research Conference on Colloidal,

Macromolecular, and Polyelectrolyte Solutions, February 3-8, 2008, Ventura, CA.

17. **K. M. Schultz**, K. L. Kiick and E. M. Furst, "Material assembly and gelation kinetics of PEG-heparin hydrogels," Poster presentation, Frontiers in Microrheology Workshop, February 6-9, 2008, Los Angeles, CA.

PROFESSIONAL ACTIVITIES

Professional Society Memberships

American Institute of Chemical Engineers, American Chemical Society, American Society for Cell Biologists, Society of Rheology

Scientific Publications

Journal Referee for Biomacromolecules

FUNDING AND PROPOSALS

- **NSF CBET Fluid Dynamics** PI: Kristi S. Anseth, written by Kelly M. Schultz and Kristi S. Anseth (\$300,000) 2012-2015
"Rheological characterization of cellularly remodeled hydrogel matrices"
- **NIH K99/R01 Pathways to Independence Award** PI: Kelly M. Schultz, by Kelly M. Schultz (not funded) 2011
"Microstructural rheological characterization of synthetic hydrogel scaffolds during three-dimensional mesenchymal stem cell migration"
- **NSF International Research Fellowship** PI: Kelly M. Schultz, written by Kelly M. Schultz (unofficially awarded/ withdrawn) 2011
"Rheological characterization of bacteria during the swarming lag"
- **NIST Postdoctoral Research Associateships Program** PI: Kelly M. Schultz, Written by Kelly M. Schultz (scored but not funded) 2010
"Does interfacial rheological heterogeneity influence the stability of Pickering emulsions?"
- **NSF Graduate Research Fellowship** PI: Kelly M. Schultz, written by Kelly M. Schultz (\$120,000) 2006-2009

EMPLOYMENT HISTORY

Albano Ballet Co., Hartford, CT September 1999–April 2006
Ballet Dancer, Principal

Nutmeg Conservatory for the Arts, Torrington, CT June 2001–December 2004
Assistant to the Ballet Master

Atlanta Ballet Co., Atlanta, GA August 2000–May 2001
Ballet Dancer, Corps de ballet