Kyle E. Broaders

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EDUCATION

University of California, Berkeley, Ph.D. *2006-2011*
Discipline: Chemistry Thesis: "Synthesis and evaluation of environemntally responsive polymeric materials"

Swarthmore College, B.A. with High Honors *2002-2006*
Major : Chemistry Minor : English Literature

RESEARCH EXPERIENCE

Mount Holyoke College, Department of Chemistry *2014-present*

Principal Investigator

Applying materials chemistry techniques to the study of cell-cell and cell-material interfaces with a goal of understanding the biophysical requirements for multicellular behavior

University of California, San Francisco, Department of Pharmaceutical Chemistry *2011-2014*

Advisor: *Professor Zev J. Gartner*

Applyed techniques from materials chemistry to the development of improved model tissues for how topographical factors like cell shape and tissue curvature affect multicellular behaviors of mammalian cells

University of California, Berkeley, Department of Chemistry *2006-2011*

Advisor: *Professor Jean M. J. Fréchet*

Collaboratively led and participated with a multidisciplinary team of chemists, engineers, and biologists in the development of materials for use in safe and effective cancer immunotherapy

- Invented and patented a class of modified polymers that uniquely combine biocompatibility; ease of synthesis; and chemical and biological fine-tuning
- Demonstrated the effect of material degradation rate on antigen presentation and studied the effect of material composition on the pathway of presentation
- Investigated microparticle degradation based on biologically relevant reductive and oxidative conditions
- Developed a new class of acid-degradable nylon for the wall material of liquid-filled impermeable microcapsules

Swarthmore College, Department of Chemistry *2005-2006*

Advisor: *Professor Robert S. Paley*

Independently synthesized the first known non-biaryl, atropisomeric vinyl phosphine and proved its chirality. Investigated the mechanism of the palladium-catalyzed hydrophosphination in this synthesis.

TEACHING EXPERIENCE

Assistant Professor, Mount Holyoke College *2014-present*

- Chem 160: Integrated Introduction to Chemistry and Biology (team taught with the Biology Department)
- Chem 302: Organic Chemistry II

Coinstructor, University of California, San Francisco *2013*

- Proposal writing course for first year graduate students aimed at predoctoral fellowships

Summer Research Training Program Mentor, University of California, San Francisco *2013*

- Nathan Nguyen – mentored for one summer on tissue culture and advanced microscopy

Undergraduate Research Mentor, University of California, Berkeley *2008-2011*

- Sirisha Grandhe – mentored for three years resulting in 2 publications.
  Currently a medical student attending VCU School of Medicine
- Ayano Kohlgruber – mentored for one year, resulting in 1 publication.
  Currently a graduate student in the immunology department at Harvard Medical School

Graduate Student Instructor (GSI), University of California, Berkeley *2006-2009*

- Organic chemistry laboratory
- Organic chemistry lecture – head GSI
- Graduate-level chemical biology

HONORS & AWARDS

- Mount Holyoke College Fund the Future Research Endowment *2015*
- NIH Ruth L. Kirschstein NRSA Postdoctoral Fellowship *2012*
- Gonzalez-Vilaplana Award, Swarthmore College *2006*

PUBLICATIONS (asterisk indicates undergraduate co-author)

1. "Coupling between apical contractility and basal adhesion allow epithelia to collectively sense and respond to substrate topography over long distances" **K.E. Broaders**, A.E. Cerchiari, Z.J. Gartner. *Integr. Biol.* 2015. Accepted.
2. "A strategy for tissue self-organization that is robust to cellular heterogeneity and plasticity." A. Cerchiari, J.C. Garbe, M.E. Todhunter, N.Y. Jee, **K.E. Broaders**, D. Peehl, M.A. LaBarge, T. Desai, M. Thomson, Z.J. Gartner. *Proc. Natl. Acad. Sci.* 2015, 112, 7, 2287-2292
3. "Exclusive formation of monovalent quantum dot imaging probes by steric exclusion." J. Farlow, D. Seo, **K.E. Broaders**, M. Taylor, R.D. Vale, Y.W. Jun, Z.J. Gartner. *Nat. Methods.* 2013, 10, 1203-1205.
4. "Chemically programmed cell adhesion with membrane-anchored oligonucleotides." N.S. Selden, M.E. Todhunter, N.Y. Jee, J.S. Liu, **K.E. Broaders**, Z.J. Gartner. *J. Am. Chem. Soc.*, 2012, 134, 765-768.
5. "Mannosylated Dextran Nanoparticles: a pH-Sensitive System Engineered for Immunomodulation through Mannose Targeting." L. Cui, J.A. Cohen, **K.E. Broaders**, T.T. Beaudette, J.M.J. Fréchet. *Bioconjugate Chem.* 2011, 22, 949-957.
6. "A Biocompatible Oxidation-Triggered Carrier Polymer with Potential in Therapeutics." **K.E. Broaders**, S. Grandhe*, and J.M.J. Fréchet. *J. Am. Chem. Soc.*, 2011, 133, 756-758.
7. "Acid-Degradable Solid-Walled Microcapsules as Environmentally Responsive Burst-release Carriers." **K.E. Broaders**, S.J. Pastine, S. Grandhe*, J.M.J. Fréchet. *Chem. Commun.* 2011, 47, 665-667.
8. "In Vitro Analysis of Acetalated Dextran Microparticles as a Potent Delivery Platform for Vaccine Adjuvants." E.M. Bachelder, T.T. Beaudette, **K.E. Broaders**, J.M.J. Fréchet, M.T. Albrecht, A.J. Mateczun, K.M. Ainslie, J.T. Pesce, A.M. Keane-Myers. *Mol. Pharmaceutics.* 2010, 7, 826-835.
9. "Acetal-Modified Dextran Microparticles with Controlled Degradation Kinetics and Surface Functionality for Gene Delivery in Phagocytic and Non-Phagocytic Cells." J.A. Cohen, T.T. Beaudette, J.L. Cohen, **K.E. Broaders**, E.M. Bachelder, J.M.J. Fréchet. *Adv. Mater.* 2010, 22, 3593-3597.
10. "Chemoselective Ligation in the Functionalization of Polysaccharide-Based Particles." T.T. Beaudette, J.A. Cohen, E.M. Bachelder, **K.E. Broaders**, J.L. Cohen, E.G. Engleman, and J.M.J. Fréchet. *J. Am. Chem. Soc.* 2009, 131, 10360-10361.
11. "*In Vivo* Studies on the Effect of Co-Encapsulation of CpG DNA and Antigen in Acid-Degradable Microparticle Vaccines." T.T. Beaudette, E.M. Bachelder, J.A. Cohen, A.C. Obermeyer, **K.E. Broaders**, J.M.J. Fréchet, E.-S. Kang, I. Mende, W.W. Tseng, M.G. Davidson, and E.G. Engleman. *Mol. Pharmaceutics.* 2009, 6, 1160-1169.
12. "Acetalated dextran is a chemically and biologically tunable material for particulate immunotherapy." **K.E. Broaders**, J.A. Cohen, T.T. Beaudette, E.M. Bachelder, and J.M.J. Fréchet. *Proc. Natl. Acad. Sci.* 2009, 106, 5497-5502.
13. "Acid-Degradable Polyurethane Particles for Protein-Based Vaccines: Biological Evaluation and in Vitro Analysis of Particle Degradation Products." E.M. Bachelder, T.T. Beaudette, **K.E. Broaders**, S.E. Paramonov, J. Dashe, and J.M.J. Fréchet. *Mol. Pharmaceutics* 2008, 5, 876-884.
14. "Acetal-Derivatized Dextran: An Acid-Responsive Biodegradable Material for Therapeutic Applications." E.M. Bachelder, T.T. Beaudette, **K.E. Broaders**, and J.M.J. Fréchet. *J. Am. Chem. Soc.* 2008, 130, 10494-10495.

PATENT

1. "Acid-degradable and bioerodible modified polyhydroxylated materials." E.M. Bachelder, T.T. Beaudette, **K.E. Broaders**, and J.M.J. Fréchet. International patent WO2010005847, filed July, 2008

PRESENTATIONS

1. **K.E. Broaders**, Z.J.Gartner. "Structured Substrates for the Investigation of Shape-Mediated Behavior." 2012 National Meeting of the American Society for Cell Biology; San Francisco. December 18, 2012.
2. **K.E. Broaders**, J.A. Cohen, T.T. Beaudette, E.M. Bachelder, and J.M.J. Fréchet. "Acid-Sensitive Modified Polysaccharides for Use in Cancer Immunotherapy." 239th National Meeting of the American Chemical Society; San Francisco. March 21, 2010.
3. **K.E. Broaders**, J.A. Cohen, T.T. Beaudette, E.M. Bachelder, and J.M.J. Fréchet. "Acetalated Dextran. A Safe Effective Material for Microparticulate Immunotherapy.." Gordon Research Conference – Drug Carriers in Medicine and Biology. August 17, 2010

PROFESSIONAL AFFILIATIONS

American Chemical Society