

Matthew D. Green

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Professional

June 2014-present Assistant Professor of Chemical Engineering
School for Engineering of Matter, Transport, and Energy (SEMTE)
Arizona State University, Tempe, AZ

Jan 2012–June 2014 Postdoctoral Researcher
Chemical and Biomolecular Engineering Department
University of Delaware
Co-advisors: Thomas H. Epps, III; Millicent O. Sullivan
Peptide-Containing Block Copolymer Amphiphiles for Targeted Drug Delivery

Education

Nov 2011 Ph.D., Chemical Engineering
Virginia Tech, Blacksburg, VA
Primary Advisor: Timothy Long, Dept. of Chemistry; Co-advisor in engineering:
Richey Davis, Dept. of Chemical Engineering
Dissertation: *Tailoring Structure and Function of Imidazole-Containing Block Copolymers for Emerging Applications from Gene Delivery to Electromechanical Devices*

April 2011 M.Eng., Chemical Engineering, April 2011
Virginia Tech, Blacksburg, VA
Advisor: Timothy Long, Dept. of Chemistry; Co-advisor: Richey Davis, Dept. of
Chemical Engineering
Thesis: *Imidazole-Containing Block Copolymers for Gene Delivery and Electromechanical Devices*

May 2007 B.S., Chemical Engineering
B.S., Chemistry
Minor in Mathematics
Virginia Tech, Blacksburg, VA

Research Interests

- Polymer Synthesis, Block Copolymers, Drug and Gene Delivery, Ion and Water Transport in Polymer Membranes

Awards

- Inducted as a member of the American Association for the Advancement of Science (AAAS)/Science Program for Excellence in Science, Spring 2014
- Mentee in the AIChE Education Division Future Faculty Mentoring Program, Fall 2013

- Hord Fellowship, Fall 2011
- Kender Fellowship, Spring 2011
- National Science Foundation Macromolecules at the Interface with Life Sciences (MILES) Integrative Graduate Education and Research Traineeship (IGERT), 2009-2011
- Chevron-Phillips Chemical Professional Excellence Travel Award, 2009 & 2010
- David H. Jackson/Bostik Findley Inc. Scholarship, 2006
- Ellen C. Wheeler Scholarship, 2006
- McGrath Award for excellence in polymer chemistry as an undergraduate, 2006
- Thomas J. Leivesley Scholarship, 2005, 2006

Publications & Presentations

Publications in Preparation or Submitted

- Foster, A. A.; Greco, C.; Green, M. D.; Epps, T. H., III; Sullivan, M. O., Photocleavable siRNA delivery vehicles. *Submitted to Journal of Controlled Release*.
- Schreiner, C.; Green, M. D.; Hunley, M. T.; Long, T. E. Solution Rheology and Fiber Formation of Segmented Imidazolium Ionenenes. *In preparation, expected submission to Macromolecular Chemistry and Physics*.

Publications

- Green, M. D.; Foster, A. A.; Roy, R.; Lehr, R. M.; Epps, T. H., III; Sullivan, M. O., Catch and Release: Photocleavable Cationic Diblock Copolymers as a Potential Platform for Nucleic Acid Delivery. *Polymer Chemistry* **2014**, 5 (19), 5535–5541.
- Green, M. D.; Wang, D.; Hemp, S. T.; Choi, J.-H.; Winey, K. I.; Heflin, J. R.; Long, T. E., Synthesis of imidazolium ABA triblock copolymers for electromechanical transducers. *Polymer* **2012**, 53 (17), 3677-3686.
- Green, M. D.; Choi, J.-H.; Winey, K. I.; Long, T. E., Synthesis of Imidazolium-Containing ABA Triblock Copolymers: Role of Charge Placement, Charge Density, and Ionic Liquid Incorporation. *Macromolecules* **2012**, 45, 4749.
- Hemp, S. T.; Allen, M. H.; Green, M. D.; Long, T. E., Phosphonium-Containing Polyelectrolytes for Nonviral Gene Delivery. *Biomacromolecules* **2011**, 13 (1), 231-238.
- Salas-de la Cruz, D.; Green, M. D.; Ye, Y.; Elabd, Y. A.; Long, T. E.; Winey, K. I., Correlating backbone-to-backbone distance to ionic conductivity in amorphous polymerized ionic liquids. *Journal of Polymer Science Part B: Polymer Physics* **2011**, 50 (5), 338-346.
- Green, M. D.; Salas-de la Cruz, D.; Ye, Y.; Layman, J. M.; Elabd, Y. A.; Winey, K. I.; Long, T. E., Alkyl-Substituted N-Vinylimidazolium Polymerized Ionic Liquids: Thermal Properties and Ionic Conductivities. *Macromolecular Chemistry and Physics* **2011**, 212 (23), 2522-2528.
- Green, M. D.; Schreiner, C.; Long, T. E., Thermal, Rheological, and Ion-Transport Properties of Phosphonium-Based Ionic Liquids. *The Journal of Physical Chemistry A* **2011**, 115 (47), 13829-13835.
- Allen Jr., M. H.; Green, M. D.; Getaneh, H.; Miller, K.; Long, T. E., Tailoring Charge Density and Hydrogen Bonding of Imidazolium Copolymers for Efficient Gene Delivery. *Biomacromolecules* **2011**, 12 (6), 2243-2250.
- Green, M. D.; Allen Jr, M. H.; Dennis, J. M.; Cruz, D. S.-d. I.; Gao, R.; Winey, K. I.; Long, T. E., Tailoring macromolecular architecture with imidazole functionality: A perspective for controlled polymerization processes. *European Polymer Journal* **2011**, 47 (4), 486-496.
- Green, M. D.; Long, T. E., Designing Imidazole-Based Ionic Liquids and Ionic Liquid Monomers for Emerging Technologies. *Polymer Reviews* **2009**, 49 (4), 291 - 314.

- Layman, J.M.; Ramirez, S.M.; Green, M.D.; Long, T.E., Influence of Polycation Molecular Weight on Poly(2-dimethylaminoethyl methacrylate)-Mediated DNA Delivery In Vitro. *Biomacromolecules* **2009**, *10* (5), 1244-1252.
- Mather, B.D.; Baker, M.B.; Beyer, F.L.; Green, M.D.; Berg, M.A.G.; Long, T.E. Multiple Hydrogen Bonding for the Noncovalent Attachment of Ionic Functionality in Triblock Copolymers. *Macromolecules* **2007**, *40* (13), 4396–4398.
- Mather, B.D.; Baker, M.B.; Beyer, F.L.; Berg, M.A.G.; Green, M.D.; Long, T.E. Supramolecular Triblock Copolymers Containing Complementary Nucleobase Molecular Recognition. *Macromolecules* **2007**, *40* (19), 6834–6845.

Presentations

Invited Seminars

- Green M. D. Manipulating ion-containing block copolymer structure and function for gene therapy vehicles and electromechanical transducers. Florida State University (Department of Chemical and Biomedical Engineering), Tallahassee, FL, February 25, 2014.
- Green M. D. Manipulating ion-containing block copolymer structure and function for gene therapy vehicles and electromechanical transducers. Auburn University (Department of Chemical Engineering), Auburn, AL, February 19, 2014.
- Green M. D. Manipulating ion-containing block copolymer structure and function for gene therapy vehicles and electromechanical transducers. Arizona State University (School for Engineering of Matter, Transport, and Energy), Tempe, AZ, February 13, 2014.
- Green M. D. Manipulating ion-containing block copolymer structure and function for gene therapy vehicles and electromechanical transducers. Rowan University (Department of Chemical Engineering), Glassboro, NJ, February 5, 2014.
- Green M. D. Manipulating ion-containing block copolymer structure and function for gene therapy vehicles and electromechanical transducers. University College London (Department of Chemical Engineering), London, UK, February 3, 2014.
- Green M. D. Manipulating ion-containing block copolymer structure and function for gene therapy vehicles and electromechanical transducers. University of Southern Mississippi (School of Polymers and High Performance Materials), Hattiesburg, MS, January 30, 2014.
- Green M. D. Manipulating ion-containing block copolymer structure and function for gene therapy vehicles and electromechanical transducers. University of Virginia (Department of Chemical Engineering), Charlottesville, VA, January 28, 2014.
- Green, M. D. Tuning Solution Assemblies of Novel Amphiphilic Block Copolymers Through Manipulation of Interfacial Interactions. Virginia Tech (Macromolecules and Interfaces Institute), Blacksburg, VA October 4, 2013.
- Green, M. D. Novel Imidazolium Triblock Copolymers as Electromechanical Transducers. Drexel University (Department of Chemical and Biological Engineering), Philadelphia, PA, November 28, 2012.

Oral Presentations

- Green, M. D.; Kelley, E. G.; Murphy, R. M.; Epps, T. H., III; Sullivan, M. O. Solution Assemblies of Novel Amphiphilic Block Copolymers for Drug Delivery. 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8, 2013.
- Green, M. D.; Palmer, A. A.; Roy, R.; Epps, T. H., III; Sullivan, M. O. Solution assemblies of block copolymers for nucleic acid and drug delivery. Macromolecular Materials Gordon Research Seminar, Ventura, CA, January 5-6, 2013.

- Green, M. D.; Long, T. E. Novel Imidazolium Triblock Copolymers as Electromechanical Transducers. Internal Departmental Seminar, Virginia Tech, Blacksburg, VA, September 19, 2011.
- Green, M. D.; Bissel, P.; Long, T. E. Imidazolium-Containing Block Polymer Ionomers for Electroactive Devices. 3rd Annual Graduate Student Research Symposium, Virginia Tech, Blacksburg, VA, April 14, 2011.
- Green, M. D.; Allen, M. H.; and Long, T. E. Designing Imidazole-Containing Polymers for Gene Delivery, ACC Interdisciplinary Forum for Discovery in Life Sciences, Virginia Tech, Blacksburg, VA USA, October 2010.
- Green, M. D.; Bissel, P.; and Long, T. E. Synthesis of Imidazolium-Based Block Copolymers with Applications in Electroactive Devices, National Graduate Research in Polymer Chemistry Conference, Chapel Hill, NC, USA, June 6-10, 2010.
- Green, M. D.; Layman, J. M.; Ramirez, S. M.; Affin, L. A.; Allen, M. H.; and Long, T. E. Effect of Charge Density on Gene Delivery Using Partially Alkylated poly(1-Vinylimidazole) , 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.
- Green, M. D.; Layman, J. M.; Salas-de la Cruz, D.; Duncan, A. J.; Leo, D. J.; Winey, K. I.; and Long, T. E. Methyl Methacrylate/1-Vinylimidazole Copolymers as Potential Electroactive Devices and Stimuli-Responsive Materials, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.

Poster Presentations

- Green, M. D. Tailoring Ionic Block Copolymer Structure and Function for Therapeutic Delivery and Energy Applications. 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8, 2013.
- Green, M. D.; Palmer, A. A.; Greco, C. T.; Roy, R.; Sullivan, M. O.; Epps, T.H., III Solution assemblies of block copolymers for gene and drug delivery. Northeast Regional IDeA Conference, Newark, DE, August 14-16, 2013.
- Green, M. D.; Palmer, A. A.; Roy, R.; Epps, T. H., III; Sullivan, M. O. Solution assemblies of block copolymers for nucleic acid and drug delivery. Macromolecular Materials Gordon Research Conference, Ventura, CA, January 6-11, 2013.
- Green, M.D.; Bissel, P.; Long, T.E. Imidazolium-Containing Ionomers for Electroactive Devices, Polymers Gordon Research Conference, South Hadley, MA, USA, June 12-17, 2011.
- Green, M. D.; Layman, J. M.; Good, A. S.; Ramirez, S. M.; Affin, L. A.; Allen, M. H.; Long, T. E. Designing Imidazole-Containing Polymeric Vectors with Controlled Charge Densities for Gene Delivery, American Society of Gene and Cell Therapy 13th Annual Meeting, Washington, DC, USA, May 19-22, 2010.
- Green, M.D.; Allen, M. H., Layman, J. M.; Ramirez, S. M.; Bissel, P.; Long, T. E. Treating Genetically Acquired Diseases with Novel Polymeric Vectors, Virginia Congress of Graduate Schools Research Forum, Richmond, VA, March 4, 2010.
- Green, M. D.; Layman, J. M.; Ramirez, S. M.; Good, A. S.; Affin, L. A.; Allen, M. H.; Long, T. E. Effect of Charge Density on Gene Delivery Using Partially Alkylated Poly(1-vinylimidazole), Southwest Virginia VABio Life Sciences Forum, Blacksburg, VA, October 13, 2009.
- Green, M. D.; Dennis, J. M.; Long, T. E. 1-Vinylimidazole-Based Block Copolymer Membranes for Electroactive Devices, Polymers and Ionic Liquids: From Synthesis to Performance, Arlington, VA, USA, October 5-7, 2009.
- Green, M. D.; Layman, J. M.; Duncan, A. J.; Leo, D. J.; and Long, T. E. Electroactive Networks of 1-Butyl-3-Vinylimidazolium Based Ionic Liquids with Applications as

Stimuli-Responsive Materials, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.

- Green, M. D.; Layman, J. M.; Affin, L. A.; Duncan, A. J.; Leo, D. J.; and Long, T. E. Wholly and Partially Alkylated poly(1-Vinylimidazole) With Applications in Electroactive Devices and Stimuli-Responsive Materials, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.
- Green, M. D.; Long, T. E. Block Copolymers of Styrene and 1-Vinylimidazole as Nanophase Separated Systems, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.
- Green, M. D.; Layman, J. M.; Affin, L. A.; Long, T. E. Designing Imidazole-Containing Polymers for Gene Delivery Vectors. Virginia Tech Chemical Engineering Symposium, Blacksburg, VA, April 22, 2009.
- Green, M. D.; Layman, J. M.; Long, T. E. Vinylimidazole as a Building Block for Ionic Liquids, Macromolecules and Interfaces Institute Annual Review, Blacksburg, VA, April 13-14, 2009.
- Green, M.D.; Layman, J.M. “Aqueous Solution Rheology of Linear and Randomly Branched Poly(2-dimethylaminoethyl methacrylate) Polyelectrolytes” International Symposium on Stimuli-Responsive Materials, Hattiesburg, MS, Nov 2006.

Co-authored Presentations

- Palmer, A. A.; Green, M. D.; Greco, C. T.; Roy, R.; Epps, T. H., III; Sullivan, M. O. Photocleavable Polyplexes As Dynamic Carriers for Controlled Nucleic Acid Delivery. 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8, 2013.
- Epps, T. H., III; Kelley, E. G.; Murphy, R. M.; Green, M. D.; Sullivan, M. O. Tuning Block Copolymer Solution Assemblies Through Manipulation of Interfacial Interactions. 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8, 2013.
- Palmer, A. A.; Green, M. D.; Roy, R.; Epps, T. H., III.; Sullivan, M. O., Photo-sensitive polymers for nucleic acid packaging, delivery, and release, 245th ACS National Meeting & Exposition, New Orleans, LA, USA, April 7-11, 2013.
- Palmer, A. A.; Green, M. D.; Roy, R.; Sullivan, M. O., Photo-active polyplexes for controlled nucleic acid delivery, 243rd ACS National Meeting & Exposition, San Diego, CA, USA, March 25-29, 2012.
- Finlay, K.A; Zhang, M.; Green, M.D.; Dillard, D.A.; Moore, R.B.; Case, S.W.; Ellis, M.W.; Li, Y.; Fuller, T.J.; Zou, L.; Gittleman, C.S.; Lai, Y. Impact of post-processing treatment on perfluorocyclobutane/polyvinylidene difluoride (PFCB/PVDF) blended fuel cell proton exchange membranes, 243rd ACS National Meeting & Exposition, San Diego, CA, USA, March 25-March 29, 2012.
- Young, T.T; Sarles, S.A.; Wu, T.; Green, M.D.; Long, T.E.; Leo, D.J. Study of the effects of ionic liquids on lipid bilayers, Proceedings of SPIE – The International Society for Optical Engineering, San Diego, CA, USA, March 12-15, 2012.
- Hemp, S.T.; Allen, M.H.; Green, M.D.; Long, T.E. Phosphonium-containing Polyelectrolytes for Nonviral Gene Delivery, 243rd ACS National Meeting & Exposition, San Diego, CA, USA, March 25-March 29, 2012.
- Allen, M.H.; Green, M.D.; Long, T.E. Tailoring Molecular Assembly of Imidazolium Copolymers and Nucleic Acids with a Synergy of Electrostatic and Hydrogen Bonding Interactions, 241st ACS National Meeting & Exposition, Anaheim, CA, USA, March 27-March 31, 2011.
- Hunley, M.T.; Allen, M.H.; Green, M.D.; Long, T.E. Influence of Polyelectrolyte Architecture on Solution Behavior and Electrospinning Behavior, 241st ACS National Meeting & Exposition, Anaheim, CA, USA, March 27-March 31, 2011.

- Long, T.E.; Willis, C.L.; Mather, B.D.; Williamson, D.T.; Murphy, E.B.; Gao, R.; Cheng, S.; Green, M.D. Charged Block Copolymers for Enhanced Water and Ion Transport: A University-Industry Partnership for Commercialization and Impact, 241st ACS National Meeting & Exposition, Anaheim, CA, USA, March 27-March 31, 2011.
- Dennis, J.M.; Green, M.D.; Long, T.E. Synthesis of n-Butyl Acrylate and 1-Vinylimidazole Containing Copolymers, Proceedings from the 33rd Annual Meeting of the Adhesion Society, 2010, 144-146.
- Bissel, P.; Ramirez, S.M.; Green, M.D.; Layman, J.M.; Allen, M.H.; Hunley, M.T.; Anderson, E.B.; Williams, S.R.; Long, T.E. Introduction of Imidazole and Imidazolium Sites for the Formation of Metallo- and Cation-Containing Polymers, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.
- Anderson, E.B.; Bey, J.P.; Green, M.D.; Long, T.E. Interfacial Imidazolium-Containing Polyesters, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.
- Joseph, E.G.; Wu, T.; Hunley, M.T.; Brown, R.H.; Green, M.D.; Cornelius, C.; Long, T.E. Electro-wetting of Charge Containing Polymers and Ionic Liquids, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.
- Layman, J.M.; Ramirez, S.M.; Green, M.D.; Long, T.E. Structure-Property Relationships in Polycation-Mediated Gene Delivery: Influence of PDMAEMA Molecular Weight on DNA Delivery, 238th ACS National Meeting, Washington, DC, USA, August 16-20, 2009.

Synergistic Activities

- Served as a referee for:
 - *Polymer* (1 manuscript reviewed)
 - *RSC Advances* (1 manuscript reviewed)
 - *Macromolecules* (4 manuscripts reviewed)
 - *European Journal of Pharmaceutical Sciences* (1 manuscript reviewed)
- Abstract sorter for American Physical Society (APS) March Meeting 2014
- Judge for the Undergraduate Poster Competition at 2013 AIChE National Meeting
- Mentor for K-12 Engineering Camp (7/25/13)
 - Developed a demonstration illustrating the importance of gear ratios using a bicycle trainer
 - Assisted students in designing and building solar-powered cars from a kit
- Member of the 2013 Executive Planning Board for the Polymer Gordon Research Seminar

Teaching Experience

- CHE 342 Introduction to Applied Thermodynamics (Fall 2014)
- ASU 101 The ASU Experience (Fall 2014)
- Guest Lecture on Step-Growth Polymerization (9/10/13, University of Delaware, CHEG 600, Introduction to Polymers)
- Guest Lecture on Ionic Polymerization (9/25/12, University of Delaware, CHEG 600, Introduction to Polymers)

Memberships

- American Chemical Society (2008-present)
- ACS Polymer Chemistry (POLY) division member (2008-present)
- American Institute for Chemical Engineers (AIChE) (2011-present)
- American Society for Gene and Cell Therapy (2009-2010)
- Society for Free Radical Biology and Medicine (2008-2009)