

Mark P. Stoykovich

Department of Chemical and Biological Engineering
University of Colorado – Boulder
Campus Box 424, ECCH 136
Boulder, Colorado 80309-0424

Phone: 303.492.6522
Fax: 303.492.4341
Email: mark.stoykovich
@colorado.edu

PROFESSIONAL PREPARATION

Massachusetts Institute of Technology	Chemical Engineering	B.S., 2000
Massachusetts Institute of Technology	Chemistry	B.S., 2000
University of Wisconsin – Madison	Chemical Engineering	Ph.D., 2007
University of Illinois at Urbana-Champaign	Materials Science	2007-2008

APPOINTMENTS

2008–present: Assistant Professor of Chemical and Biological Engineering, University of Colorado - Boulder.

2007–2008: Postdoctoral Research Associate, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign.

GRADUATE ADVISORS AND POSTDOCTORAL SPONSORS

Graduate Advisor: Professor Paul F. Nealey, University of Wisconsin - Madison
Postdoctoral Advisor: Professor John A. Rogers, University of Illinois at Urbana - Champaign

AWARDS AND HONORS

- ISI Essential Science Indicator *Hot Papers* for ACS Nano, 1(3), 168, 2007 article (2008).
- Semiconductor Research Corporation (SRC) inventor recognition award (2004, 2005, 2008).
- SRC Graduate Fellowship (2003-2006).
- Finalist for the American Physical Society's Frank J. Padden, Jr. award for graduate student research in Polymer Physics (2006).
- Best paper in session at TECHCON (2005).
- Best poster/presentation at the SRC Graduate Fellowship Conference (2004).
- Best presentation award at the SRC Review, University of Wisconsin (2002, 2005).
- Merck Index Award for outstanding scholarship, Department of Chemistry, MIT (2000).

PROFESSIONAL ACTIVITIES

- Session chair for "Top-down meets bottom-up" at the Foundations of Nanoscience (FNANO) conference (2009, 2010).
- Nano Picks reviewer for ACS Nanotation (2008-present).
- Referee for Physical Review Letters, ACS Nano, Langmuir, Macromolecules, Advanced Materials, Polymer.
- Judge for middle school science fair in Aurora, IL (2007).
- Community outreach volunteer for UW MRSEC at Engineering Expo (2005).
- Helped design and perform demonstrations for local underrepresented high school students through the University of Wisconsin Pre-college Enrichment Opportunity Program for Learning Excellence (PEOPLE) program (2003, 2004).

28. J. Song, Y. Huang, J. Xiao, S. Wang, K. C. Hwang, H. C. Ko, D.-H. Kim, **M. P. Stoykovich**, J. A. Rogers, "Mechanics of noncoplanar mesh design for stretchable electronic circuits," *J. Applied Physics*, 105, 123516 (2009).
27. G. L. Liu, **M. P. Stoykovich**, S. Ji, K. O. Stuen, G. S. W. Craig, P. F. Nealey, "Phase behavior and dimensional scaling of symmetric block copolymer-homopolymer ternary blends in thin films," *Macromolecules*, 43, 3063-3072 (2009).
26. H. C. Ko*, **M. P. Stoykovich***, J. Song, V. Malyarchuk, W. M. Choi, C. J. Yu, J. B. Geddes III, J. Xiao, S. Wang, Y. Huang, J. A. Rogers, "A hemispherical electronic eye camera based on compressible silicon optoelectronics," *Nature*, 454, 748-753 (2008) (*authors contributed equally) **(highlighted by cover illustration, Nature News and Views, and mass media outlets including Technology Review, Scientific American, Photonics Spectra, US News and World Reports, The Discovery Channel, ABC News, BBC, MSNBC, Reuters, Chicago Tribune)**.
25. H. Kang, F. A. Detcheverry, A. N. Mangham, **M. P. Stoykovich**, K. Ch. Daoulas, R. J. Hamers, M. Müller, J. J. de Pablo, P. F. Nealey, "Hierarchical assembly of nanoparticle superstructures from block copolymer-nanoparticle composites," *Physical Review Letters*, 100, 148303 (2008).
24. K. Ch. Daoulas, M. Müller, **M. P. Stoykovich**, H. Kang, J. J. de Pablo, P. F. Nealey, "Directed copolymer assembly on chemical substrate patterns: A phenomenological and Single-Chain-in-Mean-Field simulations study of the influence of roughness in the substrate pattern," *Langmuir*, 24, 1284 (2008).
23. **M. P. Stoykovich**, K. Yoshimoto, P. F. Nealey, "Mechanical properties of polymer nanostructures: Measurements based on deformation in response to capillary forces," *Applied Physics A*, 90, 277 (2008).
22. **M. P. Stoykovich**, H. Kang, K. Ch. Daoulas, G. Liu, C.-C. Liu, J. J. de Pablo, M. Müller, P. F. Nealey, "Directed self-assembly of block copolymers for nanolithography: Fabrication of isolated features and essential integrated circuit geometries," *ACS Nano*, 1(3), 168 (2007) **(highlighted by cover illustration, perspectives article, and ISI Essential Science Indicator Hot Papers May 2008)**.
21. Y.-H. La, **M. P. Stoykovich**, S.-M. Park, P. F. Nealey, "Directed assembly of cylinder-forming block copolymers into patterned structures to fabricate arrays of spherical domains and nanoparticles," *Chemistry of Materials*, 19, 4538 (2007).
20. H. R. Keymeulen, A. Diaz, H. H. Solak, C. David, F. Pfeiffer, B. D. Patterson, J. F. van der Veen, **M. P. Stoykovich**, P. F. Nealey, "Measurement of the x-ray dose-dependent glass transition temperature of structured polymer films by x-ray diffraction," *J. Applied Physics*, 102, 013528 (2007).
19. Y. Ekinici, H. H. Solak, C. Padeste, J. Gobrecht, **M. P. Stoykovich**, P. F. Nealey, "20 nm Line/space patterns in HSQ fabricated by EUV interference lithography," *Microelectronic Eng.*, 84(5-8), 700 (2007).
18. S.-M. Park, **M. P. Stoykovich**, R. Ruiz, Y. Zhang, C. T. Black, P. F. Nealey, "Directed assembly of lamellae-forming block copolymers using chemically and topographically patterned substrates," *Advanced Materials*, 19, 607 (2007).
17. E. W. Edwards, M. Müller, **M. P. Stoykovich**, H. H. Solak, J. J. de Pablo, P. F. Nealey, "Dimensions and shapes of block copolymer domains assembled on lithographically defined chemically patterned substrates," *Macromolecules*, 40(1), 90, (2007).
16. **M. P. Stoykovich**, E. W. Edwards, H. H. Solak, P. F. Nealey, "Phase behavior of symmetric ternary block copolymer – homopolymer blends in thin films and on chemically patterned surfaces," *Physical Review Letters*, 97, 147802 (2006).

15. K. Ch. Daoulas, M. Müller, **M. P. Stoykovich**, Y. J. Papakonstantopoulos, S.-M. Park, J. J. de Pablo, P. F. Nealey, H. H. Solak, "Directed assembly of copolymer materials on patterned substrates: Balance of simple symmetries in complex structures," *J. Poly. Sci. B: Poly. Phys.*, 44(18), 2589 (2006).
14. **M. P. Stoykovich**, P. F. Nealey, "Block copolymers and conventional lithography," *Materials Today*, 9(9), 20 (2006) (**invited review article**).
13. S. O. Kim, B. H. Kim, K. Kim, C. M. Koo, **M. P. Stoykovich**, P. F. Nealey, H. H. Solak, "Defect structure in thin films of a lamellar block copolymer self-assembled on neutral homogeneous and chemically nanopatterned surfaces," *Macromolecules*, 39(16), 5466 (2006).
12. E. W. Edwards, **M. P. Stoykovich**, H. H. Solak, P. F. Nealey, "Long-range order and orientation of cylinder-forming block copolymers on chemically nanopatterned striped surfaces," *Macromolecules*, 39(10), 3598 (2006).
11. K. Ch. Daoulas, M. Müller, **M. P. Stoykovich**, S.-M. Park, Y. J. Papakonstantopoulos, J. J. de Pablo, P. F. Nealey, H. H. Solak, "Fabrication of complex three-dimensional nanostructures from self-assembling block copolymer materials on two-dimensional chemically patterned templates with mismatched symmetry," *Physical Review Letters*, 96, 036104 (2006).
10. E. W. Edwards, **M. P. Stoykovich**, H. H. Solak, P. F. Nealey, "Binary blends of diblock copolymers as an efficient route to multiple length scales in perfect directed self-assembly of diblock copolymer thin films," *J. Vac. Sci. Technol. B*, 24(1), 340 (2006).
9. P. F. Nealey, E. W. Edwards, M. Müller, **M. P. Stoykovich**, H. H. Solak, J. J. de Pablo, "Self-assembling resists for nanolithography," *Proceedings of the 2005 IEEE International Electron Devices Meeting*, 356 (2006).
8. E. W. Edwards, **M. P. Stoykovich**, M. Müller, H. H. Solak, J. J. de Pablo, P. F. Nealey, "Mechanism and kinetics of ordering in diblock copolymer thin films on chemically nanopatterned substrates," *J. Poly. Sci. B: Poly. Phys.*, 43(23), 3444 (2005).
7. **M. P. Stoykovich**, M. Müller, S. O. Kim, H. H. Solak, E. W. Edwards, J. J. de Pablo, P. F. Nealey, "Directed assembly of block copolymer blends into nonregular device-oriented structures," *Science*, 308, 1442 (2005).
6. I. Junarsa, **M. P. Stoykovich**, P. F. Nealey, Y. Ma, F. Cerrina, H. H. Solak, "Hydrogen silsesquioxane as a high resolution negative-tone resist for extreme ultraviolet lithography," *J. Vac. Sci. Technol. B*, 23(1), 138 (2005).
5. K. Yoshimoto, **M. P. Stoykovich**, H. B. Cao, W. J. Drugan, J. J. de Pablo, P. F. Nealey, "A two-dimensional model of the deformation of photoresist structures using elastoplastic polymer properties," *J. Applied Physics*, 96, 1857 (2004).
4. S. O. Kim, H. H. Solak, **M. P. Stoykovich**, N. J. Ferrier, J. J. de Pablo, P. F. Nealey, "Epitaxial self-assembly of block copolymers on lithographically defined nanopatterned substrates," *Nature*, 424, 411 (2003) (**highlighted with News and Views article**).
3. **M. P. Stoykovich**, H. B. Cao, K. Yoshimoto, L. E. Ocola, P. F. Nealey, "Deformation of nanoscopic polymer structures in response to well-defined capillary forces," *Advanced Materials*, 15(14), 1180 (2003).
2. P. F. Nealey, **M. P. Stoykovich**, K. Yoshimoto, H. B. Cao, "Nanolithographic Polymer Structures: Mechanical Properties," *The Encyclopedia of Materials: Science and Technology*, Elsevier Science Ltd., (2003).
1. T. A. Bullions, **M. P. Stoykovich**, J. E. McGrath, A. C. Loos, "Monitoring the reaction progress of a high-performance phenylethynyl-terminated poly(etherimide). Part II: Advancement of glass transition temperature," *Polymer Composites*, 23(4), 479 (2002).

PRESENTATIONS

Invited Presentations (19 total) including:

- Colorado State University, Department of Chemical and Biomolecular Engineering (2009).
- Seventeenth Symposium on Thermophysical Properties, Boulder, CO (2009).
- University of Colorado, NSF MRSEC Liquid Crystal Center, Boulder, CO (2009).
- Foundations of Nanoscience (Self-Assembled Architectures and Devices), Snowbird, UT (2006).
- North Carolina State University, Department of Chemical and Biomolecular Engineering (2006).
- MIT, Department of Chemical Engineering (2006).
- Sandia National Laboratories, Albuquerque, NM (2006).
- Rice University, Chemical and Biomolecular Engineering Department (2006).
- University of Michigan, Department of Chemical Engineering (2006).
- University of Colorado, Department of Chemical and Biological Engineering (2006).
- Yale University, Department of Chemical Engineering (2006).
- University of Connecticut, Polymer Program (2006).
- The Pennsylvania State University, Department of Chemical Engineering (2006).
- Northwestern University, Department of Chemical and Biological Engineering (2006).
- Los Alamos National Laboratory (2005).
- Center for Nanoscale Materials Users' Meeting at Argonne National Laboratory (2005).

Contributed Presentations (14 total) including:

- American Physical Society (APS) March meeting (2002, 2004-2008).
- American Chemical Society (ACS) spring national meeting (2007).
- Materials Research Society (MRS) Fall Meeting (2005).
- American Institute of Chemical Engineers (AIChE) Annual Meeting (2005).
- TECHCON (2003, 2005).
- SPIE Microlithography 2004 – Advances in Resist Technology and Processing XXI (2004).
- Society for Experimental Mechanics Annual Conference on Applied Mechanics (2002).