

Mark P. Stoykovich

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PROFESSIONAL PREPARATION

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| 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

- Semiconductor Research Corporation (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).
- SRC inventor recognition award (2004-2005, 2008).
- 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 and 2005).
- Merck Index Award for outstanding scholarship, Department of Chemistry, MIT (2000).

PROFESSIONAL ACTIVITIES

- Session chair for "Top-down meets bottom-up" at the 2009 Foundations of Nanoscience (FNANO09) conference.
- 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 and 2004).

PATENTS

6. "Stretchable and foldable electronic devices," John A. Rogers, Yonggang Huang, Heung Cho Ko, **Mark P. Stoykovich**, Won Mook Choi, Jizhou Song, Jong Hyun Ahn (pending 61/061,978 - filed June 2008).

5. "Optical systems fabricated by printing-based assembly," John A. Rogers, Ralph G. Nuzzo, Matthew Meitl, Etienne Menard, Alfred J. Baca, Michael Motala, Jong-Hyun Ahn, Sang-II Park, Chang-Jae Yu, Heung Cho Ko, **Mark P. Stoykovich**, Jongseung Yoon (pending 11/981,380 - filed November 2007).
4. "Controlled buckling structures in semiconductor interconnects and nanomembranes for stretchable electronics," John A. Rogers, Ralph G. Nuzzo, Matthew Meitl, Etienne Menard, Keon Jae Lee, Dahl-Young Khang, Yugang Sun, Zhengtao Zhu, Heung Cho Ko, Andrew Carlson, Won Mook Choi, **Mark P. Stoykovich**, Hanqing Jiang, Young Huang (pending 11/851,182 - filed September 2007).
3. "Methods and compositions for forming patterns with isolated or discrete features using block copolymer materials," Paul F. Nealey, Juan J. de Pablo, **Mark P. Stoykovich**, Huiman Kang, Kostas Ch. Daoulas, Marcus Müller (pending 11/879,758 - filed July 2007).
2. "Fabrication of complex three-dimensional structures based on directed assembly of self-assembling materials on activated two-dimensional templates," Paul F. Nealey, **Mark P. Stoykovich**, Kostas Ch. Daoulas, Marcus Müller, Juan J. de Pablo, Sang-Min Park (pending 11/545,060 - filed October 2006).
1. "Methods and compositions for forming aperiodic patterned polymer films," Paul F. Nealey, Sang Ouk Kim, Erik W. Edwards, **Mark P. Stoykovich**, Juan J. de Pablo (pending 11/286,260 - filed November 2005).

PUBLICATIONS

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 with cover illustration and News and Views article**).
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 with cover illustration and perspectives article, 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 (16 total) including:

- 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 (2008-2004,2002).
- 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 (2005,2003).
- SPIE Microlithography 2004 – Advances in Resist Technology and Processing XXI (2004).
- Society for Experimental Mechanics Annual Conference on Applied Mechanics (2002).