

MARK J. KASTANTIN

Assistant Research Professor

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EDUCATION

- Ph.D. in Chemical Engineering, Univ. of California, Santa Barbara, March 2009. Advisor: Matthew Tirrell. Thesis title: *Micelles from Peptide-Amphiphiles with Multiple Biologically Relevant Functionalities*
- B.S. in Chemical Engineering, Massachusetts Institute of Technology, June 2003.
- B.S. in Brain and Cognitive Sciences, Massachusetts Institute of Technology, June 2003.

PROFESSIONAL EXPERIENCE & ACTIVITIES

- August 2013-present: Research Assistant Professor, Dept. of Chemical and Biological Engineering, Univ. of Colorado, Boulder
- April 2012-July 2013: Senior Research Associate under Prof. Daniel K. Schwartz, Dept. of Chemical and Biological Engineering, Univ. of Colorado, Boulder. Project: Connecting protein conformational changes with dynamic behavior including aggregation, enzymatic activity, and interfacial affinity and mobility
- April 2010-March-2012: Ruth L. Kirschstein postdoctoral fellow, National Institutes of Health. Project: Single-molecule FRET microscopy to identify conformational changes in peptides and DNA
- May 2009-March 2010: Research Associate under Prof. Daniel K. Schwartz, Dept. of Chemical and Biological Engineering, Univ. of Colorado, Boulder. Project: Interfacial dynamics of proteins at solid-liquid interfaces
- Reviewer for: *Journal of the American Chemical Society*, *Langmuir*, *Biomacromolecules*, and *Biotechnology and Bioengineering*
- 2006-present: Member of the American Institute of Chemical Engineers
- 2004-2008: Teaching assistant, Dept. of Chemical Engineering, Univ. of California, Santa Barbara
- 2002: NSF undergraduate research fellowship under Prof. Reza Ghodssi, Institute for Systems Research, Univ. of Maryland, College Park. Project: Polymeric materials for biological MEMS devices; Gray-scale lithography for microfabrication
- 2001-2003: Head undergraduate tutor, Dept. of Chemical Engineering, Massachusetts Institute of Technology
- 2000-2002: Undergraduate research fellowship under Prof. Paula Hammond, Dept. of Chemical Engineering, Massachusetts Institute of Technology. Project: Layer-by-layer assembly of electrochromic polymer films
- 1998-1999: Internship under Dr. Michael Domanski, Clinical Trials Group – National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, MD

MENTORING

- Graduate students (1): Blake Langdon (2010-present, Univ. of Colorado)
- Undergraduates (7): Cherrelle Thomas (2011, Howard Univ.)[†], Daniel Kienle (2011, Univ. of Colorado), Florencia Paredes (2010, Cornell Univ.)[†], Erin Chang (2009, Univ. of Pennsylvania)^{*}, Ryan Thacher (2007, UCSB), Jan Ressler (2006, Northwestern Univ.), Craig Silverman (2005, Duke Univ.)
- Expanding Pathways to Science, Engineering and Mathematics mentor (NSF), 2004, mentoring 4 high school and community college students in research related to soft materials

* NSF Research Experiences for Undergraduates † Summer Multicultural Access to Research Training program

AWARDS & INVITED LECTURES

- American Institute of Chemists Postdoctoral Award, 2012
- Invited Speaker at the Distinguished Young Scientists Summer Seminar Series. Univ. of Washington, Aug. 29, 2011
- Ruth L. Kirschstein NRSA postdoctoral fellowship, National Institutes of Health, 2010
- Invited Speaker: Materials Research Outreach Symposium. Univ. of California, Santa Barbara, Feb. 3, 2009
- Outstanding service award to the Dept. of Chemical Engineering, Univ. of California, Santa Barbara, 2005

PUBLICATIONS

(* Indicates co-first authors; IF = 5-year impact factor as of 2012)

1. Kastantin, M.; Langdon, B. B.; Schwartz, D. K., A bottom-up approach to understanding protein layer formation at the solid-liquid interface. *Adv. Colloid Interface Sci.* **In Press (2014)** DOI: 10.1016/j.cis.2013.12.006. (IF=8.01)
2. Langdon, B. B.; Kastantin, M.; Walder, R.; Schwartz, D. K., Interfacial protein-protein associations. *Biomacromolecules* **2014**, 15, 66-74. (IF=5.75)
3. *McLoughlin, S. Y.; *Kastantin, M.; Schwartz, D. K.; Kaar, J. L., Single-molecule resolution of protein structure and interfacial dynamics on biomaterial surfaces. *Proc. Natl. Acad. Sci. U.S.A.* **2013**, 110, 19396-19401. (IF=10.58)
4. *Marullo, R.; *Kastantin, M.; Drews, L. B.; Tirrell, M., Peptide contour length determines equilibrium secondary structure in protein-analogous micelles. *Biopolymers*. **2013**, 99, 573-581. (IF=2.69)
5. Kastantin, M. and Schwartz, D. K., DNA hairpin stabilization on a hydrophobic surface. *Small* **2013**, 9, 933-941. (IF=8.08)
6. Kastantin, M. and Schwartz, D. K., Identifying multiple populations from single-molecule lifetime distributions. *ChemPhysChem*. **2013**, 14, 374-380. (IF=3.39)
7. *Kastantin, M.; *Walder, R.; Schwartz, D. K., Identifying mechanisms of interfacial dynamics using single-molecule tracking. *Langmuir* **2012**, 28, 12443-12456. (IF=4.42)
8. Kastantin, M.; Keller, T. F.; Jandt, K. D.; Schwartz, D. K., Single-molecule tracking of fibrinogen dynamics on nanostructured polyethylene films. *Adv. Funct. Mater.* **2012**, 22, 2617-2623. (IF=10.34)
9. Kastantin, M. and Schwartz, D. K., Distinguishing positional uncertainty from true mobility in single-molecule trajectories that exhibit multiple diffusive modes. *Microsc. Microanal.* **2012**, 18, 793-797. (IF=3.08)
10. *Walder, R.; *Kastantin, M.; Schwartz, D. K., High throughput single molecule tracking for analysis of rare populations and events. *Analyst* **2012**, 137, 2987-2996. (IF=3.90)
11. Langdon, B.; Kastantin, M.; Schwartz, D. K., Apparent activation energies associated with protein dynamics on hydrophobic and hydrophilic surfaces. *Biophys. J.* **2012**, 102, 2625-2633. (IF=3.98)
12. Kastantin, M. and Schwartz, D. K., Connecting rare DNA conformations and surface dynamics using single-molecule resonance energy transfer. *ACS Nano* **2011**, 5, 9861-9869. (IF=12.52)
13. Kastantin, M. and Tirrell, M., Helix formation in the polymer brush. *Macromolecules* **2011**, 44, 4977-4987. (IF=5.21)
14. Kastantin, M.; Langdon, B. B.; Chang, E. L.; Schwartz, D. K., Single-molecule resolution of interfacial fibrinogen behavior: Effects of oligomer populations and surface chemistry. *J. Am. Chem. Soc.* **2011**, 133, 4975-4983. (IF=10.24)
15. Kastantin, M.; Missirlis, D.; Black, M.; Ananthanarayanan, B.; Tirrell, M., Thermodynamic and kinetic stability of DSPE-PEG(2000) micelles in the presence of bovine serum albumin. *J. Phys. Chem. B* **2010**, 114, 12632-12640. (IF=3.70)
16. Missirlis, D.; Farine, M.; Kastantin, M.; Ananthanarayanan, B.; Neumann, T.; Tirrell, M., Linker chemistry determines secondary structure of p53(14-29) in peptide amphiphile micelles. *Bioconjugate Chem.* **2010**, 21, 465-475. (IF=4.80)
17. Peters, D.; Kastantin, M.; Kotamraju, V. R.; Karmali, P. P.; Gujrati, K.; Tirrell, M.; Ruoslahti, E., Targeting atherosclerosis using modular, multifunctional micelles. *Proc. Natl. Acad. Sci. U.S.A.* **2009**, 106, 9815-9819. (IF=10.58)
18. Kastantin, M.; Ananthanarayanan, B.; Karmali, P.; Ruoslahti, E.; Tirrell, M., Effect of the lipid chain melting transition on the stability of DSPE-PEG(2000) micelles. *Langmuir* **2009**, 25, 7279-7286. (IF=4.42)
19. Karmali, P. P.; Kotamraju, V. R.; Kastantin, M.; Black, M.; Missirlis, D.; Tirrell, M.; Ruoslahti, E., Targeting of albumin-embedded paclitaxel nanoparticles to tumors. *Nanomed.-Nanotechnol.* **2009**, 5, 73-82. (IF=7.65)
20. Kastantin, M.; Ananthanarayanan, B.; Lin, B.; Ressler, J.; Black, M.; Tirrell, M., Increase of fluorescence anisotropy upon self-assembly in headgroup-labeled surfactants. *Macromol. Biosci.* **2007**, 7, 189-194. (IF=3.84)
21. Waits, C. M.; Morgan, B.; Kastantin, M.; Ghodssi, R., Microfabrication of 3D silicon MEMS structures using gray-scale lithography and deep reactive ion etching. *Sensor. Actuat. A-Phys.* **2005**, 119, 245-253. (IF=2.08)
22. Kastantin, M. J.; Li, S.; Gadre, A. P.; Wu, L. Q.; Bentley, W. E.; Payne, G. F.; Rubloff, G. W.; Ghodssi, R., Integrated fabrication of polymeric devices for biological applications. *Sensor. Mater.* **2003**, 15, 295-311. (IF=0.35)
23. DeLongchamp, D. M.; Kastantin, M.; Hammond, P. T., High-contrast electrochromism from layer-by-layer polymer films. *Chem. Mater.* **2003**, 15, 1575-1586. (IF=7.63)

24. Wu, L. Q.; Gadre, A. P.; Yi, H. M.; Kasantin, M. J.; Rubloff, G. W.; Bentley, W. E.; Payne, G. F.; Ghodssi, R., Voltage-dependent assembly of the polysaccharide chitosan onto an electrode surface. *Langmuir* **2002**, 18, 8620-8625. (IF=4.42)
25. Domanski, M. J.; Davis, B. R.; Pfeffer, M. A.; Kasantin, M.; Mitchell, G. F., Isolated systolic hypertension - Prognostic information provided by pulse pressure. *Hypertension* **1999**, 34, 375-380. (IF=6.98)

PATENTS

1. "Fabrication and Integration of Polymeric BioMEMS," Jung J. Park, Reza Ghodssi, Gary W. Rubloff, Mark J. Kasantin, Sheng Li, Li-Qun Wu, Hyunmin Yi, and Theresa M. Valentine, U.S. Patent 7,375,404, filed December 3, 2004 (Serial No. 11/003,005), issued May 20, 2008.
2. "Methods and Compositions Related to Clot-Binding Lipid Compounds," Erkki Ruoslahti, David Peters, Matthew Tirrell, Mark Kasantin, U.S. Patent Application 20110081293 (Serial No. 12/895,446), filed September 30, 2010.

SELECTED PRESENTATIONS

1. Kasantin, M.; McLoughlin, S.; Kaar, J.L.; Schwartz, D.K., *Single Molecule Observations of Fibronectin Conformation and Its Interaction With Model Integrins*, Annual meeting of the American Institute of Chemical Engineers, San Francisco, CA, **2013**; 595f.
2. Kasantin, M., *Interfacial heterogeneity at the molecular level*, Butcher Symposium, Broomfield, CO, **2013**; P96.
3. Kasantin, M.; Schwartz, D.K., *Interfacial protein dynamics resolved using single-molecule tracking*, Annual meeting of the American Institute of Chemical Engineers, Pittsburgh, PA, **2012**; 407c.
4. Kasantin, M.; Schwartz, D.K., *Dynamic interplay between macromolecular conformation and interfacial behavior*, Annual meeting of the American Institute of Chemical Engineers, Minneapolis, MN, **2011**; 503f.
5. Kasantin, M.; Tirrell, M., *Theory of helix formation in the polymer brush*, Annual meeting of the American Institute of Chemical Engineers, Minneapolis, MN, **2011**; 446c.
6. Kasantin, M.; Schwartz, D.K., *Single-molecule RET microscopy of DNA on functionalized surfaces*, Spring meeting of the American Chemical Society, San Francisco, CA, **2010**; 324.
7. Kasantin, M.; Tirrell, M., *Interaction of lipid-conjugated poly(ethylene glycol) micelles with bovine serum albumin*, Annual meeting of the Society for Biomaterials, San Antonio, TX, **2009**; 796.
8. Kasantin, M.; Tirrell, M., *The role of alpha-helix formation in the self-assembly of protein-analogous micelles*, Annual meeting of the American Institute of Chemical Engineers, Philadelphia, PA, **2008**; 245e.
9. Kasantin, M.; Ananthanarayanan, B.; Tirrell, M., *Design and characterization of protein-analogous micelles*, Spring meeting of the Materials Research Society, San Francisco, CA, **2008**; DD6.4.
10. Kasantin, M.; Smitthipong, W.; Tirrell, M., *Synthetic bioinspired and biomimicking materials: From peptide-amphiphiles to biopolymers*, BASF Symposium on Bioinspired Materials, Institut de Science et d'Ingénierie Supramoléculaires, Strasbourg, France, **2006**; P9.