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## EDUCATION

- Postdoctoral Research Associate** 2010  
Princeton University, Princeton, NJ  
Advisor: Howard A. Stone
- Ph.D. in Polymer Science & Engineering** 2009  
University of Massachusetts, Amherst, MA  
Advisor: Alfred J. Crosby  
Thesis: *Wrinkling, Folding, and Snapping Instabilities in Thin Polymer Films*
- M.S. in Polymer Science & Engineering** 2005  
University of Massachusetts, Amherst, MA
- B.S. in Chemistry** 2004  
University of New Hampshire, Durham, NH  
Advisor: Donald C. Sundberg  
Thesis: *Emulsion Polymerization: Composite Latex Particle Morphology and Particle Formation*

## AWARDS

- ICAM Scientist Travel Award: *Dynamics in Soft Condensed Matter: Dynasoft 2010*, Corsica, FR 2010
- NSF Fellowship - Short Course on *Mechanics of Soft Materials* 2010
- APS Padden Award Finalist 2009
- Adhesion Society Peebles Award 2009
- Distinguished Best Paper at the Adhesion Society 2008
- UNH College of Engineering & Physical Sciences *Douglas R. Woodward Award* 2004
- UNH College of Engineering & Physical Sciences *Wilfred F. Langelier Award* 2004
- Summer Undergraduate Research Fellowship for Polymer Research at U. of Sydney 2003
- UNH Chemistry *Vernon Lerch Award* 2001

## RESEARCH EXPERIENCE

- Postdoctoral Research Associate** 2010  
Princeton University - Princeton, NJ  
Advisor: Howard A. Stone - Complex Fluids Group
- Investigated the dynamics of thin, elastic plates in response to anisotropic strains.
  - Studied the geometry controlled adsorption of vesicles and formation of tethered nanotubes.
  - Designed and used microfluidic devices to study long-term memory in *C. elegans*.
- Ph.D. Candidate** 2004-2009  
University of Massachusetts - Amherst, MA  
Advisor: Alfred J. Crosby
- Used crumpling, folding, and snapping of polymer films to create responsive patterned surfaces.
  - Demonstrated folding of ultrathin polymer films along with relevant scaling relationships.
  - Studied the wrinkle to fold transition in the draping of thin polymer films on water.
- Research Consultant** 2008  
Draper Laboratories - Cambridge, MA
- Tested adhesion for the DARPA funded Z-Man project to improve human climbing techniques.
- Research Assistant** 2003  
University of Sydney - New South Wales, Australia
- Studied theoretical polymer modeling and Monte Carlo simulations of emulsions polymerizations
- Research Assistant** 2002-2004  
University of New Hampshire - Durham, NH  
Advisor: Donald C. Sundberg
- Performed emulsion polymerizations to quantify polymerization kinetics and particle morphology.

## PUBLICATIONS &amp; PATENTS

## Peer-Reviewed

1. M. Staykova, **D.P. Holmes**, and H.A. Stone. "Geometry Induced Adsorption of Vesicles and Nanotube Formation," *In Preparation*, 2010.
2. **D.P. Holmes**, M. Roché, T. Sinha, A. Saint-Jalmes, G. Maurdev, and H.A. Stone. "The Dynamics of Bending, Twisting, and Snapping of Soft Materials," *In Preparation*, 2010.
3. **D.P. Holmes** and A.J. Crosby. "Draping Films: A Wrinkle to Fold Transition" *Physical Review Letters*, 2010, **105**, 038303.
4. **D.P. Holmes**, A. Davis and A.J. Crosby. "Folding Thin Polymer Films," *In Preparation*, 2010.
5. **D.P. Holmes**, M. Ursiny and A.J. Crosby. "Crumpled Surface Structures," *Soft Matter*, 2008, **4**, 82-85.
6. **D.P. Holmes** and A.J. Crosby. "Snapping Surfaces," *Advanced Materials*, 2007, **19**, *21*, 3589-3593.

## Non Peer-Reviewed

1. D. Crosbie, **D.P. Holmes**, J. Stubbs, and D.C. Sundberg. "Structural Control of Multi-Lobed Latex Particles Formed During Two-Stage Emulsion Polymerization Reactions." *ACS PMSE Preprints*, Philadelphia, PA, 2008.
2. **D.P. Holmes**, D. Breid, E.P. Chan, and A.J. Crosby. "Wrinkling and Snapping Polymer Surfaces." *ACS PMSE Preprints*, Philadelphia, PA, 2008.
3. **D.P. Holmes**, D. Breid, E.P. Chan, and A.J. Crosby. "Responsive Polymer Surfaces." *Proc. of the 31st Ann. Conf. Adh. Soc.*, 2008.
4. E.P. Chan, **D.P. Holmes**, and A.J. Crosby. "Nature's Instabilities: Inspiring the Control of Adhesion, Optics, and Sensors in Soft Polymers." *ACS POLY Preprints*, Chicago, IL, 2007.
5. E.P. Chan, **D.P. Holmes**, and A.J. Crosby. "Wrinkled Geckos: Controlling Polymer Adhesion with Fabricated Surface Wrinkles." *Proc. of the 30th Ann. Conf. Adh. Soc.*, 2007.
6. E.P. Chan, **D.P. Holmes**, and A.J. Crosby. "Quantifying the Mechanisms of Adhesion and Release in Imprint Lithography." *ACS POLY Preprints*, Atlanta, GA, 2006.

## Patents

1. A.J. Crosby, **D.P. Holmes**, K. Kalaitzdou, E.P. Chan, C.J. Rand. *Stimuli-Responsive Surfaces and Related Methods of Use*, Patent Submitted, 2007.

## SELECTED PRESS

Physics	Ironing Out the Wrinkles	<b>2010</b>
Wired Magazine	New Material Could Lead to Release-on-Command Adhesive	<b>2007</b>
Discovery News	Venus Flytrap Inspires Snapping Lens	<b>2007</b>

## PRESENTATIONS

## Oral

Draping Films: A Wrinkle to Fold Transition <i>American Physical Society - Portland, OR</i>	<b>2010</b>
Responsive Polymer Surfaces: Crumpling, Folding, and Snapping Films <i>American Physical Society: Padden Award Symposium - Pittsburgh, PA</i>	<b>2009</b>
Responsive Polymer Surfaces <i>Adhesion Society: Peebles Award Talk - Savannah, GA</i>	<b>2009</b>
Wrinkling and Snapping Polymer Surfaces <i>American Chemical Society - New Orleans, LA</i>	<b>2008</b>
Learning from the Venus Flytrap: A Biomimetic Responsive Interface <i>American Physical Society - Denver, CO</i>	<b>2007</b>
Snapping Surfaces <i>Center of UMass &amp; Industry Research on Polymers Annual Meeting - Amherst, MA</i>	<b>2007</b>

## Poster

Responsive Elastic Materials <i>Princeton Center for Complex Materials: External Advisory Committee - Princeton, NJ</i>	2010
Responsive Polymer Surfaces <i>Center of UMass &amp; Industry Research on Polymers Annual Meeting - Amherst, MA</i>	2008
Crumpled Surface Structures <i>Center of UMass &amp; Industry Research on Polymers Annual Meeting - Amherst, MA</i>	2007
New Capabilities in Soft Lithography <i>Center for Hierarchical Manufacturing Annual Meeting - Amherst, MA</i>	2007
Adhesion of Patterned Materials <i>Gordon Research Conference: Adhesion Science - Tilton, NH</i>	2006
Adhesion and Release Mechanisms for Nanoimprint Lithography <i>American Physical Society - Baltimore, MD</i>	2006
Learning from the Venus Flytrap: A Biomimetic Responsive Interface <i>Center of UMass &amp; Industry Research on Polymers Annual Meeting - Amherst, MA</i>	2006

## TEACHING EXPERIENCE

<b>Student Mentor</b> Tarun Sinha	2010
Examined the dynamics and elasticity of thin membranes exposed to anisotropic strains from osmotic and thermal stresses.	
<b>Presenter</b> Center for Talented Youth (CTY)	2010
Created and presented an hour long demonstration on <i>Fast Plant Movements</i> for the Biotechnology and Bio-engineering CTY program at Princeton University. This interactive demonstration taught students how the Venus flytrap works and what tools scientists utilize to study rapid movements.	
<b>Lecturer</b>	2008
Presented a lecture to Polymer Science & Engineering graduate students on contact mechanics and JKR contact adhesion measurements. Designed and conducted a laboratory for graduate students to run JKR contact adhesion tests on soft materials.	
<b>Student Mentor</b> Andrew Davis	2008
As a part of the National Science Foundation's (NSF) Research Experience for Undergraduates (REU) program, I guided the student to investigate buckling and folding of polymer thin films. The research has led to the preparation of a manuscript for peer-reviewed publication in conjunction with the student.	
<b>Teacher Mentor</b> Sabra Dickson, Jennifer Jackson, Jennifer Felicitti	2008
In combination with another graduate student, as a part of the NSF Research Experience for Teachers (RET) program, we worked with the teachers to test the effect of surface modifications on hydrophobicity. Helped them transfer the ideas and experience gained in lab into the middle school and high school classrooms.	
<b>Student Mentor</b> Sveta Morozov	2007
Worked with student to develop a stimulus for reversibly triggering surface structures between two surface topographies.	
<b>Student Mentor</b> Michal Ursiny	2007
Mentored and worked with the NSF-REU student to quantify the buckling and crumpling of circular plates, and how to measure the snap-buckling of nonlinear shells. The research led to a peer-reviewed publication.	
<b>Student Mentor</b> John Whang	2007
Designed and performed experiments with the NSF-REU student to make precise measurements of the adhesion and release mechanisms between photopolymers and soft materials.	