

Curriculum Vitae
Derek Breid

1249 Benedum Hall
University of Pittsburgh
Pittsburgh, PA 15261

(413) 629-9035
drb@derekbreid.com
<http://www.DerekBreid.com>

EDUCATION

University of Massachusetts - *Amherst, MA*

Doctor of Philosophy - *Polymer Science and Engineering*

2012

Master of Science - *Polymer Science and Engineering*

2006

University of Kansas

Bachelor of Science - *Chemical Engineering*

2005

RESEARCH EXPERIENCE

Ph.D dissertation - "*Controlling Morphology in Swelling-Induced Wrinkled Surfaces*"

**Awarded
Feb. 2012**

University of Massachusetts - *Polymer Science and Engineering*

Advisor: Alfred J. Crosby

- Demonstrated the importance of stress state and stress history for controlling the formation of surface patterns in wrinkling bilayer materials.
- Provided first reported experimental observation of a new morphological wrinkle pattern.
- Utilized finite element modeling techniques (ABAQUS software package) to model developing stresses in wrinkling systems.

Undergraduate Research Associate

2004

University of Stuttgart - *Institut für Bioverfahrenstechnik (Institute for Biochemical Engineering)*

- Performed various research tasks related to mini-plant scale-up of growth, activation, and product collection of genetically modified E. coli in both batch and continuous setups.

Undergraduate Research Associate

2003-2005

University of Kansas - *Chemical Engineering*

Advisor: Susan M. Stagg-Williams

- Tested effectiveness of Ceria-supported catalysts for the Water-Gas-Shift reaction.

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Undergraduate Research Associate

2003

University of Minnesota - *Chemical Engineering/Materials Science*

Advisor: C. Daniel Frisbie

- Performed spin-casting and characterization of semiconducting polymer (P3HT) films.
- Fabricated and tested field-effect transistor devices using these films.

TEACHING EXPERIENCE

Lecturer

2009

- Planned and presented a short introduction to polymers for non-scientists as part of a course on post-secondary teaching.

Research Mentor - Vukasin Denic

2008

- As part of the National Science Foundation's (NSF) Research Experience for Undergraduates at UMass, I assisted and guided a student in examining the effect of substrate curvature and swelling agent on wrinkle morphology.

Judge - Westfield, MA High School Science Fair

2007, 2009

- Conversed with students about how they applied scientific thinking in designing and implementing experiments.
- Evaluated student projects and ability to demonstrate scientific awareness.

Lab Instructor - Polymer Science and Engineering ASPIRE program students

2006-2009

- Taught high school students interested in learning more about science and scientific careers.
- Designed and gave interactive demonstrations of departmental characterization equipment, including confocal microscopy, optical profilometry, and Instron testing techniques.
- Led laboratory polymerization and characterization experiments, and gave explanations for the observed phenomena.

General Mentor - Polymer Science and Engineering first-year graduate students

2006-2009

- Held regular sessions designed to help students acclimate into the Polymer Science and Engineering department and graduate student life in general.

Tutor - Polymer Science and Engineering first-year graduate students

2006-2007

- Assisted first-year students from varied educational backgrounds (physics, chemistry, engineering) with homework problems in polymer engineering.

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Outreach Presenter - Massachusetts area K-12 students

2005-2010

- Demonstrated the wonders of polymers to K-12 students at various Polymer Science and Engineering outreach events at schools, museums, and on-campus experiences.
- Led a highly interactive and hands-on presentation involving explanations and demonstrations of aspects of polymer chemistry, polymer physics and polymer engineering.

PUBLICATIONS

Peer-Reviewed

D. Breid, J. W. Hutchinson, A. J. Crosby, "Wrinkle Patterns on Curved Surfaces" *in preparation* **2011**

D. Breid, A. J. Crosby, "Effect of Stress State on Wrinkle Morphology" *accepted for publication, Soft Matter*, 2011 **2011**

S. Cai, D. Breid, A.J. Crosby, Z. Suo and J.W. Hutchinson, "Energy States of Buckled Films on Compliant Substrates" *in press, J. Mech. Phys. Solids*, 2011 **2011**

D. Breid, A. J. Crosby, "Surface Wrinkling Behavior of Finite Circular Plates" *Soft Matter*, 2009, **5**, 425-431 **2009**

Non Peer-Reviewed

D.P. Holmes, D. Breid, E.P. Chan, and A.J. Crosby, "Wrinkling and Snapping Polymer Surfaces" *ACS PMSE Preprints*, 2008 **2008**

D.P. Holmes, D. Breid, E.P. Chan, and A.J. Crosby, "Responsive Polymer Surfaces" *Proc. of the 31st Ann. Conf. Adh. Soc.*, 2008 **2008**

B. Morrow, D. Breid, R. Shah, S.M. Stagg-Williams, "Pt supported Ceria Catalysts for the Low Temperature Water Gas Shift Reaction", Proceedings from the 19th North American Catalysis Society Meeting, 2005 **2005**

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PRESENTATIONS

Oral Presentations:

- "Morphologies of Equibiaxially Wrinkled Surfaces" American Physical Society , Dallas, TX. **2011**
- "Dimple Patterns in Buckling Surfaces" American Physical Society , Portland, OR. **2010**
- "Morphology of Osmotically-Driven Surface Wrinkles" American Physical Society, Pittsburgh, PA. **2009**
- "Spin-coated Thiophene Films on Silicon Wafers", University of Minnesota Summer Undergraduate Research Expo, Minneapolis, MN. **2003**

Poster Presentations:

- "Wrinkling Patterns of Swelling Films on Soft Substrates", Center of UMass & Industry Research on Polymers Annual Meeting, Amherst, MA. **2010**
- "Wrinkling Patterns of Swelling Films on Soft Substrates", New England Workshop on the Mechanics of Materials and Structures, Cambridge, MA. **2010**
- "Morphology of Wrinkles in Confined Geometries", Center of UMass & Industry Research on Polymers Annual Meeting, Amherst, MA. **2009**
- "Morphological Dynamics of Buckling Polymer Surfaces", Center of UMass & Industry Research on Polymers Annual Meeting, Amherst, MA. **2008**
- "Morphology and Growth Dynamics of Buckling Polymer Surfaces", American Physical Society, New Orleans, LA. **2008**
- "Kinetically Controlled Surface Wrinkling Patterns", Center of UMass & Industry Research on Polymers Annual Meeting, Amherst, MA. **2007**
- Poly(3-hexylthiophene) as an Organic Semiconductor in Thin-film FETs", University of Minnesota Summer Undergraduate Research Expo, Minneapolis, MN. **2003**

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RELEVANT COURSEWORK

- Polymer Engineering courses, including Fluid Dynamics, Continuum Mechanics, Fracture Mechanics, Contact Mechanics/Adhesion, Polymer Physics I and II, Polymer Characterization Lab and Thin Films.
- Full Chemical Engineering undergraduate curriculum, with additional electives in Chemistry, Mechanical Engineering, and graduate-level Chemical Engineering.
- Introduction to College Teaching - *basic pedagogic methods and course design*.
- Scientific Management - *mastering the "soft skills" of a career in science*.

AWARDS AND HONORS

<i>Collegium</i> Fellowship and Travel Grant	2011
Distinguished Best Paper award at the Adhesion Society	2008
University of Kansas Honors Program Graduate	2005
Tau Beta Pi Engineering honor society	2004
Summer Undergraduate Fellowship for biochemical engineering research at the University of Stuttgart	2004
Lyon, Rich, and Jo Undergraduate Research Award	2004
Will B. Anderson Memorial Scholarship	2004
Frank E. Marcy Scholarship	2004-2005
Muchnic Fund Engineering Scholarship	2003-2005
William Yates Brown Scholarship	2002
Kenneth F. and Loleta Troup Scholarship	2002
Roland T. Beard Scholarship	2001-2002
James B. Holecek Memorial Scholarship	2001-2004
J. L. Constant Scholarship	2001
National Merit Finalist and full-ride National Merit Scholarship at the University of Kansas	2001
IBM Thomas J. Watson Memorial Scholarship	2001

PROFESSIONAL SERVICE

President of Polymer Science and Engineering Student Organization	2007-2008
Member of American Chemical Society	2006-2011
Member of American Chemical Society - Polymeric Materials Science & Engineering Div.	2006-2011
Member of American Physical Society	2007-2011
Member of American Physical Society - Division of Polymer Physics	2007-2011
Member of American Physical Society - Forum on Education	2007-2011