

Nancy K. Lape

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Harvey Mudd College
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Claremont, CA 91711

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EDUCATION

University of Minnesota, Twin Cities

Minneapolis, Minnesota

- Ph.D. in Chemical Engineering, June 2004
- Advisor: Dr. Edward Cussler
- Thesis Title: "Flake-filled Reactive Barrier Membranes"

University of Massachusetts, Amherst

Amherst, Massachusetts

- B.S. in Chemical Engineering, Summa Cum Laude, May 1998
- Undergraduate Research Advisor: Dr. Michael Doherty
- Undergraduate Honors Thesis: "Design and Assembly of a Crystallization Apparatus"
- GPA: 3.91/4.00

EXPERIENCE

Harvey Mudd College

Assistant Professor of Engineering

Claremont, CA

Aug. 2005 – present

Research Areas:

- Mass Transport in Micro- and Nanoscale Systems, including:
 - Polymer/Inorganic Gas Separation Membranes
 - Barrier Behavior of Human Skin

Laboratoire des Science du Genie Chimique, CNRS

Ecole Nationale Supérieure des Industries Chimiques

Postdoctoral Fellow

Nancy, France

Sept. 2004 – Aug. 2005

- Advisor: Dr. Eric Favre
- Research Area: Novel Polymer Absorption Module for Carbon Dioxide Capture: Theory, Modeling, and Experiments
- Teaching: Separations in Pharmaceutical Processing, Product Design

University of Minnesota
Department of Chemical Engineering and Materials Science

Graduate Research Fellow

Recitation Instructor

Teaching Assistant and Substitute Lecturer

Minneapolis, Minnesota

Sept. 1999 – June 2004

In addition to research activities,

- Composed and delivered lectures for undergraduate Mass and Energy Balances course and graduate Mass Transport course.
- Designed and lead interactive lectures/ problem-solving recitation sessions for undergraduate courses on Mass and Energy Balances and Separations.
- Wrote and graded course homework assignments and exams.

Solutia, Inc.

Butvar Technical Services

Indian Orchard, Massachusetts

Jan. 1999 – July 1999

- Plant design optimization, operational optimization, and environmental work.
- Supervisor: Mr. Philip Mason

University of Massachusetts, Amherst

Tutor

Amherst, MA

Sept. 1995-May 1998

- Tutored university students in chemistry and mathematics.

RELEVANT PROFESSIONAL ACTIVITIES

- FORWARD to Professorship Workshop, 2003
- Science and Engineering Education Scholars Program, 2002
- Preparing Future Faculty Program, University of Minnesota

AWARDS

- National Science Foundation CAREER Award
- American Chemical Society Petroleum Research Fund Starter Grant
- National Science Foundation Graduate Research Fellowship
- American Chemical Society's Women Chemists Committee 2002 Travel Award
- North American Membrane Society 2001 Travel Award
- University of Massachusetts Chancellor's Talent Award
- American Institute of Chemical Engineer's Outstanding Sophomore Award
- University of Massachusetts William Field Alumni Scholar

OFFICES AND SOCIETIES

- Member, American Chemical Society
- Member, American Institute of Chemical Engineers
- Member, American Society of Engineering Education
- Member, North American Membrane Society
- Member, Controlled Release Society
- Chair, CEMS (Chemical Engineering and Materials Science) Council of Graduate Students (2001-2003)
- Officer, American Institute of Chemical Engineers (University of Massachusetts, Amherst Chapter, 1997-1998)
- Tau Beta Pi Engineering Honor Society (Officer, Mass Zeta Chapter, 1997-1998; Member 1997-present)
- Member, Golden Key Honor Society

REFEREED PUBLICATIONS

Lape, N.K. "Tiered Scaffolding of Problem-Based Learning Techniques in a Thermodynamics Course". Proceedings of the 2011 American Society of Engineering Education Annual Conference, June 2011.

Lape, N.K., D. M. Harris, M. Keeter*, M.Ong*, Z. Dodds, "Autonomous Vehicles: An Hands-On Interdisciplinary Freshman Course". Proceedings of the 2011 American Society of Engineering Education Annual Conference, June 2011.

Bounaceur, R., N.K. Lape, D. Roizard, C. Vallieres, and E. Favre. "Membrane Processes for Post-Combustion Carbon Dioxide Capture," *Energy* **31** (2006) 2220-2234.

Lape, N.K., H. Mao, D. Camper, M. Hillmyer, and E.L. Cussler. "Barrier Membranes of Self-Assembled Lamellar Poly(Lactide-Isoprene-Lactide) Triblock Copolymers." *J. Memb. Sci.* **259** (2005) 1-9.

Lape, N.K. "Flake-filled Reactive Barrier Membranes." Ph.D. Thesis, University of Minnesota, Minneapolis, MN (2004).

Lape, N.K., E.E. Nuxoll, and E.L. Cussler. "Polydisperse Flakes in Barrier Films." *J. Memb. Sci.*, **236** (2004) 29-37.

Moggridge, G.D., N.K. Lape, C. Yang, and E.L. Cussler. "Barrier Films Using Flakes and Reactive Additives." *Prog. Org. Coat.*, **1239** (2002) 1-10.

Lape, N.K., C. Yang, and E.L. Cussler. "Reactive Flake-filled Membranes." *J. Memb. Sci.*, **209** (2002) 271-282.

BOOK CHAPTERS

Lape, N.K. "Role of Filler Aspect Ratio on Barrier Properties of Nanocomposites", in **Barrier Properties of Polymer Clay Nanocomposites**, V. Mittal (editor), NOVA Publishers, 2009.

PRESENTATIONS

Chun, J.*, J. Wen*, K. Chakos*, N.K. Lape. "Finite Element Modeling of Drug Transport through Human Stratum Corneum." (poster) Gordon Research Conference – Barrier Function of Mammalian Skin, August 2011, Waterville Valley, NH.

Jensen, A.*, K. Runas*, M. Hwang*, J. Chun*, K. Chakos*, N.K. Lape. "The Effects of Uniaxial Stretching on the Barrier Behavior of Mammalian Skin." (poster) Gordon Research Conference – Barrier Function of Mammalian Skin, August 2011, Waterville Valley, NH.

Peck, N.*, E. Susca*, A. Nelson, M. Loy, E. Ritz, N.K. Lape. "A Novel Synthesis Method for Fabricating Evenly Dispersed Nanocomposite Polymer Membranes." (poster) International Congress on Membranes and Membrane Processes, July 2011, Amsterdam, Netherlands.

Nelson, A.*, M. Loy*, E. Susca*, N. Peck*, N.K. Lape. "Gas Transport in Poly(dimethylsiloxane) and Poly(4-methyl-2-pentyne) Composite Films." (poster) International Congress on Membranes and Membrane Processes, July 2011, Amsterdam, Netherlands.

Nazarian, D.* and N.K. Lape. "Molecular Dynamics Simulation of Gas Diffusion through Amorphous Silica-Poly-4-methyl-2-pentyne Nanocomposites". North American Membrane Society Annual Meeting, June 2011, Las Vegas, NV.

Susca, E.*, N. Peck*, A. Nelson, M. Loy, E. Ritz, N.K. Lape. "A Novel One-Pot Procedure for Nanocomposite Membranes with Improved Dispersions." (poster) North American Membrane Society Annual Meeting, June 2011, Las Vegas, NV.

Loy, M.*, A. Nelson*, N.K. Lape. "Effects of Nanoparticle Dispersion and Polymer Chain Stiffness on Gas Separation Properties of Impermeable Inorganic Nanoparticle-Polymer Composite Membranes." (poster) North American Membrane Society Annual Meeting, June 2011, Las Vegas, NV.

Lape, N.K. "Tiered Scaffolding of Problem-Based Learning Techniques in a Thermodynamics Course". 2011 American Society of Engineering Education Annual Conference, Vancouver, B.C., June 2011.

Lape, N.K., D. M. Harris, M. Keeter*, M. Ong*, Z. Dodds, "Autonomous Vehicles: An Hands-On Interdisciplinary Freshman Course". 2011 American Society of Engineering Education Annual Conference, Vancouver, B.C., June 2011.

Nazarian, D.*, T. Oh*, E. Susca*, N.K. Lape. "Simulation of Gas Diffusion through Polydimethylsiloxane and Poly(4-methyl-2-pentyne) using Molecular Modeling." (poster) Gordon Research Conference – Membranes: Materials and Processes (also presented at the accompanying Gordon Research Seminar), July 2010, New London, NH.

E. Susca*, E. Ritz*, M. Loy*, S. Butters*, A. Nelson*, S. Kim*, J. Hubbard*, N.K. Lape. “Film Preparation and Permeation Properties of Rubbery and Glassy Polymers filled with Spherical Inorganic Nanoparticles.” (poster) Gordon Research Conference – Membranes: Materials and Processes (also presented at the accompanying Gordon Research Seminar), July 2010, New London, NH.

Nazarian, D.*, E. Susca*, T. Oh*, N.K. Lape. “Molecular Dynamics Simulations for the Study of Diffusion through Polymer Membranes.” North American Membrane Society Annual Meeting, July 19, 2010, Washington, D.C.

Ritz, E.*, E. Susca*, M. Loy*, S. Butters*, A. Nelson*, S. Kim*, J. Hubbard*, N.K. Lape. “Inorganic/Polymer Nanocomposite Membranes: Nanoparticle Synthesis, Particle Surface Treatment, and Membrane Formation.” (poster) North American Membrane Society Annual Meeting, July 19, 2010, Washington, D.C.

Wen, J.*, N.K. Lape. “Finite Element Modeling of Drug Transport Through the Human Stratum Corneum” (**Paper selected for oral presentation by peer review**). Annual Meeting of the Controlled Release Society, July 12, 2010, Portland, OR.

Lin, S.*, K. Runas*, K. Maddaelena*, J. Chun*, J. Wen*, N.K. Lape. “The Effects of Uniaxial Stretching on the Barrier Behavior of Mammalian Skin” (poster). Annual Meeting of the Controlled Release Society, July 12, 2010, Portland, OR.

Lape, N.K., “Tailoring Transport: How Nanocomposite Architecture Alters Mass Transfer Across Biological and Non-Biological Membranes”. Harvey Mudd College Stauffer Talk, June 10, 2010, Claremont, CA.

Lape, N.K., “Tunable Composite Membranes” (**invited talk**). 2009 American Institute of Chemical Engineers Annual Meeting, November 10, 2009, Nashville, TN.

Lape, N.K., “Mix and Match Membranes” (**invited talk**). Kuwait University, October 18, 2009, Kuwait City, Kuwait.

Runas, K.*, S. Lin*, J. Wen*, M. Honda*, E. Snyder*, N.K. Lape. “The Effects of Uniaxial Extension of Skin on Transdermal Drug Delivery” (poster). Gordon Research Conference – Barrier Function of Mammalian Skin, August 2009, Waterville Valley, NH.

Wen, J* and N. K. Lape. “Finite Element Modeling of Drug Transport Through the Human Stratum Corneum” (poster). Gordon Research Conference – Barrier Function of Mammalian Skin, August 2009, Waterville Valley, NH.

Lape, N.K., L. Bermudez *, G. Dinolov*, J. Hubbard*, M. Mayeda*, S. Vine*. “Gas Transport in Poly(dimethylsiloxane)-SiO_x Composite Films: Effects of Filler Size Variation from Micro- to Nanoscale” (**invited talk**). 2008 Annual Fall Meeting of the Materials Research Society, December 2, 2008, Boston, MA.

Bermudez, L.*, G. Urowsky*, G. Dinolov*, J. Hubbard*, M. Mayeda*, H. Schalliol*, C. Tang*, S. Kim*, S. Vine*, N. Lape. “Gas Transport in Poly(dimethylsiloxane)-SiO_x Composite Films: Effects of Filler Size Variation from Micro- to Nanoscale” (poster). Gordon Research Conference - Membranes: Materials and Processes, August 2008, New London, NH.

Mayeda, M.*, L. Bermudez*, G. Urowsky*, G. Dinolov*, J. Hubbard*, H. Schalliol*, C. Tang*, S. Kim*, S. Vine*, N. Lape. “Gas Transport in Poly(dimethylsiloxane)-SiO_x

Composite Films: Effects of Filler Size Variation from Micro- to Nanoscale” (poster). International Congress on Membranes and Membrane Technology. July 12-18, 2008, Honolulu, HI.

Lape, N.K. “Challenge-Based Instruction (CBI) in a Mass Transfer and Separations Course: Design and Implementation.” 2008 Annual Meeting of the American Society for Engineering Education. June 23, 2008, Pittsburgh, PA.

Bordeaux, N.*, McKibben, K.*, Palmer, A.*, Lape, N. and E. Orwin. (poster) “Measuring the Diffusion Kinetics of Proteins through Novel Matrices.” 6th Annual California Tissue Engineering Meeting, Nov 30-Dec 1, 2007, UCLA, Los Angeles, CA.

Santana, S.*, R. Howden*, M. Mayeda*, G. Urowsky*, K. Brown*, B. Tsai* and N.K. Lape. (poster) Gordon Research Conference - Membranes: Materials and Processes, August 2006, New London, NH.

Lape, N.K., G. Mauviel, C. Vallières, G. Grévillet, and E. Favre. “Novel Modules for CO₂ Capture: Finite Element Modeling.” 5th Ibero-American Congress on Membrane Science and Technology, July 7, 2005, Valencia, Spain.

Lape, N.K.. “Better Barrier Films.” 2^{ème} Séminaire PICS Franco-Russe, June 17, 2005, Nancy, France.

Lape, N.K., S. Bertelle, G. Mauviel, C. Vallières, G. Grévillet, D. Roizard and E. Favre. “Use of Polymers for Carbon Dioxide Capture.” 36^{ème} Séminaire Nancy-Karlsruhe, June 11, 2005, Ventron, France.

Lape, N.K., G. Mauviel, C. Vallières, G. Grévillet, D. Roizard and E. Favre. “Alternative Methods for CO₂ Capture : Current Research at LSGC.” University of Illinois Urbana-Champaign, April 25, 2005, Urbana, IL.

Lape, N.K., G. Mauviel, C. Vallières, G. Grévillet, and E. Favre. “CO₂ Capture using a Mauviel Module.” Groupe Génie des Procédés de Séparation, ENSIC-INPL, March 1, 2005, Nancy, France.

Lape, N.K.. “Better Barrier Films.” Centre de Recherche sur la Conservation des Documents Graphiques, February 24, 2005, Paris, France.

Lape, N.K., H. Mao, M.A. Hillmyer, E.L. Cussler, and E. Favre. “Barrier Membranes of Self-Assembled Lamellar Triblock Copolymers.” Product Technology, Product Design and Engineering, November 23, 2004, Groningen, Netherlands.

Müller, V., J. Barthez, C. Vallières, G. Grévillet, N.K. Lape, M. Kind and E. Favre. “Protective Packaging for Cellulose-Based Documents in Museums.” Product Technology, Product Design and Engineering, November 23, 2004, Groningen, Netherlands.

Cussler, E.L., N. Lape, and M. Hillmyer. “Self-Assembling Flake-Filled Barrier Membranes.” Annual Meeting of the American Institute of Chemical Engineers, November 9, 2004, Austin, TX.

Lape, N.K.. “Better Barrier Films.” (Invited presentation) Bucknell University, March 1, 2004.

Lape, N.K., E.E. Nuxoll, and E.L. Cussler. "Polydispersity Effects in Flake-filled Barrier Coatings." (poster) Gordon Research Conference – Coatings & Films, July 2003, New London, NH.

Nuxoll, E.E., N.K. Lape, R.A. Siegel, and E.L. Cussler. "Reactive Barrier Membranes: Theory & Experiment." Controlled Release Society Annual Meeting, July 2003, Glasgow, Scotland.

Lape, N.K., C. Yang, and E.L. Cussler. "Reactive Flake-filled Barriers." Annual Meeting of the American Institute of Chemical Engineers, November 7, 2002, Indianapolis, IN.

Lape, N.K., C. Yang, and E.L. Cussler. "Reactive Flake-filled Barrier Membranes." (poster) Gordon Research Conference - Membranes: Materials and Processes, August 2002, New London, NH.

Lape, N.K., W.H. Smyrl, and E. L. Cussler. "Transient Transport in Flake-filled Coatings Used for Corrosion Prevention." 2002 Tri-Service Corrosion Conference, January 18, 2002, San Antonio, TX.

*HMC student.