MICHAEL D. DICKEY

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EDUCATION

2001-present **University of Texas at Austin** **Austin, TX**

Ph.D. Chemical Engineering (expected May 2006)

Thesis: Development of Photocurable Pillar Arrays Formed via Electrohydrodynamic Instabilities

Advisor: Dr. C. Grant Willson

1995-1999 **Georgia Institute of Technology** **Atlanta, GA**

B.S. Chemical Engineering August 2001

President's Scholarship

G.P.A. 4.0/4.0

RESEARCH EXPERIENCE

2001-present **University of Texas at Austin** **Austin, TX**

Graduate Research Assistant, Department of Chemical Engineering

- Pioneered work in the Willson research group on the "pillars" project. Pillars are polymeric columnar arrays spontaneously formed across a thin gap by electric field amplification of film instabilities. The process rapidly produces thousands of pillars on the micron scale. Our work was the first done with low viscosity photopolymerizable liquids. Worked with an active gap tool to stretch pillars in order to increase their aspect ratio. Studied various polymer and photo-polymer pillar systems.
- Measured kinetic parameters and modeled the photopolymerization kinetics of Step and Flash Imprint Lithography, a novel patterning method capable of sub-50 nm resolution. Helped develop novel photo-sensitive materials for this patterning technology.

1997-1999 **Georgia Institute of Technology** **Atlanta, GA**

Research Assistant, Department of Chemical Engineering

- Developed high and low-k dielectric films using plasma enhanced vapor deposition.
  Advisor: Dr. Dennis Hess

WORK EXPERIENCE

1999-2001 **Merck & Co., Inc.** **Rahway, NJ**

Chemical Engineer, Chemical Engineering R&D

- Produced bulk drug for clinical trials and provided process improvement and scale-up for factory fits. Worked in both a research laboratory and a pilot plant environment.
- Utilized fundamental chemical engineering principles and operations such as distillation, mass/heat transfer, crystallization, filtration, and environmental impact.

1996-1998 **Kimberly-Clark Corporation** **Roswell, GA**

Co-op Engineer, Non-Wovens Engineering / Non-Wovens Technology Research

- Developed and optimized polymeric Spunbond and Meltblown processes.
- First author on two internal publications regarding methods to improve non-woven fiber orientation and fluid dynamic modeling of fiber drawing.
- Worked on both aerosol spray and electric-field induced surface treatment methods.

TEACHING EXPERIENCE

2001-present **University of Texas at Austin** **Austin, TX**

Teaching Assistant: Thermodynamics (Fall 2005), Organic Chemistry II (Spring 2005), Chemical Engineering Fundamentals Lab (Fall 2002 and Spring 2002)

- Revamped statistical process control experiment (published in *Journal of Chemical Education*).
- Lecture Certificate and Understanding Your Students Certificate from ASPECTS (Advancing Students' Professional Excellence with Certificates in Teaching Series, Fall 2005).
- Mentored nine undergraduate researchers in the Willson research group.

PATENT

M.D. Dickey, T. Holcombe, F. Palmieri, C.G. Willson. *A Covalently Bound, Durable Surface Treatment of Indium Tin Oxide* (UT Disclosure OTC-5043-WIL), 2005.

HONORS AND AWARDS

Intel Foundation PhD Fellowship Award 2005-06 ▪ ACS Excellence in Graduate Polymer Research Award 2004
National Science Foundation Graduate Fellowship 2001-04 ▪ Thrust Graduate Fellowship 2001-2003
Georgia Tech President's Scholarship 1995-99 ▪ Reginald S. Fleet International Scholarship 1998
G.T. Alumni Association Student Leadership Scholarship 1998 ▪ Henry Ford II Scholar Award 1999
Dow Chemical Engineering Scholarship 1996, 1998 ▪ Robert C. Byrd Scholarship 1995-97
Allied Signal Chemical Engineering Scholarship 1997 ▪ Mr. Georgia Tech Semi-Finalist 1998

SELECTED PUBLICATIONS (REFEREED)

M.D. Dickey, R.L. Burns, E.K. Kim, S.C. Johnson, N.A. Stacey, C.G. Willson. "A study of the kinetics of Step and Flash Imprint Lithography photopolymerization," *AIChE Journal,* 2005. 51(9): p. 2547-55.

M. D. Dickey, C.G. Willson. "Determination of the kinetic parameters for the Step and Flash Imprint Lithography photopolymerization," *AIChE Journal* (in press, Feb 2006).

M.D. Dickey, M.D. Stewart, D.A. Dickey, and C.G. Willson. "An automated statistical process control study of inline mixing using spectrophotometric detection," *Journal of Chemical Education* (in press Jan 2006).

M. D. Dickey, S. Gupta, K.A. Leach, C.G. Willson, and T. P. Russell. "Novel 3-D structures in polymer films by coupling external and internal fields," *Langmuir* (submitted Oct 2005).

M.D. Dickey, E. Collister, A. Raines, and C.G. Willson. "Photocurable pillar arrays formed via electrohydrodynamic instabilities" *Chemistry of Materials* (submitted Oct 2005).

K.A. Leach, S. Gupta, **M. D. Dickey**, C.G. Willson, and T. P. Russell. "Electric Field and Dewetting Induced Hierarchical Structure Formation in Polymer/Polymer/Air Trilayers," *Chaos* (invited paper, submitted).

X. Yan, G. Liu, **M.D. Dickey**, and C.G. Willson. "Preparation of porous polymer membranes using nano- or micro-pillar arrays as templates." *Polymer*, 2004. 45: p.8469-74.

E.K. Kim, N.A. Stacey, B.J. Smith, **M.D. Dickey**, S.C. Johnson, B.C. Trinque, and C.G. Willson. "Vinyl ethers in ultraviolet curable formulations for Step and Flash Imprint Lithography," *Journal of Vacuum Science & Technology, B*, 2004. 22(1): p.131-135.

S.C. Johnson, R. Burns, E.K. Kim, G.M. Schmid, **M.D. Dickey**, J. Meiring, S.D. Burns, N.A. Stacey, C.G. Willson, D. Convey, Y. Wei, P. Fejes, K. Gehoski, D. Mancini, K. Nordquist, W.J. Dauksher, D.J. Resnick. **"**Step and flash imprint lithography modeling and process development," *Journal of Photopolymer Science and Technology*, 2004. 17 (3): p. 417-419.

S.C. Johnson, R.L. Burns, E.K. Kim, **M.D. Dickey**, G.M. Schmid, J. Meiring, S.D. Burns, C.G. Willson, D. Convey, Y. Wei, P. Fejes, K. Gehoski, D. Mancini, K. Nordquist, W.J. Dauksher, and D.J. Resnick. "Investigation of etch barrier densification for Step and Flash Imprint Lithography," *Journal of Vacuum Science & Technology, B* (submitted).

E.K. Kim, M.D. Stewart, K. Wu, F.L. Palmieri, **M.D. Dickey**, J.G. Ekerdt, and C.G. Willson. "Vinyl ether formulations for Step and Flash Imprint Lithography," *Journal of Vacuum Science & Technology, B* (submitted).

BOOK CHAPTERS

M.D. Dickey, M. Palard, M.D. Stewart, and C.G. Willson. (expected authorship) "Advanced Lithography" in National Nanotechnology Infrastructure Network (NNIN) Open Textbook, Steve Campbell, editor. (2006)

SELECTED PRESENTATIONS

M.D. Dickey, E. Collister, A. Raines, and C.G. Willson. "High Aspect Ratio Pillar Arrays Formed via Electrohydrodynamic Instabilities," AICHE Annual Meeting, Cincinnati, OH. November 2005.

M.D. Dickey, E. Collister, and C.G. Willson. "Electrically Induced Pillar Arrays Formed Using Photocurable Materials," AICHE Annual Meeting, Austin, TX. November 2004.

M.D. Dickey and C.G. Willson. "Effects of Oxygen on Step and Flash Imprint Lithography Photopolymerization Kinetics," ACS Annual Spring Meeting, Anaheim, CA. March 2004.

M.D. Dickey and C.G. Willson. "Tailoring Photopolymerization Materials for Nanotechnology," ACS Annual Fall Meeting, Philadelphia, PA. August 2004. *(ACS Excellence in Graduate Polymer Research Session)*

***Please contact me for an extended CV containing all publications, presentations, references, etc.**