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EDUCATION

Princeton University, Princeton NJ

Ph.D. in Chemical and Materials Engineering, January 2006

Area of Research: Nanoscale structure and properties of polymeric materials

Independent Research Topic: Novel property measurement technique for fuel cell membranes

M.A. in Chemical Engineering, January 2002

University of Pennsylvania, Philadelphia PA

B.S.E. in Chemical and Biomolecular Engineering, *Magna Cum Laude*, May 2000

B.S.E. in Materials Science and Engineering, *Magna Cum Laude*, May 2000

HONORS AND AWARDS

- Engineering Council Excellence in Teaching Award, Princeton University, 2006
- Nominee, The Graduate School Teaching Award, Princeton University, 2005
- Dean's Fund for Scholarly Travel Award, Princeton University, 2005
- William R. Schowalter Travel Award, Princeton University, 2003
- Ticona Excellence in Teaching Assistantship Award, Princeton University, 2002
- Princeton Materials Institute Fellow, Princeton University, 2000-2005

TEACHING EXPERIENCE

Assistant in Instruction (Teaching Assistant), Princeton University, Dept. of Chemical Engineering

- Held weekly recitations and office hours, and/or provided assistance in laboratory work

Introduction to Materials Science and Engineering; 2005 (Prof. T.K. Vanderlick)

Introduction to Materials Science and Engineering; 2004 (Prof. T.K. Vanderlick)

Introduction to Materials Science and Engineering; 2002 (Prof. I.A. Aksay)

Chemical Engineering Laboratory II; 2001 (Prof. J.B. Benziger)

Graduate Liaison, Princeton University, McGraw Center for Teaching and Learning; 2003-2004

- represented the department for discussing teaching issues and promoting pedagogical activities

Undergraduate Consultant, University of Pennsylvania, Dept. of Chemical Engineering

- Provided fellow undergraduates with assistance in homework and test preparation

Advanced Chemical Engineering Science; 1999 (Prof. R.J. Gorte)

TEACHING INTERESTS

- Materials Science and Engineering; Material Selection
- Polymer Chemistry, Physics and Engineering
- Fabrication, Structure and Properties of Nanomaterials
- Laboratory, Technical Writing and Communication for Engineers

UNIVERSITY INVOLVEMENT

Graduate Student Committee Representative, Princeton University; 2001–2005

- Represented the class in departmental affairs and interacted with ABETS, departmental advisory council, and faculty candidates.

Cotsen Children's Library, Princeton University; 2003–2005

- Conducted Japanese storybook-reading as part of Library's community service

Science and Engineering Exposition, Princeton Center for Complex Materials; 2005

- Gave polymer-related demonstrations as part of School's interaction with local schools

Guest Scientist, Liberty Science Center, Jersey City NJ; 2004

- Taught a polymer-related course at the Material Research Society's "Strange Matter Exhibit"

RESEARCH EXPERIENCE

Post-Doctoral Associate (advisor: Prof. John M. Torkelson); 2006–present

Northwestern University, Department of Chemical and Biological Engineering

Processing of Polymer Blends and Polymer Nanocomposites via Solid-State Shear Pulverization

Assistant in Research (advisor: Prof. Richard A. Register); 2001–2006

Princeton University, Department of Chemical Engineering

Structure-Property Relationships of Semicrystalline Copolymers and Ionomers

Undergraduate Research Assistant (advisor: Prof. Russell J. Composto); 1999–2000

University of Pennsylvania, Dept. of Materials Science and Engineering

Effects of Confinement on the Phase Diagram of Polymer Blend Thin Films

RESEARCH INTERESTS

- Structure-Property Relationships in Semicrystalline Polymers
- Ion-containing Polymers: Morphology, Properties and Applications
- Polymer-Based Blends and Nanocomposites
- Sustainable Materials; Environmentally Benign Polymers
- Solid-State Polymer Processing Technique

INDUSTRIAL EXPERIENCE

Procter & Gamble Far East Inc., Hyogo Japan

Product Supply Division, Health and Beauty Care Team: Summer Intern; 1998

Engineering and Technical Systems Division, Skin Care Team: Summer Intern; 1999

University of Pennsylvania Student Federal Credit Union, Philadelphia PA

General Manager; 1999–2000

PUBLICATIONS

- A. H. Lebovitz, K. Wakabayashi and J. M. Torkelson, "Compatibilization of Immiscible Polymer Blends by Solid-State Shear Pulverization: The Effects of Feed and Processing Conditions upon Chain Scission and Combination", submitted to *Polymer Engineering and Science*.
- K. Wakabayashi and R. A. Register, "Ethylene/(Meth)Acrylic Acid Ionomers Plasticized and Reinforced by Metal Soaps", *Polymer* **47**, 2874 (2006).
- K. Wakabayashi and R. A. Register, "Morphological Origin of the Multistep Relaxation Behavior in Semicrystalline Ethylene/Methacrylic Acid Ionomers", *Macromolecules* **39**, 1079 (2006).
- K. Wakabayashi and R. A. Register, "Micromechanical Interpretation of the Modulus of Ethylene-(Meth)Acrylic Acid Copolymers", *Polymer* **46**, 8838 (2005).

- Y.-L. Loo, K. Wakabayashi, Y. E. Huang, R. A. Register, and B. S. Hsiao, "Thin Crystal Melting Produces Low-Temperature Endotherm in Ethylene/Methacrylic Acid Ionomers", *Polymer* **46**, 5118 (2005).
- B. Zhang Newby, K. Wakabayashi and R. J. Composto, "Confinement Induced Stabilization in Polymer Blend Thin Films", *Polymer* **42**, 9155 (2001).

MAJOR CONFERENCE PRESENTATIONS

- **Society of Plastics Engineers Annual Technical Conference**, Cincinnati OH; May 2007
Talk: "Solid-State Shear Pulverization as a Real World Process: Processing-Structure-Property Relationships and Comparison with Conventional Processes"
- **Materials Research Society Spring Meeting**, San Francisco CA; April 2007
Talk: "Effective Nanofiller Dispersion and Property Modification in Polymer Nanocomposites Made by Solid-State Shear Pulverization"
- **American Chemical Society National Spring Meeting**, Chicago IL; March 2007
Talk: "Solid-State-Shear Pulverization for Effective Dispersion and Compatibilization in Polymer Blends"
- **American Institute of Chemical Engineers Annual Meeting**, San Francisco CA; November 2006
Talk: "Polymer-Graphite Nanosheet Composites via Solid-State Shear Pulverization: A Robust and Practical Approach to Effective Nanofiller Dispersion"
Talk: "Ionic Oligomer Blends: Coassembled Nanoscale Structure and Enhanced Properties"
- **American Physical Society March Meeting**, Baltimore, MD; March 2006
Talk: "Structural Origin of Thermomechanical Behavior in Semicrystalline Ionomers"
- **American Physical Society March Meeting**, Los Angeles, CA; March 2005
Talk: "Influence of Neutralization of Amorphous-Phase Properties in Semicrystalline Ionomers"
Poster: "Semicrystalline Ionomer- Metal Carboxylate Composite: Phase Behavior and Mechanical Properties"
- **American Institute of Chemical Engineers Annual Meeting**, Austin TX; November 2004
Talk: "Microscopic Understanding of the Elastic Modulus of Ethylene-(Meth)Acrylic Acid Copolymers"
- **American Chemical Society National Fall Meeting**, Philadelphia PA; August 2004
Talk: "Micromechanics of Ethylene-(Meth)Acrylic Acid Copolymers: Tensile Modulus"
- **American Physical Society March Meeting**, Montreal Canada; March 2004
Talk: "Micromechanical Interpretation of the Modulus of Semicrystalline Copolymers and Ionomers"
Poster: "Structure and Mechanical Property Modifications by Blending Alkyl Carboxylate Salts into Ethylene-*co*-(Meth)Acrylic Acid Ionomers"
- **National Graduate Research Polymer Conference**, Bethlehem PA; June 2003
Talk: "Structure and Properties of Blends of Fatty Acid Salts and Ethylene-Based Ionomers"
- **American Physical Society March Meeting**, Austin TX; March 2003
Talk: "Coassembly of Fatty Acid Salts and Semicrystalline Ionomers"
Poster: "Structure of Secondary Crystals in Ethylene-Based Ionomers"

SKILLS AND EXPERIMENTAL TECHNIQUES

- Polymer Extrusion and Solid-State Shear Pulverization
- Wide- and Small-Angle X-ray Scattering (One- and Two-Dimensional)
- Infrared Spectroscopy
- Gel Permeation Chromatography
- Atomic Force Microscopy

- Scanning Electron Microscopy
- Transmission Electron Microscopy
- Differential Scanning Calorimetry
- Thermogravimetric Analysis
- Stress-Strain Testing
- Dynamic Mechanical Analysis
- Rheometry and Melt Indexing
- Gas Permeation Analysis
- Electrical Impedance Spectroscopy
- Basic Machine Shop Operation
- Foreign Languages: Mastery in Japanese; Proficiency in French; Knowledge in German

PROFESSIONAL SOCIETY MEMBERSHIPS

- American Chemical Society
- American Institute of Chemical Engineers
- American Physical Society
- Materials Research Society
- Society of Plastics Engineers