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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

1968	**Sc. D**. in Materials Engineering Dissertation: Effects of High Pressure on Amorphous Polymers
1967	**Materials Engineer**
1965	**M. S.** (unspecified) Concentrations in polymer science, textile technology Thesis: Birefringence and Orientation States in Polyacrylonitrile
1964	**B. S**. in Materials Engineering Thesis: Temperature Dependence of Birefringence Effects in Acrylonitrile Polymers

UNIVERSITY AND TEACHING EXPERIENCE

1999 – present	**Clemson University**, Clemson, SC
2010 - present	**Director, Packaging Science Program, Department of Food, Nutrition and Packaging Sciences**
2006 -- 2010	**Chair, Department of Packaging Science**
2004 – present	**Director, Center for Flexible Packaging** **Associate Professor** (tenured 2005): Co-founder and director of Clemson Center for Flexible Packaging. Developed and teach Packaging Science capstone courses "Package Design and Development" and "Packaging Career Preparation"; developed core undergraduate/graduate courses "Converting for Flexible Packaging" and "Applications of Polymers in Packaging"; developed and taught 800 level graduate courses "Flexible Packaging," "Semi-rigid Packaging." Short courses: "Materials for Confectionary Packaging," "Understanding Plastics Packaging," "Analyzing Plastics Patents." **Research**: Environmental impact of grocery carrier bags. Sustainable package design. Development of bag-in-container packaging for large volumes of liquids. Development of polymeric packaging for MREs. Effects of norbornene and octene content on the properties of LLDPE/COC blends as heat seal layers; Gelatin as an active layer in multi-layer packages; Unique barrier films using "Smart Blending" chaotic advection; Adaptation of materials characterization techniques to collaborative discovery-based learning in the undergraduate Packaging Science curriculum.
1999	Food Packaging Design Conference, Orlando, FL, Lecturer
1978	Celanese Chemical Group Middle Management Development Program, Lecturer
1973	NSF Summer Institute for College Teachers on Applied Polymer Science, Cleveland, Lecturer
1967	**Massachusetts Institute of Technology** Teaching Assistant: full responsibility as instructor for graduate course in polymer science required for all textile technology graduate students

INDUSTRIAL EXPERIENCE

1999 - present	**Reedy River Associates, Simpsonville, SC, President**. Consulting to the plastics and packaging industries. Expert witness for plastics and packaging (infringement, validity, trade dress, breach of contract, antitrust—plaintiff and defendant experience). Projects to develop and quantify product development and market entry strategies for major international plastics producers to introduce new materials into industrial and consumer packaging. Technical consulting to major polymer, plastics and packaging materials suppliers, converters and end users.

INDUSTRIAL EXPERIENCE (continued)

1968 - 1998	**Hoechst NA Holdings and its predecessor companies**
1994 - 1998	**Business Manager, Hoechst Research & Technology, Greer, SC**. Managed group of 9 to create three corporate R&D projects in multi-layer, semi-rigid and rigid plastic packaging, focused on high barrier PET resins, bottles and films, with estimated sales potential >$500MM. Based on a jointly-developed strategy, the target business unit created a new organization and product line to which these projects were transferred and commercialized.
1991 - 1994	**Department Head, New Films Business Development, Hoechst AG, Wiesbaden, Germany**. Managed department of 20 conducting basic and applied research in new polymers, films and casings. Established and led applications lab and new business development team to support LCP laminates for printed circuit boards.
1987 - 1991	**Business Manager, Packaging and Specialties Films, Hoechst Celanese Corporation, Greer, SC**. Global business team leader and directly responsible for 40 people in sales, marketing and technical service for Hostaphan® polyester film to the Packaging and Industrial Converting markets in North America, Latin America and Europe. Grew business >6X to >$50MM, with 60% of sales from new products. Co-authored and secured approval for three business strategies. Created, secured approval and implemented the Hostaphan packaging strategy, including building a new team hired from the industry, a $2MM applications laboratory, and an award-winning advertising/publicity program. Justified and secured approval for >$100MM in capital investment for new product lines. Established and managed global product and market development of Hostaphan 4400 ultra-clear films for pressure-sensitive labels and Hostaphan 2600 improved adhesion packaging film, which won AIMCAL Technology of the Year in its first year of commercial sales and numerous industry awards for specific packages. Principal representative to five major trade associations, including Flexible Packaging Association, Tag and Label Manufacturers Association, AIMCAL and Screen Printing Association.
1985 -1987	**Process Research Manager, Polyester Film, American Hoechst Corporation**. Managed department of 45 people, including films process research and R&D pilot line (24/7), engineering, facilities, accounting, and safety.
1979 - 1985	**Industry Manager, Packaging and Specialties Films, American Hoechst Corporation**.
1977 - 1979	**Product Specialist, Packaging and Specialties Films, Celanese Plastics Company**.
1975 - 1977	**Project Manager, Polyester Bottle Resin, Celanese Plastics Company**. Responsible for process development, pilot manufacturing and manufacturing strategy development for the entry of Celanese into polyester bottle resin
1975	**Product Specialist, Packaging and Specialties Films, Celanese Plastics Company**
1973 - 1975	**Group Leader Application/Product Development, Celanese Plastics Company**. Applied polyester film research, including new shrink film product line.
1968 - 1973	**Sr. Research Scientist/Team Leader, Celanese Research Company, Summit. NJ**. Research in polyester films, polyester resins, graphite fibers and composites, acrylonitrile fibers and films, acetate fibers, and polymer physics. Pioneered new thermal analysis techniques now considered standard. Team leader for multi-disciplinary group supporting the polyester film business.
1965	**Research Scientist, U.S. Army Natick Labs - Ballistic Materials Lab,** Natick, MA

INTERNATIONAL EXPERIENCE AND LANGUAGES

2018	Expert testimony for complainant before International Trade Commission
2015	Expert testimony for Plaintiff before Federal Court, Calgary
2012	Expert for defendant in patent infringement case before Singapore High Court
2014	Member of Scientific Committee, 19th IAPRI World Conference on Packaging, Melbourne
2013	Member of Scientific Committee and presenter, 26th IAPRI Symposium on Packaging, Espoo, Finland
2012	Member of Scientific Committee, 18th IAPRI World Conference on Packaging, San Luis Obispo
2011	Member of Scientific Committee, 25th IAPRI Symposium on Packaging, Berlin, Germany
2010	Member of Scientific Committee and attendee, 17th IAPRI World Conference on Packaging, Tianjin, China
2009	Symposium chair, 24th IAPRI Symposium on Packaging, Greenville, SC
2008	16th IAPRI World Conference on Packaging, Bangkok, Thailand

INTERNATIONAL EXPERIENCE AND LANGUAGES (cont)

2008	Seminar at Korea University; Keynote speaker at YonSei Packaging Forum; Keynote speaker at the 20th KOPAST International Seminar on Packaging Science & Technology, Seoul, Korea
2007	Visits to ESIEC, France; Clemson Brussels Center; European companies**)**
2007	23rd IAPRI Symposium on Packaging, Windsor, UK
2005	Visits to packaging science schools in Europe; seminar at Korea University, Seoul
2004	14th IAPRI World Conference on Packaging, Stockholm, Sweden
2004	Invited speaker Masterfoods international innovation conference, Tokyo, Japan
2003	Tours of Great Britain food and packaging companies; visit to Faraday Association
2002	13th IAPRI World Conference on Packaging, East Lansing, MI
2001	12th IAPRI World Conference on Packaging, Warsaw, Poland
1991 – 1996	Responsible for global coordination of a U.S.-Germany-Japan development partnership for LCP films.
1991 - 1994	Managed a new films business development department, including marketing and semi-works manufacturing, while living in Germany for three years
1988 - 1992	Member of negotiating team and later technical and marketing coordination teams for three way U.S.-Germany-Japan polyester film joint venture.
1988 – 1990	Managed successful anti-dumping case against Japanese and Korean polyester film producers, including testifying before the International Trade Commission.
1987 – 1991	Global business team leader for Hoechst Celanese Packaging and Specialty Films

Extensive business travel in Western Europe and Japan; personal/business travel in Eastern Europe, Middle East, Asia.
Languages (with varying degrees of fluency): German, French, Hebrew

HONORS AND AWARDS

2000--present	Listed in *Who's Who in America* and *Who's Who in American Education*
2002	Invited presenter NSF Showcase-2002 ASEE Annual Meeting
1975-76	The Fiber Society Lecturer
1967	Rohm & Haas Fellow
1966	American Can Fellow
1964	Susich Award in Fiber Rheology
1960-64	National Merit Scholar
1960	First Place winner, Mass. State Science Fair "Graft Copolymers of polystyrene and polymethyl methacrylate with natural rubber"

PROFESSIONAL MEMBERSHIPS

Institute of Packaging Professionals
Society of Plastics Engineers
International Safe Transit Association

COMMUNITY SERVICE

Volunteer, instructional technology, Woodland Elementary School, 1997-2004, Greer, SC,
Graduate of Leadership Greenville, 1988-89, Greenville, SC
Co-founder and chairman, Suzuki Academy of Talent Education, 1984-89, Greenville, SC

PUBLICATIONS

Peer-reviewed Report/Book

R.M. Kimmel, Kay D. Cooksey and A. Littman, "Life Cycle Assessment of Grocery Bags in Common Use in the United States" (2015) Clemson, SC: Clemson University Press. 192 pgs. http://tigerprints.clemson.edu/cudp_environment/6/

Refereed Journal Articles

T. Chen, D. Darby, R. Kimmel, K. Cooksey and E. Gohr. "Characterizing Metallocene-catalyzed Skin Layers on Oriented Polypropylene Films" *J. Plastic Film and Sheeting*. In preparation

K. W. Kim, B.J. Min, Y.T. Kim, R. M. Kimmel, K. Cooksey, S.I. Park "Antimicrobial activity against foodborne pathogens of chitosan biopolymer films of different molecular weights",*LWT-Food Sci. Tech* **44** 565-569 (2011)

H. J. Bae, H. J. Park, D. O. Darby, R. M. Kimmel and W. S. Whiteside "Development and characterization of pet/fish gelatin-nanoclay composite/LDPE laminate: gelatin-nanoclay film as a functional barrier layer" *Pkg. Tech. Sci*., **22**, 371-383 (2009)

H. J. Bae, Park, H. J., Hong, S. I., Byun, Y. J., Darby, D. O., Kimmel, R. M., Whiteside, W. S.. "Effect of clay content, homogenization rpm, ph, and ultrasonification on mechanical and barrier properties of fish gelatin/montmorillonite nanocomposite films" *LWT -- Food Science and Technology*. **42**, 1179–1186.(2009)

H. J. Bae, D. O. Darby, R.. M. Kimmel, H. J. Park, W. S. Whiteside, "Effects of transglutaminase induced crosslinking on properties of fish gelatin-nano clay composite film", *J. Food Chem*., **114** 180-189 (2009)

R.A. Hurley, R. M. Kimmel, D. D. Darby, K. Cooksey, L. Bix "Design and Build of an accelerometer to determine package orientation over time" NIPHLE Annual Conference: Norfolk, VA (2008)

Y-T. Kim, Y-S. Hong, R. M. Kimmel, J-H Rho, C-H. Lee "New Approach for characterization of biopolymer film using proton behavior determined by low field ^{1}H NMR" *J. Agri. Food Chem.*, **55** 10678-84 (2007)

R. M. Kimmel. "Undergraduate Labs in Applied Polymer Science – A Case Study" *Proc. 2002 ASEE Ann. Conf.* (2002)

R. M. Kimmel "A Primer on Plastic" *Graphic Arts Monthly* 55, 132, 135-136 (1983)

R. M. Kimmel. "Polyester Film" *J. Microgr*. **12**, 15-23 (1982)

W. Whitney and R. M. Kimmel. "Griffith Equation and Carbon Fiber Strength" *Nature Physical Science* 237, 93-94 (1972).

R. M. Kimmel and D. R. Uhlmann. "Activation-energy Spectra for Retraction of Hot-Stretched Polystyrene and Shear Creep in Polymethyl Methacrylate" *J. Appl. Phys*. **42**, 4926-4930 (1971).

R. M. Kimmel and D. R. Uhlmann. "Effects of Pressure on Amorphous Polymers: Thermodynamic Properties of Densified Polymethyl Methacrylate" *J. Appl. Phys*. **42**, 4917-4925 (1971).

R. M. Kimmel and D. R. Uhlmann. "Effects of High Pressure on Amorphous Polymers. II. Annealing of Densified Polymethyl Methacrylate" *J. Appl. Phys*. **42**, 1892-1896 (1971).

PUBLICATIONS (continued)

Refereed Journal Articles (continued)

R. M. Kimmel and D. R. Uhlmann. "Effects of High Pressure on Amorphous Polymers: Densification of Polymethyl Methacrylate" *J. Appl. Phys*. **41**, 2917-2927 (1970).

R. M. Kimmel and D. R. Uhlmann. "Activation Energy Spectra for Nonlinear Relaxation Processes" *J. Appl. Phys*. **41**, 592 (1970).

R. M. Kimmel and D. R. Uhlmann. "On the Energy Spectrum of Densified Silica Glass." *Phys. Chem. Glasses* **10**, 12-17 (1969).

R. M. Kimmel and D. R. Uhlmann. "Activation Energy Spectra for Relaxation in Amorphous Materials. I. Volume Relaxation in Polystyrene and Polyvinyl Acetate" *J. Appl. Phys*. **40**, 4254-4260 (1969).

R. M. Kimmel and R. D. Andrews. "Birefringence Effects in Acrylonitrile Polymers. II. The Nature of the 140°C Transition" *J. Appl. Phys*. **36**, 3063-3071 (1965).

R. D. Andrews and R. M. Kimmel. "Solid State Structure and Glass Transitions in Polyacrylonitrile: the Hetero-bonded Solid State" *J. Polymer Sci.* B3, 167-169 (1965).

R. D. Andrews and R. M. Kimmel. "Birefringence Effects in Acrylonitrile Polymers. I Effects at Different Temperatures" *J. Appl. Phys*. 35, 3194-3202 (1964).

Other Journal Articles

Trade Journals

R.M. Kimmel. "PET Also is a Film Material" *Plastics Design & Processing* **23**, 15-16 (1983).

R. M. Kimmel "The Basics of Polyester Film for Metallising" *Food & Drug Pkg*. 47 21-25 (1983)

B.L. Kindberg and R.M. Kimmel. "Films: Flexibility in Labeling" *Paper, Film & Foil Converter* **55**, 46-48 (1981)

Proceedings, Published with Oral Presentations

R. M. Kimmel, K.D. Cooksey and A. Littman, "Environmental Impact Of Grocery Bags in Common Use in the U.S. Market" 26th IAPRI Symposium on Packaging, Espoo, Finland (2013)

R.A. Hurley, K. Cooksey, D. Darby, R. Kimmel and L. Bix "The Design of a Data Recorder to Test the Effects of Color Contrast on 'This Side Up' Pictorial Markings on Package Orientation within UPS Ground" *Proc. of 25rd IAPRI Symposium on Packaging*, Berlin, Germany. (2011)

D. O. Darby, W. S. Whiteside and R. M. Kimmel "Troubleshooting Case Studies—Centre for Flexible Packaging" *Proc. Int'l Polyolefins Conf*., Houston TX Feb. 22-25 (2010)

R. M. Kimmel and K. D. Cooksey "Challenges in Sustainable Packaging" Functional Packaging Through Chemistry, North Jersey Section American Chemical Society, Newark, NJ (2008) – Keynote Address

H. Bae, H. Park, D. Darby, R. Kimmel and W. Whiteside. "Development and characterization of PET/fish gelatin-nanoclay composite/LDPE laminate" IAPRI World Conference on Packaging, Bangkok, Thailand (2008)

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