

# E. J. (Ted) Lightfoot

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Coating, drying, laminating process development,  
scale up and commercialization

## SUMMARY

Highly regarded and Certified Six Sigma Black Belt with a focus on growth. Experienced in scaling and commercializing a wide array of products through various coating methods such as slide, gravure, slot die, extrusion, and more. Versatile in laboratory techniques, including dip, Mayer rod, and membrane coating, as well as laminating methods like wet bond, dry bond, and extrusion lamination. Skilled in surface modifications like corona, flame treating, and chemical etching, alongside proficiency in web handling, winding, and both melt and solvent extrusion. Adept in film and sheet forming techniques, such as solvent casting, melt casting, biaxial orientation, and calendering. My commercialization expertise includes contract manufacturing, in-house scale-up, and on-site development at customer facilities. Experience spans from R&D to operational support, technical service, product and process development, and working closely with external vendors and clients.

## EDUCATION

Ph.D. University of Illinois at Urbana Champaign, December 1985

Major: Chemical Engineering

Minors: Physical Chemistry, Solid State Physics, Analytical Chemistry

Thesis: *Stochastic Theory of Desorption Reactions*

Advisor: Richard S. Larson

M.S. University of Illinois at Urbana Champaign, May 1981

Thesis: *The Effects of High Pressure on the Manganese Luminescence in Glass*

Advisor: Harry S. Drickamer

B.S.E. Princeton University, June 1978 (High Honors)

Major: Chemical Engineering

Thesis: Tritium Permeation Through Ferruginous Surface Films on Type 304 Stainless Steel.

Advisor: Robert C. Axtmann

## HONORS

John A Tallmadge Award International Society for Coating Science and Technology 2022

“For significant contributions to the improvement of coating technology, and for leadership in establishing and sustaining ISCST”

John Matteucci Award for Technical Excellence in Coating and Laminating

2020 AIMCAL Fall Technical Conference for “Troubleshooting and defect reduction in coated products”. Available on Ted Lightfoot LLC – YouTube

DuPont Engineering Excellence Award (2014) for Scale up of PV2025 at Circleville

West Pharmaceuticals Excellence in Six Sigma Design Award

DuPont Imaging Systems Director of Manufacturing's Award (1988)  
For design of a next generation photographic film manufacturing plant

N.S.F. Graduate Fellowship

University of Illinois Graduate Fellowship

## ACTIVITIES

American Institute of Chemical Engineers – Area 1k Steering Committee

International Society for Coating Science and Technology Founding Director (1998-Present)  
Past president (2008-2010)  
Chair, Scientific Advisory Committee ISCST (2008-Present)  
Co-chair, 11<sup>th</sup> International Coating Science & Technology Symposium  
Chair 12<sup>th</sup> International Coating Science & Technology Symposium  
Vice President - Americas (2022-2024)

Scientific Advisory Committee 2009 European Coating Symposium

Founding member and former guardian of the DuPont Coating Network

Editorial board: Journal of Plastic Film and Sheeting

## WORK EXPERIENCE

10/2019 – Present	Owner, Ted Lightfoot LLC. AIMCAL Technical Consultant	Buffalo, NY
1/2018 – 9/2019	Principal Investigator, DuPont Emerging Technologies Process synthesis and scale-up of proprietary products.	Buffalo, NY
1/2016 – 12/2017	Principal Investigator, DuPont Photovoltaic & Advanced Materials Project lead and technical lead for three new Tedlar® PVF film products.	Buffalo, NY
9/2008 – 12/2015	Principal Investigator, DuPont Photovoltaic FluoroMaterials Technical lead for PV2025 (new oriented Tedlar® PVF film for photovoltaic backsheet). Doubled production of Generation 2 Tedlar® PVF film for photovoltaic backsheet on three separate occasions through combinations of process optimization, ream out, quality and utility improvements. R&D representative for the Basic Data Team and Project team for new \$175M PVF film plant (Circleville, OH)	Buffalo, NY
4/2003 – 9/2008	Six Sigma Black Belt, DuPont Fluoroproducts Scaled up and commercialized first Optilon™ Advanced Composite reflector products, scale up of antireflective coatings (non-commercial), process improvements in extrusion and treating of Teflon® Films	Buffalo, NY

2/2002 – 4/2003      Technical Consultant, DuPont FluoroSurfacing Films      Buffalo, NY  
 Technical service/application development for fluoropolymer films with responsibility for developing coating and laminating process to open new markets. Led team identifying next generation technology for manufacture of PVF film.

5/1999 – 2/2002      Aids to Operations Group Leader, DuPont Fluoroproducts      Buffalo/Circleville  
 Supervised plant support engineers for PVF film in Buffalo, NY and Teflon® Films in Circleville, OH. Member of plant staff (Buffalo). Responsible for process improvements, quality control, process safety management (technology) and capital upgrades.

9/1996 – 5/1999      Technical Consultant, DuPont Fluoroproducts      Buffalo, NY  
 Application development, Process synthesis and improvement for extrusion, coating, and lamination of PVF film (film handling, gauge control, coating, lamination) and coating of Teflon® Finishes.

5/1995 – 9/1996      Principal Engineer, DuPont Fluoroproducts      Buffalo, NY  
 Process research, synthesis and improvement for extrusion, coating, and lamination of PVF film (film handling, gauge control, coating, lamination) and coating. Led Corporate Gauge Control Project. Extensive work with customers and vendors as well as on captive assets.

9/1991 – 5/1995      Senior Engineer DuPont Polymer Product (Fluoropolymers)      Buffalo, NY  
 Process research, gauge control, coating, lamination. Led team that successfully downstream integrated PVF film business (contract manufacturing and business processes to support adhesive coating of PVF film).

7/1988 – 9/1991      Staff Research Engineer, DuPont Imaging Systems Department      Parlin, NJ  
 Research and development of processes for the manufacture of photographic film (mass transfer, coating, modeling, and control). Reduction in starry night defect led to an average of >50% increases in line speed or 9% reduction in silver coating weight. Group Leader Imaging Systems Modeling Team, Member Worldwide scanner Team (improved laser scanner film).

7/1988 – 6/1989      Industrial Fellow, Center for Interfacial Engineering      Minneapolis, MN  
 Visiting Fellow, University of Minnesota Super Computer Institute. First US citizen to become an Industrial fellow at the University of Minnesota Coating Process Fundamentals Program modeling “starry night defect” (drying stress induced particle migration in photographic film)

8/1984 – 8/1988      Research Engineer, DuPont Imaging Systems Department      Parlin, NJ  
 R&D Representative to “Greenfield” team identifying next generation technology for manufacture of photographic film. Process improvement and commercialization of improved processes for crystallization of silver halide grains (crystals) for photographic process produced a 4x reduction in particle size variability / 50% increase in batch yields (selected products) chiefly through improvements in mixing.

8/1978 – 8/1984      Graduate Research & Teaching Assistant, University of Illinois      Urbana, IL

6/1978 – 8/1978      Engineer, Exxon Research & Engineering      Baytown, TX  
 Research in Coal Liquefaction

6/1977-8/1977      Research Assistant, Princeton University      Princeton, NJ

## PATENTS

US Patent 7,660,040 B2 Diffuse reflective Article, A. B. Starry, W. J. Gambogi, R. W. Johnson, E. J. Lightfoot, H. K Shin, R. D. Smith-Gillespie; T. J. Trout  
See also KR20060119784A, EP1724621A1, JP2006323392A,

WO2008042169A1 Diffuse Reflector Comprising Nonwoven Sheet, E. J. Lightfoot, W. G. O'Brien, A. B. Starry, R. W. Johnson, W. J. Gambogi  
See also US2008080055A1, CN101529278A, EP2067062A1, KR20090074777A

US Patent application 20160168410, Films, Fluoropolymer Coated Films and Highly Cleanable Articles , M. J Brown, E. J. Lightfoot, D. D. May, M. Periyasamy , R. E. Uschold

US Patent application NO. 17/967,564 Method and apparatus for the real time quantification of subtle variations in a planar material and identification of a corresponding source of the identified subtle variation, E. J. Lightfoot

## BOOK CHAPTERS

E. N. Lightfoot & E. J. Lightfoot, "Mass Transfer" in Encyclopedia of Separation Technology, D. M. Ruthven, Ed. New York: John Wiley & Sons 1997

E. J. Lightfoot, Chapter "Extrusion Coating and Lamination Defects", in TAPPI Web and Roll Defects Terminology 2<sup>nd</sup> Ed., R. Duane Smith, Ed, Atlanta: TAPPI Press 2007

E. D. Cohen, and E. J. Lightfoot "Coating Processes", Kirk Othmer Encyclopedia of Chemical Technology, 6th Ed., New York: John Wiley & Sons 2011.

E. J. Lightfoot, Chapter "Extrusion Coating and Lamination Defects", in Ultimate Web and Roll Troubleshooting Guide, R. Duane Smith, Ed, Atlanta: TAPPI Press 2013

E. J. Lightfoot and E. D. Cohen "Coating and Solidification", Roll-to-Roll Manufacturing: Process Elements and Recent Advances, Jehuda Greener (Editor), Glen Pearson (Editor), Miko Cakmak (Editor), New York, John Wiley & Sons 2018

E. J. Lightfoot, J. R. Wagner, Jr., P. Schmitz, S. Janocha, "Films" Ullmann's Encyclopedia of Industrial Chemistry, September 21, 2021, [https://doi.org/10.1002/14356007.a11\\_085.pub2](https://doi.org/10.1002/14356007.a11_085.pub2)

## REFEREED PUBLICATIONS

R. S. Larson & E. J. Lightfoot, 'Thermally Activated Escape from a Lennard-Jones Potential Well', Physica **149A** 296-312 (1988)

E. D. Cohen, E. J. Lightfoot, & E. B. Gutoff, "A Primer on Forming Coatings", Chem. Eng. Prog. **86(9)** 30-36 (1990)

E. J. Lightfoot, "Kinetic Diffusion in Polymer Gels", Physica **169A** 191-206 (1990)

E. J. Lightfoot & E. D. Cohen, "Commentary on 'Drying of Coated Film Controlled by Mass Transfer Within the Coating'", Industrial Coating Research V2. (1992) 151-152

E. Cohen, E. J. Lightfoot, & K. N. Christodoulou, "Important Issues in Drying of Thin Films: An Industrial Engineer's Perspective – Part 1" Industrial Coating Research V3. (1995) 45-68

E. Cohen, E. J. Lightfoot, & K. N. Christodoulou, "Important Issues in Drying of Thin Films: An Industrial Engineer's Perspective – Part 2: Models" Industrial Coating Research V4. (1995) 47-72

K. N. Christodoulou, E. J. Lightfoot, R. W. Powell, "Model of stress-induced defect formation in drying polymer films" AIChE Journal **44(7)** 1484-1498 (1998)

E.J. Lightfoot "Simple correlations for thickness profiles in melt casting of polymeric film" J. Plastic Film and Sheeting, In press

E.J. Lightfoot "Process model structures for transverse direction gauge control of tenterd polymeric film" AIChE Journal, <https://doi.org/10.1002/aic.18045>

## TRADE MAGAZINE ARTICLES

E. J. Lightfoot & P. R. Schunk "Applying coating science to industrial practice" Converting Quarterly 1Q, 91-93 (2015)

E. J. Lightfoot "High technology coating: putting coating science into perspective", Converting Quarterly 4Q, 72-75 (2016)

E. J. Lightfoot "Is Gravure Coating Right for You?", Paper, Film & Foil Converter, February 10, 2020

E. J. Lightfoot "Troubleshooting and defect reduction in coated products", Converting Quarterly 1Q, 52-54 (2020)

E. J. Lightfoot "Practical rheology for the web-coating industry", Converting Quarterly 3Q, 53-58 (2020)

E. J. Lightfoot "Troubleshooting defects in extrusion coating", Paper Film & Foil Converter March 8, (2021)

E. J. Lightfoot "Managing the coating window", Converting Quarterly 3Q, 68-74 (2021)

- E. J. Lightfoot "Drying and curing" in press *Converting Quarterly* 1Q, 63-65 (2022)
- E. J. Lightfoot "Product Process Integration" *Converting Quarterly* 1Q, 22 (2022)
- E. J. Lightfoot "Product Process Integration example: starry night and drying", *Converting Quarterly* 2Q, 22-23 (2022)
- E. J. Lightfoot "There is more than one way to treat a film", *Paper Film & Foil Converter* July (2022)
- E. J. Lightfoot "Product process integration: what is the right coating method: part 1", *Converting Quarterly* 3Q 24-25 (2022)
- E. J. Lightfoot "Product process integration: what is the right coating method: part 2", *Converting Quarterly* 4Q, 26-27 (2022)
- E. J. Lightfoot "What basic data do we need for contract coating" *Converting Quarterly* 1Q (2023) 20.

## INVITED TALKS

- "Coating Science and Technology: an Industrial Perspective", Key note address at European Coating Symposium, Mons, Belgium (2013)
- "Drying Periods", A. W. A. Release Liners Conference, Denver, CO (2023)

## PRESENTATIONS AT TECHNICAL CONFERENCES

- E. J. Lightfoot, "Non-Fickian Diffusion in Polymer Gels", Second ASEAN Science & Technology Week, Manila, Philippines, February 1989
- E. J. Lightfoot & K. N Christodoulou "Starry Night & Drying", Paper 81H, AIChE. Spring National Meeting, Symposium on Mechanics of Thin Film Coating, Orlando, FL, March 1990
- E. D. Cohen, E. B. Gutoff, & E. J. Lightfoot, "Liquid Film Drying Technology Review", Paper 67A, AIChE Spring National Meeting, Symposium on Mechanics of Thin Film Coating, Orlando FL, March 1990
- E. J. Lightfoot, "Drying of Gelatin Based Coatings; A Thermodynamic Analysis" Proceedings of the IS&T Symposium on Coating Technologies for Imaging Materials. St Paul, MN 1991
- E. J. Lightfoot "Drying of Hydrogen Bonded Coatings" Paper 40g, AIChE Spring National Meeting, New Orleans 1992
- K. N. Christodoulou & E. J. Lightfoot, "Stress Induced Defect Formation during Drying of Viscoelastic Materials" Paper 46c, AIChE Spring National Meeting, New Orleans, 1992

K. N. Christodoulou, M. A. Hackler, E. J. Lightfoot, and R. I. Hirschburg "Frequency Response of Coating Flows to Small Three-dimensional Disturbances by Supercomputer Aided Analysis" Paper 43d, AIChE Spring National Meeting, New Orleans, 1992

E. J. Lightfoot "Regimes of Gravure Coating" Paper 2d, AIChE Spring National Meeting, Atlanta, 1994

E. J. Lightfoot "Roll and Gravure Coating Overview" AIMCAL Technical Conference, Atlanta 1996

E. J. Lightfoot "Pressurized Gravure Coating" AIMCAL Technical Session, CMM, Chicago 1998

E. J. Lightfoot "Pressurized Gravure Coating" 11<sup>th</sup> International Coating Science and Technology Symposium, Minneapolis 2002

Adam Starry, William Gambogi, Raymond Ng, Steven MacMaster, William O'Brien, E.J. Lightfoot "Novel Reflectors for LCD Backlights", Society for Information Display 2006, San Francisco

Michael DeBergalis, Edwin J. Lightfoot, William J. Gambogi, T. W. Fu, T. John Trout, Alexander Z. Bradley "Adhesion in Photovoltaic Modules", 34<sup>th</sup> Annual Meeting of the Adhesion Society 2011

E. J. Lightfoot "Stochastic Theory of Dynamic Wetting" 17<sup>th</sup> International Coating Science and Technology Symposium, San Diego 2014

E. J. Lightfoot "Comparison of kinetic theories in dynamic wetting" 18<sup>th</sup> International Coating Science and Technology Symposium, Pittsburgh 2016

E. J. Lightfoot "Toward a stochastic theory of slip" 19<sup>th</sup> International Coating Science and Technology Symposium, Long Beach, 2018

E. J. Lightfoot "Generalized Kinetic Theory of Wetting" 20<sup>th</sup> International Virtual Coating Science and Technology Symposium, 2020

E. J. Lightfoot "Troubleshooting and Defect Reduction in Coated products", 2020 AIMCAL R2R Conference

E. J. Lightfoot "Nonplanarity and coating", 2020 AIMCAL R2R Conference

E. J. Lightfoot "Analysis, diagnosis, and optimization inside the coating window", 2020 AIMCAL R2R Conference

E. J. Lightfoot "Regimes of reverse gravure coating", 2021 AIMCAL R2R Conference

E. J. Lightfoot "Taxonomy and effects of variations in fiducial state of a coating substrate" Poster: 21<sup>st</sup> International Coating Science and Technology Symposium Minneapolis, 2022.

## PUBLIC SHORTS COURSES & WEBINARS

E. D. Cohen & E. J. Lightfoot, "Defects in Coated Films, The Three C's: Characterization, Causes and Cures", Course M4 at Converting Machinery/Materials Conference and Show (CMM), Chicago, 2003

E. J. Lightfoot, AIMCAL Summer School, 2007 "Web Drying"

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School, 2008 "Web Coating and Drying"

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School, 2009 "Web Coating and Drying"

E. J. Lightfoot "Is Gravure Coating Right for You?" Webinar co-sponsored by AIMCAL, ISCST and Paper Film and Foil Converting magazine October 13, 2009

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School, 2010 "Web Coating and Drying"

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School, 2011 "Web Coating and Drying"

E. D. Cohen & E. J. Lightfoot, S. Zagar AIMCAL Converting School, 2012 "Coating Process Development Technology"

E. D. Cohen & E. J. Lightfoot, S. Zagar AIMCAL Converting School, 2013 "Coating Process Development Technology"

E. J. Lightfoot, European Coating Symposium Short courses: Industrial drying, Gravure Coating 2013

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School Connect, 2014 "Web Coating and Drying"

E. J. Lightfoot, D. W. Bousfield, T. D. Blake 17<sup>th</sup> International Coating Science and Technology Symposium, San Diego 2014 "Coating Substrates and Substrate Interactions,"

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School Connect, 2015 "Web Coating and Drying"

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School Connect, 2016 "Web Coating and Drying"

E. J. Lightfoot, D. W. Bousfield, T. D. Blake 18<sup>th</sup> International Coating Science and Technology Symposium, San Diego 2016 "Coating Substrates and Substrate Interactions,"

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School, 2017 "Web Coating Process Operation Technology"

E. D. Cohen & E. J. Lightfoot, AIMCAL Converting School, 2018 "Web Coating Process Operation Technology"

Steve Zagar and Ted Lightfoot, ISCST Short Course: Industrial Web Drying – Fundamentals and Practice, September 2020

E. J. Lightfoot and E. D. Cohen AIMCAL Converting School “Troubleshooting and Defect Reduction In Web Coating Process”, November 2020

E. J. Lightfoot “Introduction to drying technology” in Coating Fundamentals course 2021 AIMCAL R2R & SPE Fall Technical conference

E. J. Lightfoot “A user’s guide to coating and drying”, AIMCAL 2021 R2R & SPE Fall Technical conference

E. J. Lightfoot “Introduction to Coating, Drying, & Laminating” Green Bay, WI, April 25, 2022

E. J. Lightfoot “Introduction to Coating” AIMCAL Fall R2R, Orlando , FL, September, 26, 2022

E. J. Lightfoot “Introduction to Drying” AIMCAL Fall R2R, Orlando , FL, September, 26, 2022

E. J. Lightfoot “Introduction to Coating, Drying, & Laminating” Green Bay, WI, April 12, 2022

**Numerous internal short courses for clients (proprietary).**