

Randy D. Weinstein

Professor and Chair, Chemical Engineering
Program Director, Sustainable Engineering
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EDUCATION:

1998 **Massachusetts Institute of Technology**, Ph.D., Chemical Engineering
1993 **University of Virginia**, B.S., Chemical Engineering with High Distinction

PROFESSIONAL EXPERIENCE:

2009-present **Villanova University**, Program Director, Sustainable Engineering
2007-present **Villanova University**, Chair, Chemical Engineering
2007-present **Villanova University**, Professor of Chemical Engineering
2007 **Villanova University**, Interim Director, Center for Innovation in Engineering Education
2004-2007 **Villanova University**, Associate Professor of Chemical Engineering
2005-2007 **Villanova University**, Associate Research Professor of Chemistry
1998-2004 **Villanova University**, Assistant Professor of Chemical Engineering

CONSULTANT EXPERIENCE:

2007 **ECOR Solutions, Inc.**
2006-2008 **Ablaze Development Corporation**
2003 **k Technology Corporation**
1999-2002 **Lucent Technologies**

PROFESSIONAL ACTIVITIES:

Foundation Member, Alpha Chi Sigma Educational Foundation, 2010-2020
Grand Collegiate Alchemist (1st Vice President), Alpha Chi Sigma, 2010-2012
Grand Master of Ceremonies (3rd Vice President), Alpha Chi Sigma, 2008-2010
International Advisory Board, SAMPADA: Specialty Advanced Materials and Polymers for Aerospace and Defense Applications, 2008
Co-Chair, "Thin Films, Coatings, and Interfacial Phenomena Using Compressible or Supercritical Fluids," AIChE Annual Meeting, Philadelphia, PA, 2008.
Chair, High Pressure Group (1f) of AIChE, 2005-2007.
Chair, "Thin Films and Coatings Using near and Supercritical Fluids," AIChE Annual Meeting San Francisco, CA, 2006.
Vice-Chair, High Pressure Group (1f) of AIChE, 2003-2005.
Co-Chair, "Synthesis and Coating via Supercritical Processing," AIChE Annual Meeting, Austin, TX, 2004.
Chair, "Materials Processing in Supercritical Fluids I," AIChE Annual Meeting, San Francisco, CA, 2003
Chair of the District Counselors, Alpha Chi Sigma, 2004-2006
Atlantic Central District Counselor (ACDC), Alpha Chi Sigma, 2002-2008
Professional Representative, Alpha Chi Sigma, 2002

Chair, "Materials Processing in Supercritical Fluids II," AIChE Annual Meeting, Indianapolis, IN, 2002
Advisor Villanova Student Chapter of Tau Beta Pi, 2001-present
Group 1f (High Pressure) session coordinator for AIChE Annual Meeting, Indianapolis, IN, 2002.
Co-Chair, "Materials Processing in Supercritical Fluids II" and "Benign Synthesis in Supercritical Fluids," AIChE Annual Meeting, Reno, NV, 2001
Co-Chair, "Thermodynamics & Processing with Supercritical Fluids," AIChE Annual Meeting, Los Angeles, CA, 2000
Chair, "Chemistry of Supercritical Fluid Extraction," AIChE Annual Meeting, Dallas, TX, 1999
National Effectiveness Teaching Institute, 1999
Advisor Villanova Student Chapter American Institute of Chemical Engineers, 1998-present

HONORS:

Lindback Award for Teaching Excellence at Villanova University, 2010.
Innovative Teaching Award, Villanova University, 2008
Semi finalist for the Lindback Award for Teaching Excellence at Villanova University, 2005, 2007, 2008, and 2009.
Farrell Award to recognize personal concern for students and exceptional dedication to the Villanova University College of Engineering, 2001
Society of Graduate Fellows for Sustainability, 1996-1998
Martin Fellow for Environmental Research, 1997-1998
MIT Department of Chemical Engineering Special Service Award, 1995
Alumni/ae Association Student Recruiter Award, 1995
Alpha Chi Sigma National Leadership Award, 1992 & 1993
UVA Chemical Engineering Faculty Award, 1993
Dow Chemical Outstanding Junior Chemical Engineering Award, 1992

PROFESSIONAL SOCIETIES:

American Society for Engineering Education, 1998
American Chemical Society, 1998
Sigma Xi Scientific Research Society, 1996
Tau Beta Pi Professional Engineering Society, 1992
Golden Key National Honor Society, 1992
American Institute of Chemical Engineers, 1991
Phi Eta Sigma Freshman Honor Society, 1990
Alpha Chi Sigma, 1990

RESEARCH INTERESTS:

Current research is focused on environmentally benign chemical processing, nanomaterials, and thermal management of electronic devices. Supercritical carbon dioxide is being used to create self-assembled monolayers (SAMs) and polymeric films on various metal surfaces for corrosion resistance and electrochemical modifications. This environmentally friendly solvent is also being used to make drug delivery devices by implanting various pharmaceuticals into biocompatible polymeric devices as well as chewing gum. Various reactions and nanomaterial synthesis processes are also being explored in sub- and supercritical carbon dioxide in attempts to better understand these unique fluids. Finally, methods of static and transient thermal

management are being studied in portable electronic devices to improve user comfort as well as the electronic reliability.

TEACHING INTERESTS:

Courses taught include chemical engineering thermodynamics II, modeling and numerical methods I, chemical engineering laboratory II and III, chemical engineering research I and II, engineering interdisciplinary projects II, graduate thermodynamics, introduction to engineering, and nanomaterials and surface science.

SELECTED PUBLICATIONS (Peer Reviewed):

1. "Oxidative Dehydrogenation of Ethanol to Acetaldehyde and Ethyl Acetate by Graphite Nanofibers," R.D. Weinstein, A.J. Ferens, R.J. Orange, P. Lamaire, *Carbon*, **in press**.
2. "Liquid and Supercritical Carbon Dioxide Assisted Implantation of Ketoprofen into Biodegradable Sutures," R.D. Weinstein, K.R. Muske, S.A. Martin, D.D. Schaeber, *Ind. Eng. Chem. Res.*, **2010**, *49*, 7281.
3. "Project-Based Freshman Engineering: The Core Course," R.H. Caverly, H.M. Fulmer, S. Santhanam, P. Singh, J.C. O'Brien, G.F. Jones, E.S. Char, F.J. Mercede, R.D. Weinstein, J.R. Yost, Proceedings of the 2010 ASEE Conference, Louisville, KY, June 20-23, 2010.
4. "An Investigation into the Solidification of Nano-Enhanced Phase Change Material for Transient Thermal Management of Electronics," O. Sanusi, A.S. Fleischer, R.D. Weinstein, 2010 Itherm Conference, Las Vegas, NV, June 2-5, 2010
5. "Introduction to Engineering: A Freshman Year Multidisciplinary Engineering Course and Competition," J.R. Yost, R.D. Weinstein, Proceedings of the *Mid Atlantic Regional Meeting of ASEE*, **2008**.
6. "Transient Thermal Management Using Phase Change Materials with Embedded Graphite Nanofibers for Systems with High Power Requirements," A.S. Fleischer, K. Chintakrinda, R.D. Weinstein, C.A. Bessel, 2008 Itherm Conference, Orlando, FL, May 28-31, 2008.
7. "Transient Thermal Performance of Phase Change Materials with Embedded Graphite Nanofibers," T. Kopec, A.S. Fleischer, R.D. Weinstein, C.A. Bessel, in *Thermes 2007: Thermal Challenges in Next Generation Systems*, Garimella, S.V. and Fleischer, A.S. eds, Millipress, Rotterdam, The Netherlands.
8. "The Removal of Copper with Dialkyldithiocarbamate Ligands in Condensed Carbon Dioxide," R.D. Weinstein, J.G. Richards, C.A. Bessel, W.H. Hanlon, D.W. Skaf, *Chem. Eng. Technol.*, **2008**, *31*, 575.
9. "An Experimental Study of Minimum-time Optimal High Pressure Gas Storage System Recharging," A.E. Witmer, K.R. Muske, R.D. Weinstein, M.A. Simeone, Proceedings of the 2007 American Control Conference, **2007**, 1365.
10. "The Experimental Exploration of Embedding Phase Change Materials with Graphite Nanofibers for the Thermal Management of Electronics," R.D. Weinstein, T.C. Kopec, A.S. Fleischer, E. D'Addio, C.A. Bessel, *J. Heat Transfer*, **2008**, *130*, 042045.
11. "Characterization of Self-Assembled Monolayers from Lithium Dialkyldithiocarbamate Salts," R.D. Weinstein, J. Richards, S.D. Thai, D.M. Omiatsek, C.A. Bessel, C.J. Faulkner, S. Othman, G.K. Jennings, *Langmuir*, **2007**, *23*, 2887.
12. "Solubility of Felodipine and Nitrendipine in Liquid and Supercritical Carbon Dioxide by Cloud Point and UV Spectroscopy," R.D. Weinstein, W.H. Hanlon, J.P. Donohue, M. Simeone, A. Rotzich, K.R. Muske, *J. Chem. Engr. Data*, **2007**, *52*, 256.
13. "Diffusion of Liquid and Supercritical Carbon Dioxide into a Chitosan Sphere," R.D. Weinstein, J. Papatolis, *Ind. Eng. Chem. Res.*, **2006**, *45*, 8651.

14. "Thermal Analysis of Phase Change Materials with Embedded Graphite Nanofibers for Thermal Management of Electronics," T.C. Kopec, R.D. Weinstein, A.S. Fleischer, E. D'Addio, C.A. Bessel, 2006, Proceedings of IMECE2006, **2006**.
15. "PIVOTS: Service Learning at the Science, Theatre & Magic Boundary," M. A. Papalaskari, K. Hess, D. Kossman, S. Metzger, A. Phares, R. Styer, C. Titone, T. Way, R. Weinstein, F. Wunderlich, *36th Annual ASEE/IEEE Frontiers in Education Conference*, **2006**, TH2-18.
16. "The Use of Dialkyldithiocarbamate and Bis(acetylacetone)ethylenediimine Ligands for Copper Chelation in Supercritical Carbon Dioxide," A. Dunbar, D. M. Omiatek, S. D. Thai, C. E. Kendrex, L. L. Grotzinger, W. J. Boyko, R.D. Weinstein, D. W. Skaf, C. A. Bessel, G. M. Denison, J. M. DeSimone, *Ind. Eng. Chem. Res.*, **2006**, *45*, 8779.
17. "The Kinetics of the Oxidation and Chelation of Cu(0) and Cu₂O in Hexanes or Condensed Carbon Dioxide by t-Butylperacetate and 1,1,1-Trifluoro-2,4-pentanedione," D.W. Skaf, S. Kandula, L. Harmonay, P. Shodder, C.A. Bessel, R.D. Weinstein, *Ind. Eng. Chem. Res.*, **2006**, *45*, 8874.
18. "A Lemon Cell Battery for High-Power Applications," K.R. Muske, C.W. Nigh, R.D. Weinstein, *J. Chemical Education*, **2007**, *84*, 637.
19. "Modeling of the Thermal Effects of Heat Generating Devices in Close Proximity on Vertically Oriented Printed Circuit Boards for Thermal Management Applications," J. Harvest, A.S. Fleischer, R.D. Weinstein, *International Journal of Thermal Sciences.*, **2007**, *46*, 253.
20. "Analysis of Transient Thermal Management Characteristics of PCM with an Embedded Carbon Fiber Heat Sink," A.S. Fleischer, R.D. Weinstein, T. Kopec, 2006 Itherm Conference, San Diego, CA, May 30 – June 2, 2006.
21. "A Minimum-time Optimal Recharging Controller for High Pressure Gas Storage Systems," K.R. Muske, A.E. Witmer, R.D. Weinstein, in Assessment and Future Directions of Nonlinear Model Predictive Control, Findeisen, R., F. Allgower, and L. T. Biegler, editors, Lecture Notes in Control and Information Science, Springer-Verlag, **2007**, 443-453.
22. "Solubility of Several Short-Chain Lithium Dialkyldithiocarbamates in Liquid and Supercritical Carbon Dioxide," R.D. Weinstein, L.L. Grotzinger, P. Salemo, D.M. Omiatek, C.A. Bessel, *J. Chem. Eng. Data*, **2005**, *50*, 2088.
23. "A Multidisciplinary, Hands-on Freshman Engineering Team Design Project and Competition," R.D. Weinstein, J. O'Brien, E. Char, J. Yost, K.R. Muske, H. Fulmer, J. Wolf, W. Koffke, *International J. Engineering Education*, **2006**, *22*, 1023.
24. "Thermal Management of Heat Generating Devices in Close Proximity on Printed Circuit Boards," J. Harvest, A.S. Fleischer, R.D. Weinstein, *ASME-HTD Proc. of the 2005 Summer Heat Transfer Conference* (2005).
25. "Liquid and Supercritical Carbon Dioxide Assisted Blending of Poly(vinyl acetate) and Citric Acid," R.D. Weinstein, J.J. Gribbin, D. Najjar, *Ind. Chem. Eng. Res.*, **2005**, *44*, 3480.
26. "The Solubility and Salting Behavior of Several β -Adrenergic Blocking Agents in Liquid and Supercritical Carbon Dioxide," R.D. Weinstein, J.J. Gribbin, K.R. Muske, *J. Chem. Eng. Data*, **2005**, *50*, 226.
27. "Effect of Fractional Fluorination on the Properties of ATRP Surface-Initiated Poly(hydroxethyl methacrylate) Films," M.R. Bantz, E.L. Brantley, R.D. Weinstein, J. Moriarty, G.K. Jennings, *J. Phys. Chem. B.*, **2004**, *108*, 9787.

28. "The Solubility of Benzocaine, Lidocaine, and Procaine in Liquid and Supercritical Carbon Dioxide," R.D. Weinstein, K.R. Muske, J. Moriarty, E. Schmidt, *J. Chem. Eng. Data*, **2004**, 49, 547.
29. "Forced Convective Cooling of Electro-Optical Components Maintained at Different Temperatures on a Printed Circuit Board," A.S. Fleischer, R.D. Weinstein, S.A. Khobragade, *IEEE Transactions on Components and Packaging Technologies*, **2004**, 27, 296.
30. "Liquid and Supercritical Carbon Dioxide Loading into Chewing Gum Base," R.D. Weinstein, E. Cushnie, T. Kopec, *Ind. Chem. Eng. Res.*, **2003**, 42, 5554.
31. "Structure, Wettability, and Electrochemical Barrier Properties of Self-Assembled Monolayers Prepared from Partially Fluorinated Hexadecanethiols," R.D. Weinstein, J. Moriarty, E. Cushnie, R. Colorado, T.R. Lee, M. Patel, W.R. Alesi, G.K. Jennings, *J. Phys. Chem. B.*, **2003**, 107, 11626.
32. "An Experimental Investigation of the Thermal Interaction of Electro-Optical Components on a Printed Circuit Board in Natural and Forced Convection," A.S. Fleischer, R.D. Weinstein, *ASME-HTD Proc. of the 2003 Summer Heat Transfer Conference* (2003).
33. "End Point Prediction Modeling for Semi-Batch Hydroxide Precipitation," R.D. Weinstein; K.R. Muske, J.P. Dawson, *Ind. Chem. Eng. Res.*, **2003**, 42, 5429.
34. "Natural Convection and Passive Heat Rejection from Two Heat Sources Maintained at Different Temperatures on a Printed Circuit Board," R.D. Weinstein, A.S. Fleischer, K.A. Krug, *J. Elect. Packag.*, **2004**, 126, 14.
35. "Controlling the Properties of n-Alkanethiolate Self-Assembled Monolayers on Gold Using Supercritical Carbon Dioxide-Ethanol Mixtures as Solvents," D. Yan, G.K. Jennings, R.D. Weinstein, *Ind. Chem. Eng. Res.*, **2002**, 41, 4528.
36. "Transient Thermal Management of a Handset Using Phase Change Materials (PCM)," M. Hodes, R.D. Weinstein, S.J. Pence, J.M. Piccini, L. Manzione, C. Chen, *J. Elect. Packag.* **2002**, 124, 419.
37. "Improved Static and Transient Thermal Management of Handsets Using Heat Spreaders Coupled with Phase Change Materials (PCMs)," R.D. Weinstein, M. Hodes, J.M. Piccini, *ASME-HTD Proc. of the 35th National Heat Transfer Conference* (2001).
38. "Self-Assembled Monolayer Films from Liquid and Supercritical Carbon Dioxide," R.D. Weinstein, D. Yan, G.K. Jennings, *Ind. Chem. Eng. Res.*, **2001**, 40, 2046.
39. "Transient Thermal Management of Handsets Using Phase Change Materials (PCMs)," M. Hodes, R.D. Weinstein, S.J. Pence, J.A. Talieri, L. Manzione, C. Chen, *ASME-HTD Proc. of the 34th National Heat Transfer Conference* (2000).
40. "Supercritical Fluids as Solvent Replacements in Chemical Synthesis," J.W. Tester, R.L. Danheiser, R.D. Weinstein, A.R. Renslo, J.D. Taylor, and J.I. Steinfeld, *ACS Sym. Ser.*, **2000**, 767, 271.
41. "Silica Promoted Diels-Alder Reactions in Carbon Dioxide from Gaseous to Supercritical Conditions," R.D. Weinstein, A.R. Renslo, R.L. Danheiser, and J.W. Tester, *J. Phys. Chem. B*, **1999**, 103, 2878.
42. "Reassignment of the Vibrational Spectra of CH₃CHF₂ (HFC 152a), CH₃CF₃ (HFC 143a), CHF₂CF₃ (HFC 125), and CHCl₂CF₃ (HCFC 123)," S. Tai, S. Papasavva, K.H. Illinger, J.E. Kenny, B.D. Gilbert, J.A. Janni, J.I. Steinfeld, J.D. Taylor, and R.D. Weinstein, *Spectrochimica Acta A*, **1999**, 55, 9.

43. "Concerning the Regiochemical Course of the Diels-Alder Reaction in Supercritical Carbon Dioxide," A.R. Renslo, R.D. Weinstein, J.W. Tester, and R.L. Danheiser, *J. Org. Chem.* **1997**, 62, 4530.
44. "Kinetic Correlation of the Diels-Alder Reaction in Supercritical Carbon Dioxide," R.D. Weinstein, A.R. Renslo, R.L. Danheiser, J.G. Harris, and J.W. Tester, *J. Phys. Chem.*, **1996**, 100, 12337.

RECENT COLLABORATORS:

Dr. Moeness Amin	Villanova University, Electrical and Computer Engineering
Dr. Carol Bessel	Villanova University, Chemistry
Dr. Steven Beulow	Los Alamos National Laboratory
Dr. Sohail Chaudhry	Villanova University, Decision and Information Technologies
Dr. Calvin Chen	Lucent Technologies
Dr. Joseph DeSimone	University of North Carolina and NC State, Chemistry & Chemical Engineering
Dr. Amy Fleischer	Villanova University, Mechanical Engineering
Dr. Yun Gong	Widener University, Electrical Engineering
Dr. Marc Hodes	Lucent Technologies
Dr. Amhad Hoorfar	Villanova University, Electrical and Computer Engineering
Dr. G. Kane Jennings	Vanderbilt University, Chemical Engineering
Dr. Barry Johnson	Villanova University, College of Engineering
Dr. Michael Kuszewski	Naval Surface Warfare
Dr. T. Randall Lee	University of Houston, Chemistry
Dr. Louis Manzione	Lucent Technologies
Dr. Kenneth Muske	Villanova University, Chemical Engineering
Dr. Dorothy Skaf	Villanova University, Chemical Engineering
Dr. Darlene K. Taylor	University of North Carolina at Chapel Hill, Chemistry
Richard Thompson	Ben Franklin Partnership
Dr. James Woods	Ben Franklin Partnership
Dr. Mark Zerby	Naval Surface Warfare

RECENT GRADUATE STUDENTS:

D. Sokolik (2003), S. Khobragade (2004), J. Moriarty (2004), T. Kopec (2005), S. Kandula (2005), J. Richards (2007)

Ph.D. ADVISOR:

Jefferson W. Tester, Professor of Chemical Engineering, Massachusetts Institute of Technology

COMMUNITY INVOLVEMENT:

Reader of names, Names Project, AIDS Memorial Quilt, 2005

Board of Directors, King of Prussia Players, Community Theater Group, 2002-2003 season

Advisor, Habitat for Humanity Trip to Danville, VA in Fall of 2001

Actor in community theaters, Celebration Theater (2005-2007: 4 shows), Footlighters (2002-2010: 15 shows), North Light Players (2001: 1 show), King of Prussia Players (2002: 1 show), Hatboro Village Players (2001-2003: 3 shows), Playcrafters of Skippack (2003: 1 show), Colonial Theater (2007: 1 show).