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Curriculum Vitae

David Barry Graves

Department of Chemical Engineering
Princeton University
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Born: August 2, 1955, Daytona Beach, Florida

Education: B.S., University of Arizona, 1978 (Chemical Engineering)
M.S., University of Arizona, 1981 (Chemical Engineering)
Ph.D., University of Minnesota, 1986 (Chemical Engineering)

Employment: Computer process control engineer, Standard Oil of California, 1978 - 81.
Assistant Professor of Chemical Engineering, University of California, Berkeley, 1986 - 91
Associate Professor of Chemical Engineering, University of California, Berkeley, 1991 - 1997
Professor of Chemical Engineering, University of California, Berkeley, 1997 - 2020
Emeritus Professor of Chemical and Biomolecular Engineering, University of California, Berkeley, 2020-present
Professor of Chemical and Biological Engineering, Princeton University, 2020-present
Associate Lab Director for Low Temperature Plasma-Surface Interactions, Princeton Plasma Physics Lab, 2020-present

Awards and Honors:
1983 Electrochemical Society Summer Research Fellowship.
1983 Electrochemical Society Young Author Award.
1989 NSF Presidential Young Investigator Award.
1998 Tegal Thinker Award
2001 Fellow of the American Vacuum Society (AVS)
2001 Plasma Prize, Plasma Science and Technology Division of the AVS
2004 Fellow Institute of Physics
2011-14 Chaire d'excellence, Nanoscience Foundation, Grenoble, France
2011-16 Lam Research Corporation Distinguished Chair, UC Berkeley
2014 Allis Prize for the Study of Ionized Gases, American Physical Society
2017 Nishizawa Award (Dry Process Symposium, Japan)
2019 Huazhong University of Science and Technology,
Foreign Expert appointment, Wuhan China

Professional Societies: American Institute of Chemical Engineers, American Physical Society, American Vacuum Society, Society for Plasma Medicine.

Professional and University Activities:

Chairman, Department of Chemical Engineering Faculty Search Committee (1991-92; member, 1994-95; 2014-15)
Instructor, University of California Extension Course on Reactive Plasmas, 1992-93.
Guest Editor, IEEE Trans. Plasma Sci., Special Issue on Modeling of Low Pressure Plasmas, 1991.
Organizer and Chair, National AIChE meeting sessions on plasma processing, 1989, 1990, 1992.
Organizing Committee, NATO ARW, Particles in Plasmas, 1993.
Executive Committee, Gaseous Electronics Conference (fall 1991-96)
Organizing Committee, Plasma Sources and Surface Interactions in Materials Processing Workshop, Fuji-Yoshida, Japan, (1995).
Organizer, (Secretary) Gaseous Electronics Conference, 1995.
Co-Chairman, National Research Council Panel on Database Needs in Plasma Processing, 1995-96.
Chairman, Plasma Science and Technology Division of the American Vacuum Society (1994-95).
Co-Editor, Report on Data Needs for Plasma Processing, National Research
Council, (1995-96)
Vice-Chair, Gordon Conference on Plasma Processing
Science, (1996-1998)
Chair Gordon Conference on Plasma Processing Science, (2000)
Vice-Chair, Department of Chemical Engineering, UC Berkeley, 2002-06
Associate Editor, Journal of Physics D, Institute of Physics, 2004-07
Associate Editor, Journal of Vacuum Science and Technology, 2007-
Maitre de Researche, Ecole Polytechnique, Paliseau, France, June 2006
International Scientific Chair, CIP, Toulouse, France, June, 2007
Co-Chair, "Plasma 2010-Low Temperature Plasma Science Workshop" (2008)
Co-Editor, "Low Temperature Plasma Science Challenges for the Next Decade." (2008)
Founding Member, Plasma Medicine Society, (2009)
Acting Department Chair, CBE UC Berkeley, Aug. 1 2015-Aug. 1 2016
Senior Editor, IEEE Trans. on Rad. Plasma Med. Sci., 2018-2020
Committee Member, NRC *Decadal Assessment of Plasma Science,* 2019-2020

RESEARCH INTERESTS:

Plasma medicine and biology

Low temperature plasma applications in semiconductor and quantum materials manufacturing

Modeling and simulation of low temperature nonequilibrium plasmas

Plasma-surface interactions and plasma-surface chemistry

Nanofeature profile evolution simulation

Molecular dynamics of plasma-surface interactions

Particles and photons in plasmas

Optical and mass spectroscopy in low temperature plasmas

Environmental, health and safety issues in plasma processing

Microplasmas

PAST RESEARCH SUPPORT:

Intel Corporation, 1986-88, 90-92, 1996, 2000
California State MICRO, 1989 – 98
California State UC SMART, 1998-2001
IBM T.J. Watson Research Center, 1988-90
SEMATECH, 1990-92; 1997-2001
Sandia National Laboratory, 1993-96
Lawrence Livermore National Laboratory, 1994-96
Toshiba Corporation, 1997-98
Hitachi, Ltd., 1997-98
Mitsubishi Ltd., 1999-00
ERC on Environmentally Benign Manufacturing for Semiconductors, 1996-2007
Applied Materials Corporation, 1996-98
Kodak Corporation, 1996-2002
VAT Corporation, 2001
Department of Energy, 2000-03, 2009-present
Lam Research Corporation, 1995-99; 2002-3, 2004-present
National Science Foundation, 1988-91; 1989-94; 1996-present
Semiconductor Research Corporation, 1995-96; 1996-present
Tokyo Electron Ltd., 2007-2009
OnWafer Technologies 2005-2008
UC Discovery
Max Planck Institute for Extraterrestrial Physics
Blum Center Developing Economies (UC Berkeley)
Sustainable Products and Solutions Program (UC Berkeley)
DOE/NSF Basic Plasma Science
DOE Plasma Science Center
Hitachi Corporation
Lam Research Corporation
Samsung Corporation
National Science Foundation

Brief Biography

David B. Graves joined the University of California at Berkeley in 1986 after receiving his PhD in Chemical Engineering from the University of Minnesota. David Graves served as vice-chair of the UC Berkeley Department of Chemical Engineering from 2002-06 and again from 2008-2011. In July, 2020, he retired from UC Berkeley and accepted a position as Professor of Chemical and Biological Engineering at Princeton University. He also accepted the position of Associate Lab Director for Low Temperature Plasma-Surface Interactions at the Princeton Plasma Physics Lab.

His research interests are in the general areas of low temperature plasma science and gas discharge phenomena. His group studies the physics and chemistry of chemically active low temperature plasmas, including modeling and simulation, experimental studies of plasma using various gas phase and surface spectroscopies, dusty plasmas, plasma stability, plasma-electromagnetic interactions, plasma-organic materials interactions, and studies of radical-, ion-, electron- and photon-surface interactions in high vacuum beam systems. New topics include plasmas used for biomedical applications, food disinfection and agricultural applications. David Graves has graduated 30 PhD students, and has supervised over 25 postdoctoral scholars. Many of these former students and postdoctoral scholars are now in positions of leadership in industry and academe. He has over 130 invited conference presentations and numerous invited seminars. He is author or co-author of over 280 peer-reviewed publications, 33 of which have at least 100 citations. His web of science h-index is currently 62.

David Graves co-chaired the 1996 National Research Council (NRC) workshop and co-edited the "Report on Data Needs for Plasma Processing," published by the NRC. He fulfilled a similar role in 2008 for the Department of Energy "Plasma 2010-Low Temperature Plasma Science Workshop" and report on "Low Temperature Plasma Science Challenges for the Next Decade." He chaired the 2000 Gordon Research Conference on Plasma Processing Science and the American Vacuum Society Plasma Science and Technology Division. He was Associate Editor for the Journal of Physics D, Institute of Physics from 2004-07. David Graves has served on the executive and organizing committees of many international plasma science conferences. He was named Maitre de Researche at the Ecole Polytechnique, Paliseau, France, in June 2006. During the year 2007-08, he was an invited researcher at the Groupe des Recherches Energetique des Milieux Ionisee (GREMI) at the Universite d'Orleans in Orleans, France, supported through the foundation *le STUDIUM*. He was an invited researcher at the University of Perpignan (France) in 2010. He is a founding member of the Society for Plasma Medicine. He received a *chaire d'excellence* from the Nanoscience Foundation, in Grenoble France for 2011-2014 to study plasma-graphene interactions. He was appointed the first Lam Research Distinguished Chair in Semiconductor Processing for 2011-2016. He served as senior editor of IEEE Transactions on Radiation and Plasma Medical Science from 2018-2020. He received the Will Allis Prize in Ionized Gases from the American Physical

Society in 2014. He received the 2017 Nishizawa Award, associated with the Dry Process Symposium in Japan. He was appointed 'foreign expert' at Huazhong University of Science and Technology in Wuhan China in 2019. David Graves has been a consultant for numerous corporations and law firms for both scientific consulting as well as for intellectual property lawsuits. He has given numerous workshops and short courses on plasma science and technology.

PUBLICATIONS:

1. "Flammability Characteristics and Structure of Pulverized Coal, Laminar Opposed Jet Diffusion Flame (with J.O.L. Wendt), 19th Symposium (international) on Combustion, The Combustion Institute, 1189-1196, 1982.
2. "Modeling and Analysis of Low Pressure CVD Reactors," D.B. Graves, K.F. Jensen, J. Electrochem. Soc. 130(9), 1950-1957, 1983.
3. "CVD in Stagnation Point Flow," D.B. Graves, C. Houtman and K.F. Jensen, J. Electrochem Soc. 133(5), 1986, 961-970.
4. "Modeling of Reactors for Plasma Processing I. Silicon Etching by CF_4 in a Radial Flow Reactor," D.B. Graves, M. Dalvie and K.F. Jensen, Chem. Eng. Sci., 41(4), 653-660.
5. "A Continuum Model of DC and RF Discharges," D.B. Graves, K.F. Jensen, IEEE Trans. Plasma. Sci., PS-14 (2), 78-91, 1986.
6. "Theoretical and Computational Problems in Modeling glow Discharges," D.B. Graves and K.F. Jensen, Materials Research Soc. Symposia Proc., vol. 68, J.W. Coburn, R.A. Gottscho and D.W. Hess, Eds., 29-230, 1986.
7. "Modeling of Plasma Processing," D.B. Graves, Proc. 6th Symposium on Plasma Processing, vol. 87-6, Electrochem. Soc., G.S. Mathad, G.C. Schwartz and R.A. Gottscho, Eds., 267-288, 1987.
8. "Fluid Model Simulations of a 13.56 MHz RF Discharge: Time and Space Dependence of Rates of Electron Impact Excitation," D.B. Graves, J. Appl. Phys., 62(1), 88-94, 1987.
9. "Space-time Resolved Kinetics of Mixed Rare-gas-attaching Gas Plasmas," D. B. Graves, R.A. Gottscho, G.R. Scheller and T. Intrator, J. Vac. Sci. Tech. A, 6(3), 1393-1396, 1988.
10. "Quenching Rates of Ar Metastables in Radio-frequency Glow Discharges," D.B. Graves, G.R. Scheller, R.A. Gottscho and T. Intrator, J. Appl. Phys., 64(2), 598-606, 1988.
11. "Nonlinear Excitation and Dissociation Kinetics in Discharges through Mixtures of Rare and Attaching Gases," D.B. Graves, R.A. Gottscho, G.R. Scheller and T. Intrator), J. Appl. Phys., 64(9) 4384-4397, 1988.
12. "Local Field and Ballistic Electron Models for Low Pressure RF and DC Glow Discharges," D.B. Graves, R.A. Gottscho, A. Mitchell, G.R. Scheller, N.L. Schryer and J.-P Boeuf, Proc. Seventh Symposium on Plasma Processing, 88-22), 1, Eds. G.S. Mathad, G.C. Schwartz and D.W. Hess, Electrochemical Society, Pennington, NJ, 1988.
13. "Plasma Processing in Electronic Materials Processing," D.B. Graves, AIChE J. (Journal Review), 35, 1-29, 1989.
14. "Plasma-enhanced Etching and Deposition," D.B. Graves and D.W. Hess, Chapter 8 in *Microelectronics Processing*, Advances in Chemistry 221, American Chemical Society, Washington, DC, 1989.

15. "Photoelectron-initiated Avalanches in Low Pressure Glow Discharges," D.B. Graves, A. Mitchell, G.R. Scheller and R.A. Gottscho, *Phys. Rev. A.*, 40, 5199, 1989.

16. "Self-consistent model of a Direct-current Glow Discharge: Treatment of Fast Electrons," D.B. Graves, M. Surendra and G.M. Jellum, *Phys. Rev. A.*, 41, 1112, 1990.

17. "Non-equilibrium Effects in DC and RF Glow Discharges," D.B. Graves, M. Surendra, Chapter in *Non-Equilibrium Effects in Ion and Electron Transport*, edited by E.E. Kunhardt, R. Van Brunt, J. Gallagher and D. Hudson, 157, Plenum, New York, 1990.

18. "Electron Heating in Low Pressure glow Discharges," D.B. Graves, M. Surendra and I.J. Morey, *Applied Physics Letters*, 56, 1022, 1990.

19. "Particulates in Aluminum Sputtering Discharges," D.B. Graves and G.M. Jellum, J. *Appl. Phys.*, 67, 6490, 1990.

20. "Dynamic Measurements of Film Thickness over Local Topography in Spin Coating," D.B. Graves, L.M. Manske and W.B. Oldham, *Applied Physics Letters*, 56, 2348, 1990.

21. "Computer Applications in Plasma materials Processing," D.B. Graves, and R.A. Gottscho, *Computers in Physics*, 584, November/December, 1990.

22. "Particle-plasma Interactions in Low Pressure Discharges," D.B. Graves and G.M. Jellum, *Applied Physics Letters*, 57, 2077, 1990.

23. "Electron Acoustic Waves in Capacitatively Coupled, Low-pressure RF Glow Discharges," D.B. Graves and M. Surendra, *Phys. Rev. Lett.*, 66, 1469, 1991.

24. "Particle Simulations of Radiofrequency Glow Discharges," D.B. Graves and M. Surendra, *IEEE Trans. Plasma Sci.*, 19, 144, 1991.

25. "Modeling and Simulation of Magnetically Confined, Low Pressure Plasmas in Two Dimensions," D.B. Graves and R.K. Porteous, *IEEE Trans. Plasma Sci.*, 19, 204, 1991).

26. "Particle Thermophoresis in Low Pressure Glow Discharges," D.B. Graves, G.M. Jellum and J.E. Daugherty, *J. Appl. Phys.*, 69, 6923, 1991.

27. "Film Thickness Profiles over Topography in Spin Coating," D.B. Graves, L.M. Manske), *J. Electrochem Soc.*, 138, 2115, 1991.

28. "Capacitively Coupled Glow Discharges at Frequencies above 13.56 MHz," D.B. Graves, M. Surendra, *Applied Physics Letters*, 59, 2091, 1991.

29. "Self-Consistent DC Glow Discharge Simulations Applied to Diamond Film Deposition Reactors," D.B. Graves, M. Surendra and L.S. Plano, *J. Appl. Phys.*, 71, 5189, 1992.

30. "Sheath Structure Around Particles in Low Pressure Discharges," D.B. Graves, J.E. Daugherty, M.D. Kilgore, and R.K. Porteous, *J. Appl. Phys.*, 72, 3934, 1992.

31. "Spin Coating over Topography," D.B. Graves, L.M. Peurrung, *IEEE Trans. Semicond. Manufac.*, 6, 72, 1993.

32. "A Model of Particulates in Glow Discharge Plasmas," D.B. Graves, M.D. Kilgore, J.E. Daugherty and R.K. Porteous, *Proc. Electrochemical Society*, 92-18, 221, 1992.

33. "Electrostatic Forces on Small Particles in Low Pressure Discharges, " D.B. Graves, J.E. Daugherty and R.K. Porteous, *J. Appl. Phys.*, 73. 1617, 1993.

34. "Ion Drag on an Isolated Particulate in a Low Pressure Discharge," D.B.Graves, M.D. Kilgore, J.E. Daugherty and R.K. Porteous, *J. Appl. Phys.*, 73, 7195, 1993.

35. "Modeling and Simulation of High Density Plasmas, D.B. Graves, H.-M. Wu and R.K. Porteous, *Japanese Journal of Applied Physics*, 32, 2999, 1993.

36. "Particulate Temperature in rf Glow Discharges," D.B. Graves, J.E. Daugherty, *J. Vac. Sci. Tech. A*, 11. 1126, 1993.

37. "A Two-Dimensional Axisymmetric Model of a Magnetized Glow Discharge Plasma," D.B. Graves, R.K. Porteous and H.-M. Wu, *Plasma Sources Science and Technology*, 3, 25, 1994.

38. "Transport and Heating of Small Particles in High Density Plasma Sources," D.B. Graves, M.D. Kilgore, J.E. Daugherty, and R.K. Porteous, *J. Vac. Sci. and Tech. B*, 12, 486, 1994.

39. "Neutral Transport in High Plasma-Density Reactors," D.B. Graves, M.D. Kilgore, and H.M. Wu, *J. Vac. Sci. and Tech. B*, 12, 494, 1994.

40. "A Two-Dimensional Fluid Model of High Density Inductively Coupled Plasma Sources," D.B. Graves, R.A. Stewart and P. Vitello, *J. Vac. Sci. and Tech. B*, 12, 478, 1994.

41. "The Gaseous Electronics Conference Radio-Frequency Reference Cell: A defined parallel plate radio-frequency system for experimental and theoretical studies of plasma-processing discharges," (with 32 others), *Rev. Sci. Instrum.*, 65, 140, 1994.

42. "Plasma Processing," (Invited Review), *IEEE Trans. Plasma Sci.*, 22, 31, 1994.

43. "Charging, Transport and Heating of Particles in Radiofrequency and Electron Cyclotron Resonance Plasmas," D.B. Graves, J.E. Daugherty, M.D. Kilgore, and R.K. Porteous, *Plasma Sources Sci. Technol.*, 3, 433, Jan, 1994.

44. "Comparison Between a Two-Dimensional Simulation and a Global Conservation Model for a Compact ECR Plasma Source," D.B. Graves, H-M. Wu, and R.K. Porteous, *Plasma Sources Sci. Technol.*, 4, 22, Oct, 1994.

45. "Plasma Uniformity in High-density Inductively Coupled Plasma Tools," R.A. Stewart, P. Vitello, D.B. Graves, E.F. Jaeger, and L.A. Berry, *Plasma Sources Sci. Technol.*, 4, 36, Aug, 1994.

46. "A Comparison of Particle in Cell and Fluid Model Simulations of Low-Pressure Radio Frequency Discharges," T.E. Nitschke and D.B. Graves, *J. Appl. Phys.*, 76, (10), 5646, Nov, 1994.

47. "Global Model of Plasma Chemistry in a High Density Oxygen Discharge," C. Lee, D.B. Graves, D.W. Hess, and M.A. Lieberman, J. Electrochemical Society, 141, 1546, 1994.

48. "Chemical and Physical Sputtering of Fluorinated Silicon," M.E. Barone and D.B. Graves, J. Appl. Phys., 77, (3), 1263, Feb, 1995.

49. "Role of Etch Products in Polysilicon Etching in a High Density Chlorine Discharge," C. Lee, D.B. Graves, and M.A. Lieberman, *Plasma Chemistry Plasma Processing*, 16, 99, 1996.

50. "Derivation and experimental verification of a particulate transport model for a glow discharge," J.E. Daugherty and D.B. Graves, *J. Appl. Physics*, 78, 2279, 1995.

51. "Matching an RF Sheath Model to a Bulk Plasma Model," T.E. Nitschke and D.B. Graves, *IEEE Trans. Plasma Sci.*, 23, 717, 1995.

52. "Molecular Dynamics Simulations of Direct Reactive Ion Etching of Silicon by Fluorine and Chlorine," M.E. Barone and D.B. Graves, *J. Appl. Phys.*, 78, 6604, 1995.

53. "Molecular Dynamics Simulations of Plasma-Surface Chemistry," M.E. Barone and D.B. Graves, *Plasma Sources Science and Technology*, 5, 1, 1996.

54. "Molecular Dynamics Simulations of Direct Reactive Ion Etching: Surface Roughening of Silicon by Chlorine," M.E. Barone, T.O. Robinson and D.B. Graves, *IEEE Transactions on Plasma Science*, 24, 77, 1996.

55. "In Situ Characterization of the Transient Behavior of Particles in Low Pressure Plasmas," U.I. Schmidt and D.B. Graves, *J. Vac. Sci. Tech. A*, 14, 595, 1996.

56. "Two-dimensional fluid model of an inductively coupled plasma with comparison to experimental spatial profiles," J.D. Bukowsk, D.B. Graves and P. Vitello), *J. Applied Phys.*, 80, 2614, 1996.

57. "Molecular dynamics simulations of fluorosilyl species impacting fluorinated silicon surfaces with energies from 0.1 eV to 100 eV," B.A. Helmer and D.B. Graves, *J. Vac. Sci. Tech. A*, 15(4), 2252, 1997.

58. "The recombination of chlorine atoms at surfaces," G.P. Kota, J.W. Coburn and D.B. Graves, *J. Vac. Sci. Tech. A*, 16(1), 270, 1998.

59. "Role of Oxygen in Ion-Enhanced Etching of Poly-Si and WSix with Chlorine," G.P. Kota, J.W. Coburn and D.B. Graves, *J. Vac. Sci. Tech. A*, 16(4), 2215 1998.

60. "Fluid, Kinetic and Hybrid Simulation Strategies for Modeling Chemically Complex Inductively Coupled Plasmas," M. Li, H. Date and D.B. Graves, *Electron Kinetics and Applications of Glow Discharges*, Ed. U. Kortshagen and L. Tsendin, Plenum Press, New York, p. 349-366, 1998.

61. "Molecular dynamics simulations of Ar+ and Cl+ impacts onto silicon surfaces: distributions of reflected energies and angles," D.B. Graves and B.A. Helmer, *J. Vac. Sci. Tech. A*, 16(6), 3502, 1998.

62. "Energetic ion bombardment of SiO_2 surfaces: Molecular dynamics simulations," C.F. Abrams and D.B. Graves, *J. Vac. Sci. Tech. A*, 16(5), 3006, 1998.

63. "Heterogeneous recombination of atomic bromine and fluorine," G.P. Kota, J.W. Coburn and D.B. Graves, *J. Vac. Sci. Tech. A*, 17(1), 282-290, 1999.

64. "Heteronuclear and homonuclear surface abstraction reactions of Cl, Br and F, with G.P. Kota, J.W. Coburn and D.B. Graves," *J. Appl. Phys.*, 85(1), 74, 1999.

65. "Molecular dynamics simulations of Cl_2+ impacts onto a chlorinated silicon surface: energies and angles of the reflected Cl_2 and Cl fragments," B.A. Helmer and D.B. Graves, *J. Vac. Sci. Tech. A*, 17(5), 2759-2770, 1999.

66. "A Model of Point-of-Use Plasma Abatement of Perfluroinated Compounds with An Inductively Coupled Plasma," D.B. Graves, A. Fiala, M. Kiehlbauch, and S, Mahnovski, *J. Appl. Phys.*, 86(1), 152-162, 1999.

67. "Effects of plasma conditions on the shapes of features etched in Cl2 and HBr Plasmas. I. Bulk crystalline silicon etching," M.A. Vyvoda, H. Lee, M. Malyshev, F.P. Klemens, M. Cerullo, V.M. Donnelly, D.B. Graves, A. Kornblit, and J. Lee, *J. Vac. Sci. Tech. A*, **16**(6), 3247, 1998.

68. "Numerical Modeling," D.B. Graves, M. Li and M. Vyvoda, Chapter 8 in *Ionized Physical Vapor Deposition,* Ed. J. Hopwood, Academic Press, NY, 1999.

69. "Feature Evolution Simulations of Copper Seed Layer Deposition Using Atomic-level Particle Scattering Information," M.A. Vyvoda, C.F. Abrams and D.B. Graves, *IEEE Trans. Plasma Sci.*, **27**(5), 1433, 1999.

70. "3D Spatiokinetic Distributions of Sputtered and Scattered Products of Ar+, and Cu+ Impacts onto the Cu Surface: Molecular Dynamics Simulations," C.F. Abrams and D.B. Graves, *IEEE Trans. Plasma Sci.*, **27**(5), 1426, 1999.

71. "Sputtering and deposition of off-normal, near-threshold Cu+ bombardment: Molecular dynamics simulations," C.F. Abrams and D.B. Graves, *J. Appl. Phys.*, **86**(4), 2263, 1999.

72. "Mass Spectrometric Detection of Reactive Neutral Species: Beam to Background Ratio," H. Singh, J.W. Coburn and D.B. Graves, *JVST A*, **17**(5), 2447-2455, 1999.

73. "Trapping dynamics of ethane on Si(100)-(2x1): molecular beam experiments and molecular dynamics simulations," C.T. Reeves, B.A. Ferguson, C.B. Mullins, G.O. Sitz, B.A. Helmer and D.B. Graves, *J. Chem. Phys.*, 111, 7567-7575, 1999.

74. "The Role of Sidewall Scattering in Feature Profile Evolution During Cl2 and HBr Plasma Etching of Silicon," M.A. Vyvoda and D.B. Graves, *JVST B*, 18, 820, 1999.

75. "Inductively-coupled, point-of-use plasma abatement of PFCs and HFCs from etch processes utilizing O2 and H2O as additive gases," E.J. Tonnis, V.H. Vartanian, L. Beu, T. Lii, R. Jewett and D.B. Graves, *JVST A*, 18, 393, 2000.

76. "Hardmask Charging during Cl2 Plasma Etching of Silicon," M.A. Vyvoda M. Li and D.B. Graves, *J. Vac. Sci. Tech. A*, **17**(6), 3293, 1999.

77. "Molecular dynamics simulations of Si etching by energetic CF_3^+," C.F. Abrams and D.B. Graves, *J. Appl. Phys.*, 86, 5938, 1999.

78. "Measurements of the electron energy distribution function in molecular gases in an inductively coupled plasma," H. Singh and D.B. Graves, *J. Appl. Phys.*, **87**(9), 4098, 2000.

79. "Appearance potential mass spectrometry: Discrimination of dissociative ionization products," H. Singh, J.W. Coburn and D.B. Graves, *JVST A*, **18**(2), 299, 2000.

80. "New C-F interatomic potential for molecular dynamics simulation of fluorocarbon film formation," J. Tanaka, C.F. Abrams and D.B. Graves, *JVST A*, **18**(3), 938, 2000.

81. "On the active surface layer in CF_3^+ etching of Si: Atomistic simulation and a simple mass balance model," C.F. Abrams and D.B. Graves, *JVST A*, **18**(2), 411, 2000.

82. "Molecular dynamics simulations of Si etching with energetic F^+: Sensitivity of the results to the interatomic potential," C.F. Abrams and D.B. Graves, *J. Appl. Phys.*, 88, 3734, 2000.

83. "Measurements of the electron energy distribution function in molecular gases in a shielded inductively coupled plasma," H. Singh and D.B. Graves, *J. Appl. Phys.*, **88**(7), 3889, 2000.

84. "Atomistic simulation of silicon bombardment by energetic CF_3^+: Product distributions and energies," C.F. Abrams and D.B. Graves, *Thin Solid Films*, 374, 150, 2000.

85. "Surface Loss Coefficients of CFx and F Radicals on Stainless Steel," H. Singh, J.W. Coburn and D.B. Graves, *JVST A*, 18, 2680, 2000.

86. "Vacuum beam studies of photoresist etching kinetics," F. Greer, J.W. Coburn, and D.B. Graves, *JVST A*, 18, 2288, 2000.

87. "Recombination coefficients of O and N radicals on stainless steel," H. Singh, J.W. Coburn and D.B. Graves, *J. Appl. Phys.*, 88, 3748, 2000.

88. "Measurements of Neutral and Ion Composition, Neutral Temperature, and EEDF in a CF4 Inductively Coupled Plasma," H. Singh, J.W. Coburn and D.B. Graves, *JVST A*, **19**(3), 719-729, 2001.

89. "Atomistic Simulation of Fluorocarbon Deposition on Si by Continuous Bombardment with Energetic CF^+ and CF_2^+," C.F. Abrams and D.B. Graves, *JVST A*, **19**(1), 175-181, 2001.

90. "Temperature Resolved Modeling of Plasma Abatement of Perfluorinated Compounds," M.W. Kiehlbaugh and D.B. Graves, *J. Appl. Phys.*, **89**(4), 2047-2057, 2001.

91. "D and F radical reaction kinetics on photoresist," F. Greer, J.W. Coburn and D.B. Graves, *JVST B*, **20**(1), 145-153, 2002.

92. "Molecular Dynamics Simulations of Ion-Surface Interactions with Applications to Plasma Processing," C.F. Abrams and D.B. Graves, *Advances in Chemical Engineering*, Vol. 28, 149-202, 2001.

93. "Modeling argon inductively coupled plasmas: The electron energy distribution function and metastable kinetics," M.W. Kiehlbaugh and D.B. Graves, *J. Appl. Phys.*, **91**(6), 3539-3546, 2002.

94. "Ion-induced damage and annealing of silicon. Molecular dynamics simulations," D. Humbird and D.B. Graves, *Pure and Applied Chemistry*, **74**(3), 419-422, 2002.

95. "Surface chemistry associated with plasma etching processes," D. Humbird and D.B. Graves, *Applied Surface Science*, **192**(1-4), 72-87, 2002.

96. "Controlling Surfaces in Plasma Processing: Role of Ions via Molecular Dynamics Simulations of Surface Chemistry," D. Humbird and D.B. Graves, *Plasma Sources Science and Technology*, **11**(3A Special Issue SI):A191-A195, 2002.

97. "The Effect of Neutral Transport on the Etch Product Lifecycle during Plasma Etching of Silicon in Chlorine Gas," M.W. Kiehlbaugh and D.B. Graves, *JVST A*, **21**(1):116-126, 2003.

98. "Fundamental Beam Studies of Deuterium and Fluorine Radical Reaction Kinetics on Surfaces," F. Greer and D.B. Graves, *JVST*, **21**(4):1391-1402, 2003.

99. "Argon and Oxygen Ion Chemistry Effects in Photoresist Etching," F. Greer, L. Van, D. Fraser, J.W. Coburn and D.B. Graves, *JVST B*, **20**(5): 1901-1906, 2002.

100. "C_4F_8 Dissociation in an Inductively Coupled Plasma," M. T. Radtke, J. W. Coburn and D.B. Graves, *JVST A*, **21**(4):1038-1047, 2003.

101. "Neutral gas temperatures measured within a high-density, inductively coupled plasma abatement device," E. Tonnis and D.B. Graves, *J. Vac. Sci. Tech A*, **20**(5):1787-1795, 2002.

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219. "Effective dose delivery in atmospheric pressure plasma jets for plasma medicine: a model predictive control approach," D. Gidon, D.B. Graves and A. Mesbah, Plasma Sources Science and Technology, 26(8), 085005, 2017.

220. "Production of TEMPO by O atoms in atmospheric pressure non-thermal plasma–liquid interactions," Daniel T Elg, I-Wei Yang1 and David B Graves, J. Phys. D: Appl. Phys. 50(47), 475201, 2017. doi: 10.1088/1361-6463/aa8f8c.

221. "Mechanisms of plasma medicine: Coupling plasma physics, biochemistry, and biology," D. B. Graves, IEEE Trans. Radiat. Plasma Med. Sci., vol. 1, no. 4, pp. 281–292, Jul. 2017, doi: 10.1109/TRPMS.2017.2710880.

222. "Clinical experience of cold plasma in the treatment of locally advanced head and neck cancer," H-R. Metelmann et al., Clinical Plasma Medicine, 9, 6-13, 2018.

223. "Frugal Biotech Applications of Low-Temperature Plasma" Z. Machala and D.B. Graves, TRENDS IN BIOTECHNOLOGY, 36(6), 579-581, 2018.

224. "Key Roles of Reactive Oxygen and Reactive Nitrogen Species," D.B. Graves and G. Bauer, Chapter 4 of Comprehensive Clinical Plasma

Medicine: Cold Physical Plasma for Medical Application, Metelmann et al., eds., Springer International Publishing, DOI: 10.1007/978-3-319-67627-2, 2018.

225. "Side Effect management," G. Bauer, D.B. Graves, M. Schuster and H.-R. Metelmann, Chapter 16 of Comprehensive Clinical Plasma Medicine: Cold Physical Plasma for Medical Application, Metelmann et al., eds., Springer International Publishing, DOI: 10.1007/978-3-319-67627-2, 2018.

226. "Propeller Arc: Design and basic characteristics" by X. Pei, D. Gidon, and D.B. Graves, Plasma Sources Science and Technology, **27**, 125007, 2018.

227. "Lessons From Tesla for Plasma Medicine," D.B. Graves, IEEE Trans. Radiat. Plasma Med. Sci., vol. 2, no. 6, pp. 594–607, 2018. doi:10.1109/TRPMS.2018.28663732018.

228. "Reducing Energy Cost of NO_x Production in Air Plasmas, Chemical Engineering Journal, 2019, doi: https://doi.org/10.1016/j.cej.2019.01.011, 2019.

229. "Spatial Thermal Dose Delivery in Atmospheric Pressure Plasma Jets" D. Gidon, D.B. Graves, and A. Mesbah, Plasma Sources Science and Technology, 28(2), Article Number: 025006, 2019.

230. "Plasma activated organic fertilizer," D.B. Graves, L. B. Bakken, M. B. Jensen, and R. Ingels, Plasma Chemistry Plasma Processing, 39(1), 1-19, (2019).

231. "Uptake and diffusion of plasma-generated reactive nitrogen species through keratinized membrane," Y.-H Im, Z. Xiong, D. Elg, and D.B. Graves, J. Phys. D: Appl. Phys. 52(19), 195201, 2019. doi: 10.1088/1361-6463/ab0867.

232. "Machine Learning for Modeling, Diagnostics, and Control of Non-equilibrium Plasmas" by A. Mesbah and D.B. Graves, J. Phys. D: Appl. Phys., 52(30), 30LT02, 2019.

233. "Predictive control of 2D spatial thermal dose delivery in atmospheric pressure plasma jets," D. Gidon, D.B. Graves and A. Mesbah, PSST, 28(8), 085001, 2019.

234. "Perfluorodecalin to enhance reactive species delivery in plasma-biomaterial interactions," by D. Elg and D.B. Graves, Journal of physics. D. Applied physics, 52(35), 355204, 2019.

235. "Machine Learning for Real Time Diagnostics of Cold Atmospheric Plasma Sources, D. Gidon, D.B. Graves, et al., IEEE TRANSACTIONS ON RADIATION AND PLASMA MEDICAL SCIENCES Volume: 3 Issue: 5 Pages: 597-605 Published: SEP 2019

236. "Sim-to-real transfer reinforcement learning for control of thermal effects of an atmospheric pressure plasma jet," M. Witman, D. Gidon, D.B. Graves, et al., PSST, 28 (9), 095019, 2019.

237. "Dynamics of Singlet Oxygen-Triggered, RONS-Based Apoptosis Induction after Plasma Treatment of Tumor Cells with Cold Atmospheric Plasma or Plasma-Activated Medium," G. Buaer, D.B. Graves, et al., Scientific Reports, 9, 13931, 2019

238. "Cold Atmospheric Plasma and Plasma-Activated Medium Trigger RONS-Based Tumor Cell Apoptosis, G. Bauer, D.B. Graves, et al., Scientific

Reports, 9, 14210, 2019.

239. "Specific energy cost for nitrogen fixation as NOx using DC glow discharge in air," X. Pei, D. Gidon, D.B. Graves, et al., Journal of physics D: Applied physics, 53(4), 044002, 2020.

INVITED PAPERS **PRESENTED AT MEETINGS**

1. Theoretical and Computational Problems in Modeling Glow Discharges, Invited Speaker, Materials Research Society Symposium on Plasma Processing, Palo Alto, CA, April 1986.
2. Modeling Plasma-Enhanced Chemical Vapor Deposition, Invited Speaker, American Chemical Society Fall Meeting, Anaheim, CA, September 1986.
3. Applications of Gas Discharge Modeling to Plasma Processing, Invited Speaker, Electrochemical Society Fall Meeting, San Diego, CA, October 1986.
4. Models of Weakly Ionized Low Temperature Plasmas: Comparisons of Simulation and Experiment, Invited Speaker, American Vacuum Society National Symposium, Atlanta, GA, October 1988.
5. Application of Swarm Data to Discharge Modeling, Invited Speaker, Sixth International Swarm Seminar, Long Island, NY, August 1989.
6. Numerical Techniques for Gas Discharge Simulation, Invited Speaker, 17th IEEE Conference on Plasma Science, Oakland, CA, May 1990.
7. Modeling and Analysis of RF Glow Discharges, Invited Speaker, Symposium on Physics of Ionized Gases - 90, Bubrovnik, Yugoslavia, September, 1990.
8. Plasma-Particle Interactions in DC and RF Glow Discharges, Invited Speaker, 37th Annual Symposium of the American Vacuum Society, Toronto, Canada, October 1990.
9. Particles in Plasmas: Measurements and Models, Invited Speaker, Tegal Seventeenth Annual Plasma Technology Seminar, May 20, 1991.
10. Simulation and Modeling of RF Discharges, Invited Speaker, International Seminar on Reactive Plasmas, Nagoya, Japan, June 1991.
11. Modeling and Simulation of Low Pressure Discharges, Invited Speaker, XXth International Conference on Phenomena in Ionized Gases, Italy, July 1991.
12. Laser Diagnostics of Particulates in Surface-Processing Plasmas, Invited Speaker, Seventh Interdisciplinary Laser Science Conference, Monterey, CA, September 1991.
13. A Model of Particulates in Glow Discharge Plasmas, Invited Speaker, Electrochemical Society Spring Meeting, St. Louis, MO, May 1992.
14. Self-consistent, Kinetic Level Simulations of Low Pressure Glow Discharges, Invited Speaker, 23rd Annual Meeting of the Division of Atomic, Molecular, and Optical Physics, Chicago, IL, May 1992.
15. Modeling and Simulation of High Density Plasma Sources, Invited Speaker, Semiconductor Research Conference Topical Research on Plasma Etch, Princeton,

NJ, May 1992.

16. Plasma Modeling: Physics and Chemistry, Invited Speaker, Gordon Research Conference on Plasma Chemistry, NH, August 1992.
17. Modeling and Simulation of ECR Discharges, Invited Speaker, Northern Calif. Chapter of American Vacuum Society 1-Day Symposium on Plasma Etching, San Jose, September, 1992.
18. The Modeling of High Density Plasma Sources, Invited Speaker, SPIE Dry Etch Process Symposium, San Jose, CA, September 22, 1992.
19. Modeling and Simulation of High Density Plasmas, Invited Speaker, 14th Dry Process Symposium, Tokyo, Japan, October 29, 1992.
20. Particle-in-Cell / Monte Carlo Simulations of Low Pressure Discharges, Invited Speaker, Plasmas Spatiaux et Modelisation des Decharges, Marseille, France, December 2, 1992.
21. Plasma Processing: Challenges and Opportunities, Plenary Speaker, IEEE Conference on Plasma Science, Vancouver, Canada, June 1993.
22. Charging, Transport and Heating of Particles in RF and ECR Plasmas, Invited Speaker, NATO ARW: Formation, Transport and Consequences of Particles in Plasmas, Chateau de Bonas, France, August, 1993.
23. Overview of the NATO ARW: Formation, Transport and Consequences of Particles in Plasmas, Invited Speaker, Gaseous Electronics Conference, Montreal, Canada, October 1993.
24. Computer Simulations of Plasma-Surface Chemistry, Invited Speaker, Tegal Sixth Annual European Plasma Technology Seminar, Geneva, Switzerland, April, 1994.
25. Modeling and Simulation of High Density Plasma Sources, Keynote Speaker, 13th Annual Symposium on Electronic Materials, Processing and Characterization, Dallas, TX, June, 1994.
26. High Density Plasma Technology, Invited Speaker, 20th Annual Tegal Technology Symposium, San Francisco, CA, July 1994.
27. Overview of High Density Source Technology, Invited Speaker, SEMI Symposium, San Francisco, CA, July, 1994.
28. Chemical and Physical Sputtering of Fluorinated Silicon, Invited Speaker, Third World Conference on Computational Mechanics, Organized Session on Low and High Pressure Plasma-Aided Manufacturing and Materials Processing, Tokyo, Japan, August, 1994.
29. Plasma Process Modeling, Invited Speaker, AIChE Annual Meeting, Topical Conference, San Francisco, CA, November, 1994.
30. Modeling of Chemically Reactive Plasmas, Invited Speaker, MRS Fall Meeting, Boston, MA, December 1994.
31. Database Needs in Plasma Modeling and Diagnostics for Semiconductor Processing, Workshop on the Treatment of Gaseous Emissions via Plasma Technology, Invited Speaker, Gaithersburg, MD, March 1995.
32. Molecular Dynamics Simulations of Plasma-Surface Chemistry, Invited Speaker, Gordon Research Conference of Electronic Materials, Proctor Academy, Andover, NH, August, 1995.
33. Molecular Dynamics Simulations of Low Energy Reactive Ion Etching of Silicon

(with M. E. Barone), Invited Speaker, IUVSTA International Workshop on Plasma Sources and Surface Interactions in Materials Processing, Fuji-Yoshida, Japan, September, 1995.

34. Modeling and Simulation of Plasma Materials Processing Devices, Invited Speaker, 1996 International Sherwood Fusion Theory Conference, Philadelphia, PA, March, 1996.
35. Electron Kinetics Inductively Coupled Plasmas, Invited Speaker, NATO ARW on Electron Kinetics and Applications of Glow Discharges, St. Petersburg, Russia, May 1997.
36. Atomistic Simulations and Beam-Surface Experimental Studies of Plasma-Surface Interactions, Invited Speaker, Workshop on Basic Aspects of Nonequilibrium Plasmas Interacting with Surfaces, Shirahama, Japan, January, 1997.
37. Modeling and Simulation of Low Pressure Plasmas for Materials Processing, Invited Speaker, International Conference on Fluid Engineering, Tokyo, Japan, July, 1997.
38. Modeling and Simulation of Low Pressure Plasmas for Materials Processing, Invited Speaker, International Conference on Fluid Engineering, Tokyo, Japan, July, 1997.
39. Modeling Plasma Processes from Tool Scale to Atomistic Scale, Invited Speaker, International Conference on Atomic and Molecular Data and Their Applications, NIST, Gaithersburg, MD, October, 1997.
40. Fundamental Studies Applied to Environmental Challenges in Plasma Processing, Invited Speaker, 44th National Symposium, American Vacuum Society, San Jose, October, 1997.
41. Molecular Dynamics Study of Atomic Chlorine Surface Recombination with Comparison to Experiment, Invited Speaker, TMS, Annual Meeting, San Antonio, February, 1998.
42. High Density Plasma Tools for PFC/HFC Emission Abatement: Modeling and Experiments, Invited speaker, 2nd International Workshop on Fluorocarbon Plasmas, Sarcenas, France, March, 1998.
43. Point-of-Use Abatement of PFC Emission Using High Density Plasmas: Modeling and Experiments, Invited Speaker, New Mexico Chapter of the AVS Symposium, Albuquerque, May, 1998.
44. Fundamental Studies of Plasma-Surface Interactions Using Molecular Dynamics, Invited Speaker, *Advances in Thin Film Simulations and Experimental Verification*, MRS, San Jose, June, 1999.
45. Modeling Feature Evolution in Plasma Processes, Invited Speaker, 46th National Symposium, American Vacuum Society, Seattle, October, 1999.
46. Approximation Methods for Plasma-Surface Processes, Invited Speaker, 52nd Gaseous Electronics Conference, Norfolk, October, 1999.
47. Molecular Dynamics Study of Fluorocarbon-Silicon Interactions, Invited Speaker, Workshop on Basic Aspects of Nonequilibrium Plasmas Interacting with Surfaces, Huis Ten Boshi, Japan, January, 2000.
48. Plasma Abatement of Perfluroinated Compounds: Practical Results and Fundamental Understanding, Invited Speaker, 17th Plasma Processing Symposium, Nagasaki, Japan, January, 2000.
49. Plasma-Surface Interactions in Plasma Processing, Invited Speaker, 15th International

Symposium on Plasma Chemistry, Orleans, France, July 9-13, 2001.

50. Modeling of Plasma Transport and Surface Interactions, Invited Speaker, International Conference on Phenomena in Ionized Gases, Nagoya, July 16-29, 2001.
51. What is Known and Not Known About Surfaces Exposed to Plasmas, Invited Speaker, International Workshop on Basis for Low Temperature Plasma Applications, Hakone, Japan, July 23-25, 2001.
52. Atomistic Simulations of Plasma-Surface Chemistry and Comparison to Experiment, Invited Speaker, Nano and Giga Challenges in Microelectronics, Moscow, Russia, September 10-13, 2002.
53. Microhollow Cathode Plasmas: Flow and Reaction, Invited Speaker, Third Workshop on Basic Aspects of Nonequilibrium Plasmas Interacting with Surfaces, Awaji-Yume-Butai, Japan, February, 2003.
54. Modeling and Diagnostics Studies of Si Plasma Etch and Etch By-Products, Invited Speaker, Plasma Etch User's Group, Santa Clara, May, 2003.
55. Mechanisms of Surface Modifications via Reactive Plasmas, Invited Speaker, American Institute of Chemical Engineers Annual Meeting, San Francisco, November, 2003.
56. Multiscale, Damage-Free Plasma-Surface Interactions: Extending the Limits of Device Processing, Invited Speaker, First International Symposium on Optical and Electronic Device Technology for Access Network, Tokyo, December, 2003.
57. Molecular Dynamics Simulations of Silicon Etching in Argon and Fluorocarbon Plasmas. Invited Speaker, International COE Forum on Plasma Science and Technology, Nagoya, April, 2004.
58. Molecular Dynamics Simulations of Spontaneous and Ion-Assisted Etching of Silicon**,** Invited Speaker, International Vacuum Congress, Venice, Italy, June, 2004.
59. Fundamentals of Plasma-Surface Interactions, Invited Speaker, International Conference on Plasma Physics, Nice, October, 2004.
60. Etching Ruthenium by Inductively Coupled Plasma with O_2- and Cl_2-Containing Plasma, Invited Speaker, Plasma Etch User's Group, Santa Clara, May, 2005.
61. Challenges in Understanding Plasma-Surface Chemistry: Etching Through Fluorocarbon Films, Invited Speaker, China-Korea Workshop, Hunan, China, July, 2005.
62. Plasma and Plasma Processing, Invited Speaker, Tsinghua University, Beijing, China, July, 2005.
63. Vacuum Beam Studies of Radical-Enhanced Atomic layer Deposition of TiN Thin Films, Invited Speaker, (with Frank Greer), ISPC, Toronto, August, 2005.
64. Plasma-Surface Interactions, Invited Speaker, SEMICON Korea, Seoul, February, 2006.
65. Mechanisms of Etching in Fluorocarbon Plasmas, Invited Speaker, 6th International Workshop on Fluorocarbon Plasmas, Villard de Lans, France, March, 2006.
66. Fundamentals of Plasma-Surface Interactions, Invited Speaker CSIRO, Melbourne, Australia, July, 2006.
67. Plasma-Surface Interactions in Etching, Invited Speaker, Center of Excellence for Optical and Electronic Device Technology for Access Network, Keio University,

Yokohama, Japan, October 23, 2006.

68. Limits of Plasma Etching, Invited Speaker, IBM T.J. Watson Research Center, Yorktown Heights, NY, January 8, 2007.
69. Nanoscale Challenges in Plasma-Surface Interactions, Invited Speaker, DAMOP, Calgary June, 2007.
70. Molecular Dynamics and Beam Studies of Plasma-Surface Interactions, Invited Speaker, ICPIG, Prague, July, 2007.
71. Insights into plasma-surface interactions from molecular dynamics simulations and beam experiments, Invited Speaker, ISPC, Kyoto, August, 2007.
72. Collision Physics and Low Temperature Plasmas, Invited Speaker, QuAmp 2007, London, September, 2007.
73. Mechanisms of Near-Surface Alterations in Plasma Etch, Invited Speaker, GEC, Washington, D.C., October, 2007.
74. Energetic Ion and VUV Beam Interactions with Photoresist Polymers, Invited Speaker, 29th International Symposium on Dry Process, Tokyo, November, 2007.
75. Molecular Dynamics and Beam Studies of Plasma-Surface Interactions, Invited Speaker, GREMI, Orleans, France, January, 2008.
76. Modeling Atmospheric Pressure Plasmas for Biomedical Applications, Invited Speaker, Plasma-Santé Workshop, GREMI, Orleans, France, July 1, 2008.
77. Molecular Dynamics Studies of Nanometer Scale Etch Processes, Invited Speaker, Laser and Plasma Applications in Materials Science, Algiers, Algeria, June 23-26, 2008.
78. Plasma-Surface Interactions: Molecular Dynamics and Beam Studies of Plasma-Surface Interactions, Plenary Speaker, 11th International Conference on Plasma-Surface Engineering, Garmisch-Partenkirchen, Germany, September 15-19, 2008.
79. Synergistic Mechanisms of Plasma-Polymer Interactions, Invited Speaker, 55th AVS, Boston, October, 2008.
80. Plasma-Surface Interactions and the Control of Nanostructure, Plenary Speaker, Materials Engineering and Sciences Division Plenary Session, AIChE, November 19, 2008.
81. Atomistic Simulations of Feature Scale Etch Profile Evolution, Invited Speaker, Topics in Plasma Science and Thin Film Applications I, November 17, 2008.
82. Modeling Atmospheric Pressure Plasma 'Jet' Sources for Biomedical Applications, Invited Speaker, 2nd International Conference on Plasma Medicine, March 19, 2009.
83. Capacitive Discharge Modeling, Invited Speaker, 2009 Workshop on RF Discharges, May 17-20, 2009.
84. New Frontiers from Old Ideas in Plasma-Surface Chemistry, Plenary Speaker, ISPC, Bochum, Germany, July 26-31, 2009.
85. When Low Temperature Plasmas Meet Surfaces, Gaseous Electronics Conference Foundation Talk, 62nd Annual Gaseous Electronics Conference, Albany, NY, October 20-23, 2009.
86. Molecular Dynamics Simulations of Plasma-Polymer Interactions, Invited Speaker, ITFPC, Nancy, France, November 17-20, 2009.

87. Pushing the Limits of Plasma Etch to the Nanoscale, Invited Speaker, CSTIC 2010, Shanghai, China, March 18-19, 2010.

88. Mechanisms of Plasma Damage to Ultra-Low K SiCOH Dielectrics, Invited Speaker, Materials Research Symposium, San Francisco, May, 2010.

89. Plasma Infection Control: A Grand Challenge, Invited Speaker, Gordon Research Conference on Plasma Processing Science, New Hampshire, July, 2010.

90. Plasma Medical and Healthcare Opportunities in the Developing World, Invited Speaker, 3rd International Conference on Plasma Medicine, Greifswaldf, Germany, September 2010.

91. Plasma Surface Interactions at the Nanometer Scale, Invited Speaker, ISPlasma 2011, Nagoya, Japan, March, 2011.

92. Plasma sources for medical and health applications in the developing world, Invited Speaker Electrochemical Society, Montreal, May 2011.

93. Synergistic effects in plasma surface interactions, Invited Speaker, 8th EPS Conf. on Plasma Physics, Strasbourg, France, June 2011.

94. Fundamentals and New Directions in Plasma Medicine, Invited Speaker, International Conference on Phenomena in Ionized Gases, Belfast, UK, September 2011.

95. Computer Simulation of Plasma Medical Devices to Meet Future Challenges in Infection Control and Therapy, Plenary Speaker, MMVR/NextMed 19, Newport Beach CA, February 2012.

96. VUV Effects in Plasma Etching, Invited Speaker, Plasma Etch and Strip in Microtechnology, Leuven, Belgium, March, 2013.

97. MD simulations of hydrogen plasma interaction with graphene surfaces, Invited speaker, FAW 2013, Grenoble, France, July, 2013.

98. Plasma-graphene interactions, Invited speaker, iPlasmaNano IV, Asilomar, August, 2013.

99. Challenges of Low Temperature Plasma-Surface Interactions, Invited Speaker, Plasma-Surface Interaction Workshop, GEC, Princeton, September, 2013.

100. Low temperature plasma biomedicine, Invited Tutorial Speaker, American Physical Society -Division of Plasma Physics Annual Meeting, November, 2013.

101. Atmospheric Pressure Plasmas in Air Interacting with Biomolecules and Cells, Plenary Speaker, 8th Asia-Pacific International Symposium on the Basics and Applications of Plasma Technology, Taipei, Taiwan, December, 2013.

102. Reactive Species from Air Plasmas: Implications for Therapeutic Applications, Invited speaker, International Workshop on Plasma Cancer Treatment, Washington D.C., March 2014.

103. Mechanisms of plasma biomedicine: what do we know?, Tutorial Invited Speaker, 5th International Conference on Plasma Medicine, Nara, Japan, May, 2014.

104. Modeling Wound Healing and Mass Transfer Effects in Low Temperature Plasma-Liquid Interactions, Invited Speaker, DMPM, Nara, Japan, May, 2014.

105. Low Temperature Plasma-Surface Interactions: From Computer Chips to Cancer Therapy, Plenary Allis Prize acceptance speaker, Division of Atomic, Molecular and Optical Physics Meeting, Madison, WI, June 2014.

106. Future Low Temperature Plasma Science and Technology: Attacking Major Societal Problems by Building on a Tradition of Scientific Rigor, Plenary Allis Prize acceptance speaker, Gaseous Electronics Conference, Raleigh, NC, October, 2014.

107. Non-Thermal Plasmas for Biomedicine: A New Frontier in Plasma Processing, Invited Speaker, NCCAVS, Sunnyvale, CA, November, 2014.

108. Plasma Biomedicine, Plenary speaker, Frontiers of Plasma Physics and Technology (FPPT-7), Kochi, India, April, 2015.

109. Plasma-liquid interactions: reactive species generation and transport, Invited speaker, Bioplasmas & Plasmas with Liquids, Bertinoro, Italy, 13th-17th September 2015.

110. Mechanisms of Plasma Therapeutics, Invited speaker, 9th International Conference on Reactive Plasma / 68th Gaseous Electronics Conference, Honolulu, October 12-16, 2015.

111. Plasma Biomedicine and Reactive Species, Invited speaker, AVS 62nd Annual Symposium, San Jose, October 20, 2015.

112. RONS and their interactions with living tissues, Invited speaker, Atelier Applications Biomédicales des Plasmas, Orléans France, 16- 17 November, 2015.

113. Plasma-liquid interactions and implications for biological applications," invited speaker, First International Workshop on Plasma Agriculture, Drexel Univ., May 16-20, 2016.

114. Mechanisms of Plasma Therapeutics, invited speaker, 229th Electrochemical Society Meeting, May 29–June 03, 201, San Diego, CA, May 30 - June 3, 2016.

115. Plasma Biomedicine, invited speaker, 30th International Symposium on rarefied gas Dynamics, Victoria, BC, Canada, July 10-15, 2016.

116. NSF Low Temperature Plasma Workshop, invited speaker, Low Temperature Plasmas for Biotechnology and the Food Cycle, Washington, DC, August 22-23, 2016.

117. AVS NCAVS Symposium, plenary speaker, Mechanisms of Plasma Medicine, San Jose, CA, February 2017.

118. 8th International Conference on the Frontiers of Plasma Physics and Technology, , invited speaker, Advanced Control of Plasma Medical Devices, Vina del Mar, Chile, April 3-7, 2017.

119. Le Colloque de Plasma-Quebec, invited speaker, The Mechanisms of Plasma Therapy, Montreal, May 17-18, 2017.

120. NSF RE3 Workshop, plenary speaker, Air Plasma to Improve Nitrogen Utilization Efficiency, May 21-24, Louisville, KY, 2017

121. Harold Winters and Plasma-Surface Interactions, invited speaker, AVS 64th Annual Symposium, October 29-November 3, 2017.

122. Plasma-surface interactions: challenges that span applications, invited speaker, Dry Process Symposium, Nov. 16-17, 2017, Tokyo.

123. Air Plasma to Improve Nitrogen Utilization Efficiency, invited speaker, Japan Society of Plasma Physics, Dec. 4-7, 2017, Okinawa, Japan.

124. Mechanisms of Plasma Medicine; Models of Plasma-Liquid Interactions and Air Plasma for Improved Nitrogen Utilization Efficiency in Agriculture, invited speaker, Workshop on Cold Atmospheric Plasma Technologies in Medicine and Agriculture,

Adelaide, Australia, December, 2017.

125. Air Plasma for Organic Fertilizer, invited speaker, International Workshop on Plasma Agriculture, Takiyama, Japan, March 9-11, 2018.
126. Advanced Control of Plasmas Medical Devices, invited speaker, International Workshop on Plasma Cancer Treatment, Greifswald, Germany, March 20-21, 2018.
127. Mechanisms and Control of Plasma Biomedical Processes, invited speaker, ICMAP/ISPB 2018 Incheon Korea, July 25-28, 2018.
128. Air Plasma for Organic Fertilizer, invited speaker, Plasma Processing Science Gordon Research Conference, Rhode Island, August 5-10, 2018.
129. Tribute to John W. Coburn, Invited Speaker, NCCAVS, San Jose, CA, February, 2019.
130. Plasma activated organic fertilizer, Invited Speaker, 1rst China International Smart Agricultural Plasma Technology Innovation Forum, Beijing, Chine, April 28, 2019.
131. Tribute to John W. Coburn, Invited Speaker, AVS Symposium, Columbus, OH, October, 2019.

132.SYNERGISTIC ACTIVITIES

Outreach:

- April 2012, Career Day presentation Acalanes High School, Lafayette, CA
- March 2012, Presentation in Washington DC to Congressional Staff on Plasma Science

Teaching:

- Freshman Seminar, Unit Operations Laboratory; Solid State Devices; Process Control
- Transport Processes (graduate); Mathematical Methods (graduate)

University Service:

- Department service: Vice Chair Undergraduate Affairs; Vice Chair Graduate Affairs; Graduate Admissions Chair
- UCB Senate service: Member, Committee on Conflict of Interest

STUDENTS ADVISED

- Ph.D. Students: (total number: 31) Greg Jellum (1990, 3M), M. Surendra (1991, IBM), L. Perrung (1992, Pacific Northwest, National Labs), J. Daugherty (1994, Lam Research), M. Kilgore (1994, Novellus Systems), T. Nitschke (1994, Intel), C. Lee (1994, Lam Research), M. Barone (1995, Lam Research), J. Bukowski (1996, Air Products), B. Helmer (1998, Lam Research), G. Kota (1998, Lam Research), M. Vyvoda (1999, Twin Creeks Technologies), C. Abrams (2000, Drexel University), E. Tonnis (2000, Lam Research), H. Singh (2000, Lam Research), F. Greer (2002, Novellus Systems/Jet Propulsion Labs), D. Hsu (2003, Intel/NREL), M. Kiehlbaugh (2003, Lam Research, Micron), D. Humbird (2004, Lam Research/nrel), M. Nierode (2005, Exxon/Mobil), Y. Kimura (2005, Lam Research), C.C. Hsu (2006, National Taiwan University), Joe Vegh (2007, Lam Research), Dustin Nest (2009, Lam Research), Kasi Kiehlbaugh (2009, U. Arizona), Monica Titus (2010, Lam Research), Ting-Ying Chung (2010, Lam Research), Joe Lee (2013, IBM); Matthew Pavlovich (2014, Editor Trends in Biotech.), Carly Anderson (2016, Mosaic Materials).
- Postdoctoral and Associate Researchers: Robert Porteous (1992, Australian Defence Ministry), Richard Stewart (1995, Teaching College), Han Ming Wu (1996, SMIC, Shanghai, China), U. Schmidt (1998, Applied Materials, Desden, Germany), Ales Fiala (1999, Unilever, Netherlands), Ming Li (1997-2000, Novellus Systems), Kasu Kurihara (2000, Toshiba), Koji Stake (2003, Mitsubishi), Yassine Kabouzi (2006, Lam Research), Erwin Pargon (2006, CNRS, LETI, Grenoble, France), Insook Lee (2007, Korea), Joe Vegh (2009-11), Emi Kawamura (2012, UCB EECS), Yukinori Sakiyama (2012, Lam Research), Mierk-Anne Schwabe (Max Planck), Laurent Azarnouch (Applied Materials), R. Gopalakrishan (U. Memphis), Zilan Xiong (Huazhong University), Dan Elg (U. S. Indiana), Xuekai Pei, (current).

- Undergraduate Researchers: Zhi Chen (09/2008 – 08/2011) Sandip Ambastha (09/2009-05/2010), Marat Orazov (09/2010-05/2012), Baoying Yuan (06/2011 – 12/2011), Dustin Chen (09/2011 – 05/2012), Leo Kao (09/2011-05/2012); Philip Tu (09/2010 – 2012), Stephenie Zhang (09/2010 – 2012), Prita Hait (09/2010 – present), Connor Galleher (09/2011- present), Lin Yang (05/2012 – 2013), Joe Trisnodi (05/2012 – 2013), Artos Cen (06/2012 – 2013), Mohan Xing (07/2012 –2013).
- Visitors: Junichi Tanaka (2000, Hitachi), Thierry Czerwiec (2003, Ecole des Mines, Nancy, France), Yukinori Sakiyama (2005-2007, Univ. Tokyo Japan), Christian Wachendorf, (2008, RUB, Germany), Michikazu Morimoto, ('Michi', 2008 – 2009, Hitachi, Japan), Takaaki Tomai (2008-2009, U Tokyo, Japan), Kohei Sato (2008-2009, Hitachi, Japan), Nozomi Takeuchi (2009, Hitachi, Japan), Geun-Young Yeom (2009-2010, Sungkyunkwan Univ, South Korea), Constance Moreau-Luchaire (2011, ENS-ICFP, France), Shinji Obama (2011-2012, Hitachi, Japan), Ansgar Schmidt-Bieker (2012, INP, Germany), Tobias Klaempfl (2012, Max-Planck Institute, Germany), John Coburn (1994- 2013), Harold Winters (2000-2010), Dave Fraser (2000-2010), Mierk Ann Schwabe (2011-present, Max-Planck Institute, Germany), Hung-Wen Chang (2012 – 2013, NTU, Taiwan), Takamasa Ichino (2012 – 2013, Hitachi, Japan), Zdenko Machala (2013-2014, Comenius University, Slovakia), Toshiato Ono (2013-2014, Tokyo Inst. Tech.), Heungsik Park (2013-2014, Samsung, Korea), Jane Dai (2013, Deakin University, Australia) Julie Hubert (2013; Free University of Brissels), Tomoyuki Watanabe ('Nabe'; 2013- 2014, Hitachi Corporation, Japan).