

# JOSEPH L. CECCHI

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Professor of Chemical and Nuclear Engineering  
Dean Emeritus, School of Engineering  
University of New Mexico  
Albuquerque, NM  
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1-505- 239-0176

## EDUCATION

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PhD	1972	Harvard University, Cambridge, MA Field: Physics
MBA	2011	University of New Mexico, Albuquerque, NM Field: Business
MA	1969	Harvard University, Cambridge, MA Field: Physics
BA	1968 <i>Magna cum Laude</i>	Knox College, Galesburg, IL Field: Physics

## ACADEMIC APPOINTMENTS

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### ADMINISTRATIVE

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2011-present	Senior Advisor to the Provost for National Laboratory Relations Office of the Provost University of New Mexico
2011-2012	Provost Masdar Institute of Science and Technology Masdar City, Abu Dhabi, United Arab Emirates
2004-2011	Chair, Board of Directors STC.UNM ( <i>formerly</i> The Science and Technology Corporation @ UNM)
2001-2009	Dean, School of Engineering University of New Mexico
2000-2001	Interim Dean, School of Engineering University of New Mexico
1994-2000	Chair, Department of Chemical and Nuclear Engineering University of New Mexico
1991-1994	Director, New Jersey SEMATECH Center of Excellence for Plasma Etching, New Jersey University Consortium
1987-1994	Director, Graduate Program in Plasma Science and Technology School of Engineering, Princeton University

- 1987-1994 Head, Plasma Processing Group, Plasma Physics Laboratory  
Princeton University
- 1979-1987 Head, Materials Physics Group, Plasma Physics Laboratory  
Princeton University

### TEACHING AND RESEARCH

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- 1994-present Professor of Chemical and Nuclear Engineering  
University of New Mexico
- 2011-2012 Professor of Engineering  
Masdar Institute of Science and Technology  
Masdar City, Abu Dhabi, United Arab Emirates
- 1988-1994 Lecturer with Rank of Professor, Department of Chemical Engineering  
Princeton University
- 1986-1988 Lecturer, Department of Chemical Engineering  
Princeton University
- 1984-1994 Principal Research Physicist, Plasma Physics Laboratory  
Princeton University
- 1978-1984 Research Physicist, Plasma Physics Laboratory  
Princeton University
- 1972-1978 Staff Physicist, Plasma Physics Laboratory  
Princeton University
- 1969-1972 Research Assistant to Professor Norman F. Ramsey  
Department of Physics, Harvard University
- 1969-1972 Teaching Fellow, Department of Physics  
Harvard University
- 1967-1968 Research Associate, Physics Division  
Argonne National Laboratory

### HONORS AND AWARDS

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- 2011 STC.UNM Lobo VentureLab Incubator Facility renamed the Joseph L.  
Cecchi VentureLab
- 2010 New Mexico Business Weekly, *Who's Who in Technology*
- 2009 Fellow of the American Vacuum Society (AVS)
- 2005 *Who's Who in Engineering Higher Education (WWEHE)*
- 2000 *Who's Who in Science and Engineering*
- 1992, 1994 Semiconductor Research Corporation Inventor Award
- 188 IBM Faculty Development Award
- 1968-1972 National Science Foundation Pre-doctoral Fellow
- 1970 Sigma Xi
- 1968 Phi Beta Kappa

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## COURSES TAUGHT AND DEVELOPED

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### PRINCETON UNIVERSITY

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- ChE 346 *Chemical Engineering Laboratory*
- ChE 417 *Plasmas for Chemical Processing of Materials* (newly developed)
- ChE 422 *Semiconductor Processing Technology*
- ChE 441 *Chemical Reactor Engineering*
- ChE 444 *Special Topics in Chemical Engineering and Technology*
- ChE 454 *Senior Thesis*
- ChE 551 *Topics in Plasma Science and Technology* (newly developed)

### UNIVERSITY OF NEW MEXICO

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- ChNE 461 *Chemical Reactor Engineering*
- ChNE 486/586 *Statistical Design of Experiments for Semiconductor Manufacturing* (newly developed)
- ChNE 515 *Special Topics*
- ChNE 599 *Masters Thesis*
- ChNE 699 *Dissertation*
- ME 461 *High Performance Engines* (newly developed)
- ChNE 499/515 *Sustainable Energy* (newly developed)
- ChNE 213 *Laboratory Electronics*
- ChNE 419L *Senior Chemical Engineering Laboratory*
- BME 558 *Methods of Analysis in Biomedical Engineering*

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## UNDERGRADUATE RESEARCH SUPERVISED

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### PRINCETON UNIVERSITY (CHEMICAL ENGINEERING)

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Michael R. Grillo (B.S., 1993), *An Historical Account of the Search for the Structure of Fullerenes*

Craig H. Boyce (B.S., 1994), *Mechanisms for Anisotropic Reactive Ion Etching of Photoresist via O<sub>2</sub>, N<sub>2</sub>/O<sub>2</sub>, and SO<sub>2</sub>/O<sub>2</sub> Plasmas*

### UNIVERSITY OF NEW MEXICO (CHEMICAL ENGINEERING)

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Frank B. Lopez, (1995), *Design of Experiments for Optimization Study of Oxide Etch*

James J. Chambers, (1995), *Optimization of a Plasma Etch Process Utilizing Statistical Design and Analysis of Experiments with Response Surface Methodology*

Jennifer Drez, (1996,) *Modeling the Growth of a CF<sub>x</sub> Polymer on Silicon Wafer*

David L. Temer, (1996), *A Correlation Between  $CF_x$  In the Plasma Environment To Index of Refraction*

Zachary J. Walster, (1996), *Polymer Deposition for Selective Oxide Etching Using HFC-134a*  
Tara Martinez, (1997), *The Characterization of Si Wafers Using A Scanning Electron Microscope*

Stacy Dunivan, (1997), *Statistically Designed Experiment to Determine Defect Generation of a Lithographic Process*

Jason Bradley, (1998), *Optimization of Chemical Mechanical Planarization*

Karla Waters, (1998), *Parameter Space for Oxide Etching Using the Lucas Labs Cluster Tool*

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## GRADUATE RESEARCH SUPERVISED

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### PRINCETON UNIVERSITY (CHEMICAL ENGINEERING UNLESS OTHERWISE NOTED)

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Shashank Chaturvedi (PhD, 1989), *Energy Flows in a Quasi-Isobaric Fusion-Fission Hybrid Reactor*

James Cross (MS, 1990), *Introductory Survey of Modeling Strategies for Process Plasmas*

Dwani Vyas (MS, 1991), *Global Modeling of the Electron Cyclotron Resonance Reactor*

Mark Bannister (Astrophysical Sciences, PhD, 1992), *A Surface Wave Sustained Plasma Source of Supersonic Nozzle Beams of Metastable Argon Atoms (the "Surfajet")*

C.W. Cheah (PhD, 1993), *Plasma Diagnostics for the Characterization of Etching and Deposition Reactors*

Chris Zuiker (Astrophysical Sciences, PhD, 1993), *Laser-Induced Fluorescence Measurements in an Electron Cyclotron Resonance Plasma Etch Reactor*

Y-C Huang (PhD, 1994), *Characterization of Surface Reaction During  $SF_6$  Etching of Silicon in an Electron Cyclotron Resonance (ECR) Plasma Reactor*

Rob Goheen (MS, 1995), *In-Situ Analysis of A Plasma Deposited Polymer Film in a  $CF_3H$  Discharge Using Reflection Infrared Spectroscopy*

Rob Jarecki (PhD, 1996), *Low Temperature Sulfur Hexafluoride Plasma Etching of Silicon/Silicon Dioxide in an Electron Cyclotron Resonance Reactor*

Mark Sowa (PhD, 1998), *Mechanism for the Selective Etch of Silicon Dioxide in a High-Density, Low-Pressure, Inductively Coupled Fluorocarbon Plasma*

Served on an additional 5 PhD dissertation committees

UNIVERSITY OF NEW MEXICO (CHEMICAL ENGINEERING UNLESS OTHERWISE NOTED)

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Vinay Pohray (MS, 1997), *Role of Polymer Growth and Ion Bombardment of Selective Oxide Tech Chemistry in an Inductively Coupled Plasma Reactor*

Craig Brown (MS, 1998), *Plasma Polymerized Fluorocarbon (CHF<sub>3</sub>) Thin Films Optimization and Characterization for the Elimination of Post Release Adhesion in Polysilicon Microstructures*

David Stein (PhD, 1998), *Mechanistic, Kinetic, and Processing Aspects of Tungsten Chemical Mechanical Polishing*

Michael Littau (MS, 1998), *Wavelength Modulated Infrared Diode Laser Absorption Spectroscopy of Fluorocarbon Species in a Low-Pressure, High-Density Plasma Reactor*

Iyano Inoue (MS, 1999), *Applications of Infrared Diode Laser Absorption Spectroscopy to Measurements of Dissociation Kinetics and Calibration of Actinometric Optical Emission Spectroscopy*

Prabhakar Gopoldasu (MS, 2000), *Response Surface Modeling of the Composition of AlAsSb Alloys Grown by Molecular Beam Epitaxy*

Yong Xiang Guo (MS, 2001), *Modeling of a Fluorocarbon-based Process for Selective Etching of Interlevel Dielectrics*

Amy Moy (MS, 2001), *Polishing Pad Degradation and Wear Due to Tungsten and Oxide CMP*

Todd Bauer (PhD, 2001), *Fluorocarbon Radical Density Measurements in an Inductively Coupled Plasma Reactor*

Stacy Stone (Manufacturing Engineering, ME, 2002), *Feasibility of Printing 185 nm Nested Contact Holes at 320 nm Pitch with a 0.60 NA 248 nm KrF Lithography Source*

Xiaomei Wu (PhD, 2003), *Study of Rotational Temperature and Loss Mechanisms of Fluorocarbon Radicals in an Inductively Coupled Plasma Reactor*

Ying-Bing Jiang (PhD, 2005), *Plasma-Assisted Atomic Layer Deposition of Conformal Nano Cap Layers on Self-Assembled Mesoporous Low-k Dielectrics*

Keith Green (MS, 2006) *Polysilicon Gate Etch CD Bias Characterization*

Served on an additional 9 MS/ME and 11 PhD graduate student committees

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### SELECTED UNIVERSITY SERVICE (PRESENT-2000)

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- Member, Faculty Senate Budget Committee (2010-2013)
- Chair, UNM Strategic Planning Task Force (2006-2007)
- Chair, Dean of the College of Arts and Sciences Search Committee (2000-2007)
- Member, Search Committee for the Provost and Executive Vice President for Academic Affairs (2005-2006)
- Member, Business and Industry Cabinet (2000-2008)
- Member, Economic Development Advisory Council (2000-2008)
- Member, Research & Economic Development Collaboration Council (2005-2009)
- Chair, Board of Directors, The Science and Technology Corporation at the University of New Mexico, (2004 – present)
- Member, President's Leadership Roundtable (2004-2006)
- Member, Faculty Dispute Resolution Advisory Board (2003-2009)
- Member, UNM Planning Council (2003-2009)
- Member, Federal Priorities Group (2002-2009)
- Member, UNM Presidential Search Committee (2002-2003)
- Member, UNM Rankings Committee (2002-2004)
- Member, Board of Directors, The Science and Technology Corporation at the University of New Mexico, (2001-present), Board Chair, (2004-present)
- Member, UNM Urban Agenda Task Force (2001-2002)
- Chair, Dean of the College of Fine Arts Search Committee (2001-2002)
- Member, UNM Council of Deans (2000-2009)
- Member, UNM Strategic Planning Task Force, (2000-2001)

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### RESEARCH EXPERTISE

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- Micro- and nano-fabrication for semiconductor devices and interconnects
- Plasma etching and plasma etch tools (Parallel Plate, RIE, ECR, ICP, TCP, Helicon)
- Plasma diagnostics: RF measurements, optical emission, laser induced fluorescence, diode laser absorption spectroscopy, microwave interferometry
- Chemical Vapor Deposition (CVD) and Plasma-Enhanced CVD (PECVD)
- Micro-Electro Mechanical Systems (MEMS)
- Chemical-Mechanical Planarization (CMP)
- Atomic Layer Deposition (ALD) and Plasma-Assisted ALD (PA-ALD)
- Molecular beam electric resonance measurements of rotational magnetic moments and hyperfine structure of diatomic molecules
- Plasma physics, Plasma Transport, Plasma-materials interactions

- Vacuum ultraviolet spectroscopy
- Beam foil spectroscopy/vacuum ultraviolet spectroscopy of highly stripped atoms
- Interaction of hydrogen and deuterium with Zr-alloy bulk getter
- Polarization of atomic hydrogen by optical pumping and spin exchange
- Plasma-excited supersonic atom sources (Ar, He) for metastable and reactive beam generation

## CONTRACT AND GRANT SUPPORT

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Southern California Edison, "Equipment Grant for Optical Pumping/Spin Exchange Production of Spin-Polarized Hydrogen," \$50,000, 10/1/82 - 9/30/83.

Public Service Electric and Gas Company, "Equipment Grant for Optical Pumping/Spin Exchange Production of Spin-Polarized Hydrogen," \$50,000, 10/1/82 - 9/30/83.

U.S. Department of Energy, "Production of Spin-Polarized Hydrogen by Optical Pumping and Spin Exchange," \$210,000, 2/1/84 - 9/30/85.

New Jersey Commission on Science and Technology, Innovation Partnership Program, "Characterization and Optimization of Microwave Plasma Discharges used for Surface Modification Technology," \$110,000, 5/1/87 - 4/30/88.

U.S. Department of Energy, "Program in Plasma Science and Technology," \$1,120,000, 10/1/87 - 9/30/94.

IBM, Faculty Development Award, \$30,000, 6/1/88 - 5/31/89.

Semiconductor Research Corporation, New Jersey SEMATECH Center of Excellence for Plasma Etching, "Electron Cyclotron Resonance Plasma Etch Tool Research and Plasma Diagnostic Development," \$3,200,000, 10/1/88 - 3/31/94.

New Jersey Commission on Science and Technology, Advanced Technology Center for Surface Engineered Materials, "Microfabrication Process Technology," \$400,000, 1/1/89 - 6/30/93.

SEMATECH, "Plasma Etch Reactor Development," \$80,000, 10/1/92 - 9/30/93.

Equipment donations, AT&T, IBM, and SRI/David Sarnoff Research Center.

Semiconductor Research Corporation, "Helicon Plasma Source Development," \$200,000, 1/1/94 - 3/31/95.

Semiconductor Research Corporation, "Diagnostic Development," \$145,000, 1/1/94 - 3/31/95.

SEMATECH, "Diagnostic Support of Equipment Improvement Program," \$400,000, 9/1/94 - 3/31/96.

Semiconductor Research Corporation, "Helicon Plasma Source Development," \$200,000, 4/1/95 - 3/31/96.

Semiconductor Research Corporation, "Diagnostic Development," \$100,000, 4/1/95 - 3/31/96.

Intel, "Donation of Phi 660 Scanning Auger Spectrometer," \$175,000, 12/95.

DARPA (subcontract from Orincon, San Diego, CA), "Prototype Development of Adaptive Process Monitoring for Plasma Etch," \$79,698, 1/27/97 - 8/31/97.

Lucent Technologies, Bell Labs, "Donation of Lucas Labs Cluster Etch Tool," \$800,000, 1997.

Semiconductor Research Corporation, "Diagnostic Development for Low-Pressure High-Density Etch Tools," \$100,000, 8/1/97 - 7/31/98.

Lam Research (Fremont, CA), "Donation of Advanced Plasma Cluster Tool," \$1,700,000, 1998.

DOE/NSF (subcontract from SUNY, Albany, NY), "Fundamental Science of High-Density Fluorocarbon Plasmas," \$120,875, 9/15/97 - 9/14/00.

DOE/NSF (subcontract from SUNY, Albany, NY), "Fundamental Science of High-Density Fluorocarbon Plasmas," \$94,560, 9/15/00 - 9/14/03.

## REFEREED PUBLICATIONS

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1. Stability and Heating Experiments on the ATC Tokamak, K. Bol, J. L. Cecchi, C. C. Daughney, R. A. Ellis, H. P. Eubank, H. P. Furth, R. A. Jacobsen, L. C. Johnson, E. Mazzucato, and W. Stodiek, Proceedings of the Sixth European Conference on Controlled Fusion and Plasma Physics (Joint Institute for Nuclear Research, Moscow, 1973) Vol. I, p.18-21.
2. Molecular Zeeman Spectra of  ${}^6,7\text{Li}$   ${}^{79,81}\text{Br}$ , J. L. Cecchi and N. F. Ramsey, J. Chem. Phys. **60**, 53-65 (January 1974).
3. Neutral-Beam Heating in the Adiabatic Toroidal Compressor, K. Bol, J. L. Cecchi, C. C. Daughney, R. A. Ellis, H. P. Eubank, H. P. Furth, R. J. Goldston, H. Hsuan, R. A. Jacobsen, E. Mazzucato, R. R. Smith, and T.H. Stix, Phys. Rev. Lett. **32**, 661-664 (March 1974).
4. Neutral-Beam Heating in the Adiabatic Toroidal Compressor, K. Bol, J. L. Cecchi, C. C. Daughney, R. A. Ellis, H. P. Eubank, H. P. Furth, R. J. Goldston, H. Hsuan, E. Mazzucato,



- R. R. Smith, and P. E. Stott, Proceedings of the Fifth International Conference on Plasma Physics and Controlled Nuclear Fusion Research (International Atomic Energy Agency, Vienna, 1975) Vol. I, p. 77-82.
5. Experiments on the Adiabatic Toroidal Compressor, K. Bol, J. L. Cecchi, C. C. Daughney, F. DeMarco, R. A. Ellis, H. P. Eubank, H. P. Furth, H. Hsuan, E. Mazzucato, and R. R. Smith, Proceedings of the Fifth International Conference on Plasma Physics and Controlled Nuclear Fusion Research (International Atomic Energy Agency, Vienna, 1975) Vol. I, p. 83-97.
  6. Transport of Injected Impurities in ATC, S. A. Cohen, E. S. Marmor, and J. L. Cecchi, Proceedings of the Seventh European Conference on Controlled Fusion and Plasma Physics (Centre de Recherches en Physique des Plasmas, Ecole Polytechnique, Lausanne, 1975) Vol. I, p. 137.
  7. System for Rapid Injection of Metal Atoms Into Plasmas, E. S. Marmor, J. L. Cecchi, and S. A. Cohen, Rev. Sci. Instrum. **46**, 1149-1154 (September 1975).
  8. Impurity Transport in Quiescent Tokamak Plasma, S. A. Cohen, J. L. Cecchi, and E. S. Marmor, Phys. Rev. Lett. **35**, 1507-1510 (December 1975).
  9. Intensity Modulations in the Decay of the  $3^2P_{1/2}^0$  Level in the Sodium-Like Ion,  $Cu^{18+}$ , D. J. Pegg, P. M. Griffin, B. M. Johnson, K. W. Jones, J. L. Cecchi, and T.H. Kruse, Phys. Rev. Lett. **38**, 1471-1473 (June 1977).
  10. Radiative Lifetimes of the Low-Lying Levels of Na-Like Copper, D. J. Pegg, P. M. Griffin, B. M. Johnson, K. W. Jones, J. L. Cecchi, and T. H. Kruse, Phys. Rev. A **16**, 2008-2010 (November 1977).
  11. Sputtering and Surface Damage of TFTR Protective Plate Candidate Materials by Energetic  $D^+$  Irradiation, M. Kaminsky, K. S. Das, and J. L. Cecchi, Fusion Technology (Pergamon Press, Oxford, 1979) Vol. 2, p. 789-794.
  12. Tritium Permeation and Wall Loading in the TFTR Vacuum Vessel, J. L. Cecchi, J. Vac. Sci. Technol. **16**, 58-70 (January/February 1979).
  13. Spectra From Foil-Excited Molybdenum Ions, B. M. Johnson, K. W. Jones, J. L. Cecchi, and T. H. Kruse, IEEE Trans. Nucl. Sci. **NS-26**, 1317-1319 (February 1979).
  14. Comparison of Tungsten and Gold Radiation From Beam-Foil Excitation and Tokamak-Produced Plasmas, B. M. Johnson, K. W. Jones, J. L. Cecchi, E. Hinnov, and T. H. Kruse, Phys. Lett. **70A**, 320-322 (March 1979).

15. Surface Damage and Sputtering of ATJ Graphite as Candidate Material for TFTR Under D<sup>+</sup> Bombardment, S. K. Das, M. Kaminsky, R. Tishler, and J. L. Cecchi, *J. Nucl. Mater.* **85/86**, 225-230 (December 1979).
16. The ISX Graphite Limiter Experiment, R. A. Langley, R. J. Colchin, R. C. Isler, M. Murakami, J. E. Simpkins, J. L. Cecchi, V. L. Corso, H. F. Dylla, R. A. Ellis, and M. Nishi, *J. Nucl. Mater.* **85-86**, 215-219 (December 1979).
17. Transient Getter Scheme for the Tokamak Fusion Test Reactor, J. L. Cecchi, S. A. Cohen, and J. J. Sredniawski, *J. Vac. Sci. Technol.* **17**, 294-297 (January/February 1980).
18. EUV Spectra of MoXIV to MoXXIX, B. M. Johnson, K. W. Jones, J. L. Cecchi, and T. H. Kruse, *Phys. Lett.* **78A**, 61-64 (July 1980).
19. PDX Divertor Operation, D. K. Owens, V. Arunasalam, C. Barnes, M. G. Bell, K. Bol, S. A. Cohen, J. L. Cecchi, C. C. Daughney, S. L. Davis, D. L. Dimock, H. F. Dylla, P. C. Efthimion, R. J. Fonck, B. Grek, R. J. Hawryluk, E. Hinnov, H. Hsuan, M. Irie, R. A. Jacobsen, D. W. Johnson, H. Maeda, D. K. Mansfield, E. Mazzucato, K. McGuire, D. M. Meade, D. Mueller, M. Okabayashi, G. L. Schmidt, J. A. Schmidt, E. H. Silver, J. C. Sinnis, P. Staib, J. D. Strachan, S. Suckewer, F. H. Tenney, and M. Ulrickson, *J. Nucl. Mater.* **93/94**, 213-219 (October 1980).
20. Impurity Control in TFTR, J. L. Cecchi, *J. Nucl. Mater.* **94/95**, 28-43 (October 1980).
21. Thermal Testing of Coated Materials for Limiters and Protective Plates in the Tokamak Fusion Test Reactor, M. Ulrickson and J. L. Cecchi, *J. Thin Solid Films* **73**, 133-138 (November 1980).
22. Tracer Element Injection Into PDX Tokamak for Spectral Line Identification and Localized Doppler Temperature Measurements, S. Suckewer, J. L. Cecchi, S. A. Cohen, R. J. Fonck, and E. Hinnov, *Phys. Lett.* **80A**, 259-262 (December 1980).
23. PDX Experimental Results, D. M. Meade, V. Arunasalam, C. Barnes, M. G. Bell, M. Bitter, K. Bol, R. Budny, J. L. Cecchi, S. A. Cohen, C. C. Daughney, S. L. Davis, D. L. Dimock, H. F. Dylla, P. C. Efthimion, H. P. Eubank, R. J. Fonck, R. Goldston, B. Grek, R. J. Hawryluk, E. Hinnov, H. Hsuan, M. Irie, R. A. Jacobsen, D. W. Johnson, L. C. Johnson, H. W. Kugel, H. Maeda, D. K. Mansfield, R. T. McCann, D. C. McCune, K. McGuire, D. R. Mikkelsen, S. Milora, D. M. Manos, D. Mueller, M. Okabayashi, D. K. Owens, M. F. Reusch, K. Sato, N. R. Sauthoff, G. L. Schmidt, E. H. Silver, J. C. Sinnis, J. D. Strachan, S. Suckewer, H. Takahashi, and F. H. Tenney, *Proceedings of the Eighth International Conference on Plasma Physics and Controlled Nuclear Fusion Research (International Atomic Energy Agency, Vienna, 1981) Vol. I*, p. 665-676.

24. The Design and Test Results of an In-Torus Zirconium/Aluminum Getter Pump System for PDX, J. J. Sredniawski, J. L. Cecchi, and H. F. Dylla, Proceedings of the 9th Symposium on Engineering Problems of Fusion C. K. Choi, Editor, (IEEE, NY, 1981) 1601-1604.
25. Response of Zr-Al Getter Material to the Anticipated TFTR In-Torus Environment, B. Ferrario, M. Borghi, J. L. Cecchi, and J. J. Sredniawski, Proceedings of the Eleventh Symposium on Fusion Technology (Pergamon Press, New York, 1981) Vol. 1, p. 375-383.
26. TFTR Impurity Control Prototype Tests, J. L. Cecchi, H. F. Dylla, R. J. Fonck, R. J. Knize, H. W. Kugel, M. Okabayashi, D. K. Owens, M. Ulrickson, and J. J. Sredniawski, Proceedings of IAEA Technical Committee Meeting on Divertors and Impurity Control, edited by M. Keilhacker and U. Daybelge (Max-Planck-Institut fur Plasmaphysik, Garching, 1981) p. 97.
27. Compatibility of the Zr-Al Alloy With a Tokamak Plasma Environment, R. J. Knize, J. L. Cecchi, and H. F. Dylla, J. Nucl. Mater. **103/104**, 539-543 (1981).
28. Surface Analysis of TFTR Vacuum Vessel Samples Subjected to the Post-Weld Heat Treatment, R. L. Moore, S. A. Cohen, J. L. Cecchi, and H. F. Dylla, J. Vac. Sci. Technol. **18**, 1072 (April 1981).
29. Anomalies in the Beam-Foil Measurements for  $n=0$  Transitions in Highly Ionized Members of the Li, Na, and Cu Sequences, B. M. Johnson, D. C. Gregory, K. W. Jones, D. J. Pegg, P. M. Griffin, T. H. Kruse, J. L. Cecchi, and J. O. Ekberg, IEEE Trans. Nucl. Sci. **NS-28**, 1159-1161 (April 1981).
30. The Effect of Hydrogen Glow Discharge Conditioning on Zr/Al Getter Pumps, H. F. Dylla, J. L. Cecchi, and M. Ulrickson, J. Vac. Sci. Technol. **18**, 1111-1113 (April 1981).
31. Design of TFTR Movable Limiter Blades for Ohmic and Neutral Beam Heated Plasmas, D. W. Doll, M. Ulrickson, J. L. Cecchi, J. C. Citrolo, D. Weissenburger, and J. Bialek, Proceedings of the 9th Symposium on Engineering Problems in Fusion Research, C. Choi, editor, (IEEE, N.Y. 1981) p. 1654-1657.
32. Tokamak Limiter Design, J. L. Cecchi, Proceedings of the 9th Symposium on Engineering Problems in Fusion Research, C. K. Choi, editor, (IEEE, N.Y. 1981) p 1378-1382.
33. Measurement of H<sub>2</sub>, D<sub>2</sub> Solubilities in Zr-Al, R. J. Knize, J. L. Cecchi, and H. F. Dylla, J. Vac. Sci. Technol. **20**, 1135-1137 (April 1982).
34. Changes in Tokamak Plasma Properties During Impurity Injection, S. A. Cohen, J.L. Cecchi, C. C. Daughney, S. L. Davis, D. L. Dimock, P. C. Efthimion, M. Finkenthal, R. J.

- Fonck, E. Hinnov, R. A. Hulse, D. W. Johnson, D. M. Manos, D. H. McNeill, S. S. Medley, E. B. Meservey, D. Mueller, J. F. Schivell, E. H. Silver, S. Suckewer, J. R. Timberlake and S. von Goeler, *J. Vac. Sci. Technol.* **20**, 1226-1229 (April 1982).
35. Beam-Foil Spectra for 15-160 MeV Zr-Al Wavelengths from 6-60 nm, T. H. Kruse, J.L. Cecchi, B. M. Johnson, D. C. Gregory and K. W. Jones, *Phys. Lett. A*, **90A**, 284-287 (July 1982).
  36. Reduction of Recycling by Pumping at the PDX Limiter, J. L. Cecchi, R. J. Knize, H. F. Dylla, R. J. Fonck and D. K. Owens, *J. Nucl. Mater.* **111/112**, 305-310 (October 1982).
  37. Diffusion of Hydrogen and Deuterium in Zr-Al, R.J. Knize and J. L. Cecchi, *J. Nucl. Mater.* **111/112**, 645-647 (October 1982).
  38. Impurity Levels and Power Loading in the PDX Tokamak with High Power Neutral Beam Injection, R. J. Fonck, M. G. Bell, K. Bol, K. Brau, R. Budny, J. L. Cecchi, S. A. Cohen, S. L. Davis, H. F. Dylla, R. J. Goldston, B. Grek, R. J. Hawryluk, J. Hirschberg, D. W. Johnson, R. A. Hulse, R. Kaita, S. M. Kaye, D. K. Owens, R.J. Knize, H. W. Kugel, D. M. Manos, D. K. Mansfield, K. McGuire, D. Mueller, K. Oasa, M. Okabayashi, G. L. Schmidt, S. Sesnic, S. Suckewer, H. Takahashi, F. H. Tenney, P. Thomas, M. Ulrickson, and R. V. Yelle, *J. Nucl. Mater.* **111/112**, 343-354 (November/December 1982).
  39. Pressure Dependence of Zr-Al Pumping Speed for H<sub>2</sub>, J. L. Cecchi and R. J. Knize, *J. Vac. Sci. Technol.* **A1**, 1276-1278 (April/June 1983).
  40. Enhanced Selective Hydrogen Desorption from Metals, R. J. Knize and J. L. Cecchi, *J. Vac. Sci. Technol.* **A1**, 1273-1275 (April/June 1983).
  41. Theory of Bulk Gettering, R. J. Knize and J. L. Cecchi, *J. App. Phy.* **54**, 3183-3189 (June 1983).
  42. Modeling the Coupling of Magnetodynamics and Elastomechanics in Structural Analysis, J. Bialek, D. Weissenberger, M. Ulrickson and J. L. Cecchi, *Proceedings of the Tenth Symposium on Fusion Engineering*, 51-5 (1984).
  43. Phenomenology of Bulk Gettering, R. J. Knize and J. L. Cecchi, *Fus. Technol.* **6**, 503-510 (September 1984).
  44. Gettering in Fusion Devices, J. L. Cecchi and R. J. Knize, *J. Vac. Sci. Technol.*, **A2**, 1214-1221 (April 1984).
  45. Spin Exchange Optical Pumping to Produce Large Amounts of Polarized Nuclei, W. Happer, E. Miron, R. Knize, and J. Cecchi, *Proceedings of Polarized Proton Ion Sources Vancouver, Canada, May 1983, AIP Conference Proceedings No 117, (American Institute of Physics, 1984) 114-121.*

46. Initial Limiter and Getter Operation on TFTR, J. L. Cecchi, et al., *J. Nucl. Mater.* **128/129**, 1-9 (1984).
47. Tritium Inventory and Permeation in TFTR, M. I. Baskes, K. L. Wilson, D. K. Brice, B. L. Doyle, W. R. Wampler, D. B. Heifetz, H. F. Dylla, and J. L. Cecchi, *J. Nucl. Mater.* **128/129**, 629 (1984).
48. TFTR Initial Operations, K. M. Young, M. G. Bell, W. R. Blanchard, N. L. Bretz, J. L. Cecchi, J. Coonrod, S. L. Davis, H. F. Dylla, P. C. Efthimion, R. J. Fonck, R. J. Goldston, D. J. Grove, R. J. Hawryluk, H. W. Hendel, K. W. Hill, J. Isaacson, L. C. Johnson, R. Kaita, R. B. Krawchuk, R. Little, M. P. McCarthy, D. C. McCune, K. McGuire, D. M. Meade, S. S. Medley, D. Mikkelson, D. Mueller, E. Nieschmidt, D. K. Owens, A. T. Ramsey, A. L. Roquemore, L. E. Samuelson, N.R. Sauthoff, J. F. Schivell, J. A. Schmidt, S. Sesnic, J. Sinnis, J. D. Strachan, G. D. Tait, G. Taylor, F. H. Tenney, and M. Ulrickson, *Plasma Physics and Controlled Fusion* **26**, 11 (January 1984).
49. Measurement of the Hydrogenic Recombination Coefficient for the TFTR Vacuum Vessel, H. F. Dylla, J. L. Cecchi, R. J. Knize, *J. Nucl. Mater.*, **121**, 243-248 (March 1984).
50. Thermal Loads on the Ignitor Limiter for Elongated Plasmas, J. L. Cecchi and B. Coppi, *J. Nucl. Mater.*, **121**, 449-452 (March 1984).
51. Recent Results from TFTR, R. J. Hawryluk, M. G. Bell, M. Bitter, W. R. Blanchard, N. Bretz, C. Bush, J. L. Cecchi, et al., *Proceedings of Fourth International Symposium on Heating in Toroidal Plasmas, Rome, Italy, (March 1984)* edited by H. Knoepfel and E. Sindoni, Vol. II, pp. 1012-1031.
52. Power Handling and Particle Control in TFTR, R. J. Hawryluk, J. L. Cecchi, H. F. Dylla, R. J. Knize, R. Little, D. K. Owens, and M. Ulrickson, *Proceedings of the Fourth International Symposium on Heating in Toroidal Plasmas, Rome, Italy, (March 1984)* edited by H. Knoepfel and E. Sindoni, Vol. II, p. 1374.
53. Diffusion of Hydrogen and Deuterium in ZrVFe, R. J. Knize, J. L. Stanton, and J. L. Cecchi, *J. Nucl. Mater.*, **122/123**, 1553-1557 (April 1984).
54. Initial Confinement Studies of Ohmically Heated Plasmas in the Tokamak Fusion Test Reactor, P. C. Efthimion, M. G. Bell, W. R. Blanchard, N. L. Bretz, J. L. Cecchi, et al., *Phys. Rev. Letters*, **52**, 1492-1495 (April 1984).
55. Optical Pumping Production of Spin Polarized Hydrogen, R. J. Knize, W. Happer, and J. L. Cecchi, *Proceedings of the Workshop on Polarized Targets in Storage Rings Argonne, Il, (May 1984)*.

56. Neutral Beam Heating in TFTR-Projections and Initial Results, H. P. Eubank, J. Bell, M. G. Bell, M. Bitter, W. R. Blanchard, F. Boody, D. Boyd, N. Bretz, C. Bush, J. L. Cecchi, et al. Proc. Tenth International Conference on Plasma Physics and Controlled Nuclear Fusion Research IAEA-CN-44/A-V-3, 27 pp. London, UK, 12-19 (September 1984).
57. Confinement Studies of Ohmically-Heated Plasmas in TFTR, P. C. Efthimion, N. L. Bretz, M. G. Bell, M. Bitter, W. R. Blanchard, F. P. Boody, D. Boyd, C. E. Bush, J. L. Cecchi, et al. Tenth International Conference on Plasma Physics and Controlled Nuclear Fusion Research London, UK, September 1984, Paper IAEA-CN-44/A-I-2 1 (September 1984).
58. Adiabatic Toroidal Compression and Free-Expansion Experiments in TFTR, G. D. Tait, J. Bell, M. G. Bell, M. Bitter, W. R. Blanchard, F. P. Boody, D. Boyd, N. L. Bretz, C. E. Bush, J. L. Cecchi, et al., Tenth International Conference on Plasma Physics and Controlled Nuclear Fusion Research, London, UK, September 1984, Paper IAEA-CN-44/A-III-1 (September 1984).
59. Technique for In Vacuo Inerting of ZrAl Alloy Bulk Getters, J. L. Cecchi, P. H. LaMarche, H. F. Dylla, and R. J. Knize, *J. Vac. Sci. Technol.* **A3**, 487 (1985).
60. Performance of the TFTR Moveable Limiter Tiles, M. Ulrickson, J. L. Cecchi, B. Doyle, H. F. Dylla, S. S. Medley, D. K. Owens, and P. Trester, *J. Nucl. Mater.*, **133/134**, 253 (1985).
61. Initial Results Utilizing Optical Pumping with a Laser to Produce Spin-Polarized Hydrogen, R.J. Knize and J.L. Cecchi, *Phys Lett.*, **113A**, 255 (1985).
62. Lifetimes and Oscillator Strengths for the Resonance Transitions in Cu-like Iodine, I XXV, B.M. Johnson, K.W. Jones, D.C. Gregory, J.O. Ekberg, L. Engstrom, T.H. Kruse, and J.L. Cecchi, *Physica Scripta*, **32**, 210 (1985).
63. Confinement Studies of Neutral Beam Heated Discharges in TFTR, M. Murakami, V. Arunasalam, J.D. Bell, W.G. Bell, M. Bitter, W.R. Blanchard, F. Boody, N. Bretz, R. Budny, C.E. Bush, J.D. Callen, J.L. Cecchi, et al., *Plasma Physics and Controlled Fusion*, **28**, 17 (September 1986).
64. TFTR Confinement Results, M.G. Bell, V. Arunasalam, M. Bitter, W.R. Blanchard, F. Boody, N. Bretz, R. Budny, C.E. Bush, J.D. Callen, J.L. Cecchi, et al., *Plasma Physics and Controlled Fusion*, **28**, 1329-1340 (September 1986).
65. Time Resolved Optical Pumping Studies of Hydrogen Discharges, R.J. Knize and J.L. Cecchi, *Phys. Rev. A*, **33** 3595 (May 1986).
66. Dissociative Pumping of the Alkanes Using Nonevaporable Getters, L.C. Emerson, R.J. Knize, J.L. Cecchi, and O. Auciello, *J. Vac. Sci. Technol.*, **A4**, 297-299 (May 1986).

67. Plasma Materials Interactions in TFTR, H.F. Dylla, M.G. Bell, W.R. Blanchard, F.P. Boody, N. Bretz, R. Budny, C.E. Bush, J.L. Cecchi, et al., *J. Nucl. Mater.* **145/146**, 48-60 (February, 1987).
68. Measurement of the Hydrogen Recombination Coefficient for ZrAl, R.J. Knize, L.C. Emerson, and J.L. Cecchi, *J. Vac. Sci. Technol.*, **A5**, 2202-2204 (June 1987).
69. Pumping of Hydrocarbons Using Nonevaporable Getters, L.C. Emerson, R.J. Knize, and J.L. Cecchi, *J. Vac. Sci. Technol.*, **A5**, 2584-2586 (July, 1987).
70. Plasma Surface Interactions in Compact Ignition Devices, M. Ulrickson, J.L. Cecchi, and B. Lipschultz, *J. Vac. Sci. Technol.*, **A5**, 2257-2262 (June 1987).
71. Neutral Beam Injection on the Tokmak Fusion Test Reactor, L.R. Grisham, M.G. Bell, W.R. Blanchard, F.P. Boody, N. Bretz, R. Budny, C.E. Bush, J.L. Cecchi, et al., *Nucl. Instrum. Methods, Phys. Res., Sect. B*, **b24-25**, 741-745 (1987).
72. Introduction to Plasma Concepts and Discharge Configurations, J.L. Cecchi, in, *Handbook of Plasma Processing Technology*, S.M. Rossnagel, J.J. Cuomo, and W.D. Westwood, eds., (Noyes, Park Ridge, NJ, 1990) pp. 14-69.
73. Diagnostics of Low Temperature Plasmas: The Electron Component, D.M. Manos, J.L. Cecchi, C.W. Cheah, and H.F. Dylla, *Thin Solid Films*, **195**, 319-336 (1991).
74. Operational Characteristics of SF<sub>6</sub> Etching in an Electron Cyclotron Resonance Plasma Reactor, J.L. Cecchi, J.E. Stevens, R.L. Jarecki, Jr., and Y.C. Huang, *J. Vac. Sci. Technol.*, **B9**, 318 (1991).
75. Optimized Microwave Coupling in an Electron Cyclotron Resonance Etch Tool, J.E. Stevens, J.L. Cecchi, Y.C. Huang, and R.L. Jarecki, Jr., *J. Vac. Sci. Technol.*, **A9**, 696 (1991).
76. Microwave Interferometric Measurements of Process Plasma Density, C.W. Cheah, J.L. Cecchi, and J.E. Stevens, *Advanced Techniques for Integrated Circuit Processing*, J. Bondur and T.R. Turner, eds., **1392**, 487 (1991).
77. Plasma Uniformity and Power Deposition in Electron Cyclotron Resonance Etch Tools, J.E. Stevens, Y.C. Huang, R.L. Jarecki, Jr., and J.L. Cecchi, *J. Vac. Sci. Technol.*, **A10**, 1270 (1992).
78. Wave Propagation and Plasma Uniformity in an Electron Cyclotron Resonance Plasma Etch Reactor, J.E. Stevens and J.L. Cecchi, *Jpn. J. Appl. Phys.*, **32**, 15 (1993).

79. Metastable Argon Beam Source Using a Surface Wave Sustained Plasma, M.E. Bannister and J.L. Cecchi, *J. Vac. Sci. Technol.* **A12** (1993) 106.
80. Effect of RF Wafer Biasing in an ECR Plasma Etch Reactor, J.L. Cecchi, J.E. Stevens, C.W. Cheah, Y.C. Huang, R.L. Jarecki, and C.D. Zuiker, *Proc. 2nd Int. Conf. on Reactive Plasmas and 11th Symp. on Plasma Processing*, 19-21 Jan. 94, Yokohama, Japan (Japan Society of Applied Physics, 1994) 35.
81. Helicon Plasma Source Excited by a Flat Spiral Coil, J.E. Stevens, M.J. Sowa, and J.L. Cecchi, *J. Vac. Sci. Technol.* **A 13**, (1995) 2476.
82. Uniformity of RF Bias Voltages Along Conducting Surfaces in a Plasma, J.E. Stevens, M.J. Sowa, and J.L. Cecchi, *J. Vac. Sci. Technol.* **A 14**, (1996) 139.
83. *In-situ* Electrochemical Investigation of Tungsten Electrochemical Behavior During Chemical Mechanical Polishing, D.J. Stein, D. Hetherington, T. Guilinger, and J.L. Cecchi, *J. Electrochem. Soc.*, **145**, (1998) 3190.
84. Investigation of the Kinetics of Tungsten Chemical Mechanical Polishing in Potassium Iodate-Based Slurries I: Role of Alumina and Potassium Iodate, D.J. Stein, K.L. Hetherington, and J.L. Cecchi, *J. Electrochem. Soc.*, **146**, (1999) 376.
85. Investigation of the Kinetics of Tungsten Chemical Mechanical Polishing in Potassium Iodate-Based Slurries II: Roles of Colloid Species and slurry Chemistry, D.J. Stein, K.L. Hetherington, and J.L. Cecchi, *J. Electrochem. Soc.*, **146**, (May, 1999).
86. Atomic Force Microscopy, Lateral Force Microscopy, and Transmission Electron Microscopy Investigations and Adhesion Force Measurements for Elucidation of Tungsten Removal Mechanisms, D.J. Stein, J.L. Cecchi, and D.L. Hetherington, *J. Mater. Res.*, **14**, (1999) 3695.
87. Fluorocarbon Polymer Deposition Kinetics in a Low-Pressure High-Density Inductively Coupled Plasma Reactor, M.J. Sowa, M.E. Littau, V. Pohray, and J.L. Cecchi, *J. Vac. Sci. Technol. A* **18** (2000) 2122.
88. Response Surface Modeling of the Composition of  $\text{AlAs}_y\text{Sb}_{1-y}$  Alloys Grown by Molecular Beam Epitaxy, P. Gopaladasu, J.L. Cecchi, K.J. Malloy, and R. Kaspi, *J. Cryst. Growth* **225** (2001) 556.
89. Diode Laser Measurements of  $\text{CF}_x$  Species in a Low-Pressure High-Density Plasma Reactor, M.E. Littau, M.J. Sowa, and J.L. Cecchi, *J. Vac. Sci. Technol. A* **20** (2002) 1603.
90. High Performance Engines: Fast Cars Accelerate Learning, S.M. Han, J.L. Cecchi, and J.J. Russell, *Journal of Engineering Education*, *Chem. Eng. Educ.* 37(3), 208 (2003).



91. Nanometer-Thick Conformal Pore Sealing of Self-Assembled Mesoporous Silica by Plasma-Assisted Atomic Layer Deposition, Y-B Jiang, N. Liu, H Gerung, J.L. Cecchi, and C.J. Brinker, *J. Am. Chem. Soc.* 128, 11018 (2006).
92. Ultra-Thin Conformal Pore-Sealing of Low-k Materials by Plasma-Activated Atomic Layer Deposition, J.L. Cecchi, C.J. Brinker, and Y-B Jiang, *ECS Transactions*, 11(7) 167-176 (2007).
93. Sub-10 nm Thick Microporous Membranes Made by Plasma-Defined Atomic Layer Deposition of a Bridged Silsesquioxane Precursor, Y-B Jiang, G Xomeritakis, Z Chen, D Dunphy, D.J. Kissel, J.L. Cecchi, and C.J. Brinker, *J. Am Chem. Soc.*, 129, 15446-15447 (2007).

### CONFERENCE PRESENTATIONS (1990-PRESENT)

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1. Anisotropic Etching of Polysilicon in a Downstream ECR-RF Hybrid Reactor, J.L. Cecchi, C.W. Cheah, Y.C. Huang, R.L. Jarecki, M. Leahy, J.E. Stevens, American Vacuum Society, 37<sup>th</sup> National Symposium, Toronto, Ontario, 8-12 October, 1990, PS-1-FrM7.
2. Optimized Microwave Coupling in an ECR Plasma Etch Tool, J.L. Cecchi, Y.C. Huang, R.L. Jarecki, J.E. Stevens, American Vacuum Society, 37<sup>th</sup> National Symposium, Toronto, Ontario, 8-12 October, 1990, PS-WeM2.
3. Measurement and Analysis of RF Discharge Impedance Characteristics of a Parallel Plate Triode Etch Reactor, C.W. Cheah, C.D. Zuiker, J.L. Cecchi, J.E. Stevens, American Vacuum Society, 37<sup>th</sup> National Symposium, Toronto, Ontario, 8-12 October, 1990, PS-TuA5.
4. Coupling To Whistler Waves In ECR Plasma Etch Tools, J.E. Stevens, Y.C. Huang, R.L. Jarecki, J. L. Cecchi, 7<sup>th</sup> Topical Conference on RF Power in Plasmas, Charleston, South Carolina, August, 1991.
5. Surface Wave Sustained Plasma Source of a Supersonic Beam of Argon Metastables, M. Bannister, J.L. Cecchi, G. Scoles, GEC 91 44<sup>th</sup> Annual Gaseous Electronics Conference, Albuquerque, New Mexico, 22-25 October, 1991, BB-4.
6. Microwave Impedance Matching in an ECR Plasma Etch Tool, J.E. Stevens, J.L. Cecchi, GEC91 44<sup>th</sup> Annual Gaseous Electronics Conference, Albuquerque, New Mexico, 22-25 October, 1991, RB-2.

7. Measurement of rf Current and Voltage on the rf-Biased Wafer Chuck of an ECR Plasma Etch Reactor, C.W. Cheah, R.L. Jarecki, JR., Y.C. Huang, J.E. Stevens, J.L. Cecchi, American Vacuum Society, 38<sup>th</sup> National Symposium, Seattle, Washington, 11-15 November, 1991, PS2-We M2.
8. Plasma Uniformity and Power Deposition in Electron Cyclotron Resonance Etch Tools, J.E. Stevens, Y.C. Huang, R.L. Jarecki, J.L. Cecchi, American Vacuum Society, 38<sup>th</sup> National Symposium, Seattle, Washington, 11-15 November, 1991, PS2-WeM7.
9. Characterization of Selectivity and Anisotropy for Polysilicon Etching in a Downstream Electron Cyclotron Resonance Plasma Reactor, J.L. Cecchi, R.L. Jarecki, JR., Y.C. Huang, C.W. Cheah, J.E. Stevens, American Institute of Chemical Engineers, 1991 Annual Meeting, Los Angeles, California, 17-22 November, 1991, 28f.
10. Wave Propagation and Plasma Uniformity in an ECR Plasma Etch Reactor, [**Invited**], J.L. Cecchi, J.E. Stevens, The Institute of Electrical Engineers of Japan, Proceedings of Symposium on Dry Process, Tokyo, Japan, 29-30, 1992.
11. Mechanisms for Microwave Power Absorption in ECR Plasmas, J. Cecchi, J.E. Stevens, American Institute of Chemical Engineers, 1992 Annual Meeting, Miami Beach, Florida, 1-6 November, 1992.
12. Laser-Induced Fluorescence Detection of Metastable Fluorine and Neon Atoms in an ECR Reactor, C.D. Zuiker, J.L. Cecchi, American Vacuum Society, 39<sup>th</sup> National Symposium, Chicago, Illinois, 9-13 November, 1992, PS-TuM9.
13. Correlation of Etch Characteristics to Reaction Parameters in an ECR Reactor, Y.C. Huang, R.L. Jarecki, J.E. Stevens, J.L. Cecchi, American Vacuum Society, 39<sup>th</sup> National Symposium, Chicago, Illinois, 9-13 November, 1992, PS2-ThM5.
14. Microwave Power Absorption and Plasma Uniformity in ECR Plasma Reactors, J.L. Cecchi, J. Stevens, R.L. Jarecki, JR., Semiconductor Research Corporation, TECHCON '93, Atlanta, Georgia, 28-30 September, 1993.
15. Effect of RF Wafer Biasing on Plasma Uniformity in a Magnetized High-Density, Etch Tool, J.L. Cecchi, J.E. Stevens, C.W. Cheah, Y.C. Huang, R.L. Jarecki, JR., C.D. Zuiker, American Vacuum Society, 40<sup>th</sup> National Symposium, Orlando, Florida, 15-19 November, 1993, PS-TuA6
16. Comparison of ECR Etch Plasma Properties from Microwave Absorption and Langmuir Probe Measurements, J.E. Stevens, J.L. Cecchi, J. Forrester, M.G. Blane, G.D. Tipton, K. Maxwell, P. Westerfield, American Vacuum Society, 40<sup>th</sup> National Symposium, Orlando, Florida, 15-19 November, 1993, PS-WeP12

17. Effect of Wafer Biasing in an ECR Plasma Etch Reactor, J.L. Cecchi, J.E. Stevens, C.W. Cheah, Y.C. Huang, R.L. Jarecki, C.D. Zuiker, Japan Society of Applied Physics, Proceedings of the 2<sup>nd</sup> International Conference on Reactive Plasmas and 11<sup>th</sup> Symposium on Plasma Processing, Yokohama, Japan, 19-21 January, 1994.
18. Future Trends in Submicron Patterning of Silicon Semiconductors, **[Invited]**, J.L. Cecchi, New Mexico Chapter of the American Vacuum Society, 30<sup>th</sup> Annual Symposium, Albuquerque, New Mexico, 18-22 April, 1994.
19. Helicon Plasma Source Excited by Flat Spiral Coil, J.E. Stevens, J.L. Cecchi, American Vacuum Society, 41<sup>st</sup> National Symposium, Denver, Colorado, 24-28 October, 1994, PS-TuA1.
20. Effects of RF Wafer biasing in Low Pressure High-Density Plasma Etch Tools, J.L. Cecchi, J.E. Stevens, 21<sup>st</sup> Annual Plasma Seminar Proceedings, July, 1995.
21. Recent Trends in Plasma Science and Technology, **[Invited]** J.L. Cecchi, AVS 42<sup>nd</sup> National Symposium, Minneapolis, Minnesota, 16-20 October, 1995, PS-WeM1.
22. Diode Laser Absorption Measurements of Fluorocarbon Species in a Plasma Etching Reactor, R.T.P. Pender, D.J. Kane, J.C. Arnold, K.E. Greenberg, H.M. Anderson, J.L. Cecchi, American Vacuum Society, 42<sup>nd</sup> National Symposium, Minneapolis, Minnesota, 16-20 October, 1995, MS-WeP12.
23. Low Pressure High-Density Plasma Reactors for Submicron Etching, **[Invited]** J.L. Cecchi, Thirteenth International Vacuum Congress, Ninth International Conference on Solid Surfaces, Yokohama, Japan, 25-29 September, 1995.
24. Applications of Laser Scanning Confocal Microscopy to Surface Topography Measurement of CMP Pads, D. J. Stein, J. L. Cecchi, D. L. Hetherington, and F. B. Kaufman, CMP-MIC Meeting, Santa Clara, Feb. 1996. [Proceedings page 61]
25. Kinetics of Polymer Film Growth During Selective Oxide Etching in a Low-Pressure High-Density Plasma Reactor, M. J., Sowa, M. Littau, V. Pohray, K. Greenberg, J. L. Cecchi, Semiconductor Research Corporation, TECHCON '96, Phoenix, Arizona, 12-14 September, 1996, 24.4.
26. Kinetics of Polymer Film Growth During Selective Oxide Etching in a Low-Pressure High-Density Plasma Reactor, J. L. Cecchi, M.J. Sowa, J.T. Pender, American Vacuum Society, 43<sup>rd</sup> National Symposium, Philadelphia, Pennsylvania, 14-18 October, 1996, PS-MoA3.
27. Fluorocarbon Species Measurement and Modeling for Low-Pressure, High Density SiO<sub>2</sub> Plasma Etching, M.J. Sowa, J.T. Pender, M. Littau, J.L. Cecchi, American Vacuum

- Society, 43<sup>rd</sup> National Symposium, Philadelphia, Pennsylvania, 14-18 October, 1996, PS-MoA4.
28. Remote Plasma Impedance Measurements in an Inductively Coupled Plasma, G.J. Melden, J.L. Cecchi, American Vacuum Society, 43<sup>rd</sup> National Symposium, Philadelphia, Pennsylvania, 14-18 October, 1996, MS+PS-WeM8.
  29. High Density Plasma Tool Process Development using "Plasma Chemical State" Diagnostics, H.M. Anderson, M.P. Splichal, J.T. Pender, J.L. Cecchi, American Vacuum Society, 43<sup>rd</sup> National Symposium, Philadelphia, Pennsylvania, 14-18 October, 1996, PS1-WeA5.
  30. Polymer Deposition and Fluorocarbon Concentrations During Oxide Etching in a Low Pressure High Density Plasma Reactor, **[Invited]**, J.L. Cecchi, M.J. Sowa, V. Pohray, and M. Littau, Plasma Etch Users Group, Santa Clara, CA, January 9, 1997.
  31. Oxide Etch Rate and Photoresist Selectivity in a High Density Inductively Coupled Plasma Reactor, M.J. Sowa, M. Littau, and J.L. Cecchi, American Vacuum Society, 44<sup>th</sup> National Symposium, San Jose, CA, October 20-24, 1997, PS-WeA4.
  32. In-situ Electrochemical Investigation of Tungsten Oxidation During Chemical Mechanical Polishing, D. J. Stein, J. L. Cecchi, D. Hetherington, and T. Guilinger, Clarkson University Workshop on CMP, Lake Placid, NY, August 1997.
  33. In-situ Electrochemical Investigation of Tungsten Oxidation During Chemical Mechanical Polishing, D. J. Stein, J. L. Cecchi, D. Hetherington, and T. Guilinger, The Third International CMP Symposium, Tokyo, Japan, December 1997.
  34. Tungsten CMP Performance of Politex and IC1400 Pads Using an Iodate/Alumina Based Slurry, D. J. Stein, J. L. Cecchi, and D. L. Hetherington, CMP-MIC Meeting, Santa Clara, CA, Feb. 1998. [Proceedings page 161]
  35. Selective Oxide Etching in a High-Density Plasma Reactor: Gas Phase Chemistry, **[Invited]** J.L. Cecchi, T.M. Bauer, A. Inoue, M.E. Littau, and M.J. Sowa, American Vacuum Society, 45<sup>th</sup> International Symposium, Baltimore, MD, November 2-6, 1998, PS2-TuM3.
  36. New Developments in Understanding the Removal of Tungsten by Chemical Mechanical Polishing, **[Invited]** D.J. Stein, D.L. Hetherington, and J.L. Cecchi, 35<sup>th</sup> Annual Symposium of the New Mexico Chapter of the American Vacuum Society, March 29-April 2, 1999, Albuquerque, NM.
  37. Comparison of Actinometric and Diode-Laser Absorption Measurements of [CF] and [CF<sub>2</sub>] in an Inductively Coupled Plasma Reactor, T.M. Bauer, A. Inoue, P.-T. Ton-Nu, and J.L. Cecchi, American Vacuum Society, 46<sup>th</sup> International Symposium, Seattle, WA, October 25-29, 1999, PS-MoA3.

38. Surface Science of Tungsten CMP Removal, D.J. Stein, D.L. Hetherington, and J.L. Cecchi, American Vacuum Society, 46<sup>th</sup> International Symposium, Seattle, WA, October 25-29, 1999, MS-TuA3.
39. Reaction Mechanisms for Tungsten Chemical-Mechanical Polishing, David J. Stein, Dale L. Hetherington, and Joseph L. Cecchi, American Institute of Chemical Engineering 1999 Annual Meeting, October 31- November 5, 1999, Dallas, TX, Paper 192j.
40. Time evolution of fluorocarbon radical concentrations during pulsed oxide etching plasmas in an ICP reactor, **[Invited]** T.M. Bauer, X. Wu, and J.L. Cecchi, Gordon Research Conference: Plasma Processing Science, Tilton, NH, August 13-18, 2000
42. Time-Resolved Measurements of Fluorocarbon Radical Concentrations during Pulsed Oxide Etching Plasmas, T.M. Bauer, X. Wu, and J.L. Cecchi, American Vacuum Society, 47<sup>th</sup> International Symposium, Boston, MA, October 2-6, 2000, PS2-TuA6.
43. Measurements of Fluorocarbon Radical Kinetics in an ICP Oxide Etch Reactor, Todd M. Bauer, Xiaomei Wu, and Joseph L. Cecchi, American Institute of Chemical Engineering 2000 Annual Meeting, November 12-17, 2000, Los Angeles, CA, Paper 210b.
44. Time-Resolved CF<sub>2</sub> Rotational Temperature Measurements in Inductively-Coupled Pulsed Plasmas, X. Wu, T.M. Bauer, and J.L. Cecchi, American Vacuum Society, 48<sup>th</sup> International Symposium, San Francisco, CA, October 28 – November 2, 2001, PS1-TuM3.
45. Plasma Enhanced Chemical Vapor Deposition of a Dense SiO<sub>2</sub> Cap Layer on Low-k Nanostructured Porous Silica, Y.B. Jiang, N. Liu, C.J. Brinker, and J.L. Cecchi, American Vacuum Society, 49<sup>th</sup> International Symposium, Denver, CO, November 3-8, 2002, PS+NT-WeM1.
46. Loss Kinetics of CF<sub>x</sub> Radicals and F Atoms in the Afterglow of Inductively Coupled Pulsed Plasmas, X. Wu and J.L. Cecchi, American Vacuum Society, 50<sup>th</sup> International Symposium, Baltimore, MD, November 2-7, 2003, PS-TuM9.
47. Deposition of Conformal Nano Cap Layers on Self-Assembled Nanoporous Low-k Silica by Plasma-Assisted ALD, Y-B Jiang, J.L. Cecchi, C.J. Brinker, American Vacuum Society, 5th International Conference on Atomic Layer Deposition, August 8-10, 2005, San Jose, California.
48. Remote Plasma Assisted Atomic Layer Deposition of Ultra-thin Pore-sealing for Self-assembled Porous Low-k Materials Ying-Bing Jiang, George Xomeritakes, Zhu Chen, Darren Dunphy, Jiebin Pang, Eric Branson, Joseph L. Cecchi and C. Jeffrey Brinker, Materials Research Society, 2007 Spring Meeting, April 10-12, 2007, San Francisco, CA., B1-4.

49. Ultra- Thin Conformal Pore-Sealing of Low-K Materials by Plasma-Assisted ALD, **[INVITED]** Joseph L. Cecchi, C. Jeffrey Brinker, and Ying-Bing Jiang, Third symposium on Atomic Layer Deposition Applications, 212th Electrochemical Society Meeting, Washington, DC, October 7 - 12, 2007.

### INVITED PRESENTATIONS AND SEMINARS

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- Dartmouth College, Mar., 1972
- Trenton State College, Nov., 1973
- East Stroudsburg State College, Dec., 1973
- Lehigh University, Nov., 1974
- East Stroudsburg State College, Nov., 1974
- Joint USSR-USA Workshop on the Problems of Impurities, Divertors, Walls, and Limiters, Kurchatov Institute of Atomic Energy, Moscow, USSR, May, 1975
- Massachusetts Institute of Technology, Sept., 1975
- Columbia University, April, 1976
- Seventh Annual Symposium on Applied Vacuum Science and Technology (American Vacuum Society), Tampa, FL, Feb., 1978
- Fourth International Conference on Plasma Surface Interactions in Controlled Fusion Devices, Garmisch-Partenkirchen, Federal Republic of Germany, April, 1980
- 9th Symp. on Engineering Problems in Fusion Devices, Chicago, IL., Nov., 1981
- Gordon Conference on Atomic Physics, New London, NH, July, 1983
- Third Topical Meeting on Fusion Reactor Materials, Albuquerque, NM, Sept., 1983
- 30th National Symposium, American Vacuum Society, Boston, MA, Nov., 1983
- Sixth International Conference on Plasma Surface Interactions in Controlled Fusion Devices, Nagoya, Japan, May, 1984
- 10th Intern. Vacuum Congress, 6th Intern. Conference on Solid Surfaces, and 33rd National Symposium, American Vacuum Society, Baltimore, MD., Oct., 1986
- University of Virginia, April, 1988
- Princeton University, Department of Chemical Engineering, Oct., 1988
- IBM, East Fishkill, NY, Mar., 1989
- AT&T Bell Laboratories, Murray Hill, NJ, June, 1989
- 7th American Physical Society Topical Conference on Atomic Processes in Plasmas, Gaithersburg, MD., Oct., 1989
- Princeton University, Plasma Physics Laboratory, Nov., 1989
- SEMATECH, Austin, TX, Jan., 1990
- AT&T Bell Laboratories, Allentown, PA, Feb., 1990
- Hercules Advanced Materials and Systems, Wilmington, DE, June, 1990
- Princeton University, Plasma Physics Laboratory, April, 1991
- IBM, East Fishkill, NY, April, 1991
- IBM, Burlington, VT, April, 1991

- University of New Mexico, Department of Chemical and Nuclear Engineering, Albuquerque, NM, Feb., 1992
- SEMATECH, Austin, TX, Mar., 1992
- Princeton University, Department of Electrical Engineering, April, 1992
- Rutgers University, Department of Physics, May, 1992
- SEMATECH, Etch Focus Technical Advisory Board, Austin, TX, July, 1992
- 14th Dry Process Symposium, Tokyo, Japan, Oct., 1992
- Princeton University, Department of Chemical Engineering, Dec., 1992
- North Carolina State University, Center for Advanced Electronic Materials Processing, Raleigh, NC, Mar., 1993
- University of New Mexico, Department of Chemical and Nuclear Engineering, Albuquerque, NM, May, 1993
- American Vacuum Society, New Mexico Chapter Meeting, April, 1994
- Tegal Symposium, San Francisco, CA, July 1995
- IUUSTA Workshop on Plasma Sources and Surface Interactions in Materials Processing, Fuji-Yoshida, Japan, Sept., 1995
- 13th International Vacuum Congress and 9th International Conference on Solid Surface, Yokohama, Japan, Sept., 1995
- 42nd National Symposium, American Vacuum Society, Minneapolis, MN, Oct., 1995
- Lucent Technologies, Bell Laboratories, Mar., 1996
- Lam Research Corporation, Fremont, CA, July, 1996
- Intel Corporation, Rio Rancho, NM, Sept., 1996
- Plasma Etch Users' Group (PEUG) Meeting, Santa Clara, CA, Jan., 1997
- 45<sup>th</sup> International Symposium, American Vacuum Society, Baltimore, MD, November 1998
- 35<sup>th</sup> Annual Symposium of the New Mexico Chapter of the American Vacuum Society, Albuquerque, NM, March 1999
- University of Texas at Austin, Department of Chemical Engineering, Sept., 1999.
- Texas Tech University, Department of Physics, October, 1999
- The University of California at Los Angeles (UCLA), Department of Chemical Engineering, May, 2000
- The Gordon Research Conference on Plasma Processing Science, Tilton, NH, August, 2000
- The University of Wisconsin, Madison, April, 2001
- Colorado School of Mines, Golden, CO, April 2008
- The Masdar Institute of Science and Technology, Abu Dhabi, UAE, June 2008

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## PATENTS

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- Method of Enhancing Selective Isotope Desorption from Metals, U.S. Patent No. 4,476,100, Issued: October 9, 1984.
- Hydrogen Isotope Separation Utilizing Bulk Getters, U.S. Patent No. 4,976,938, Issued: December 11, 1990.

- Hydrogen Isotope Separation Utilizing Bulk Getters, U.S. Patent No. 5,041,147, Issued: August 20, 1991.
- Method and Apparatus for Coupling a Microwave Source in an Electron Cyclotron Resonance System, U.S. Patent No. 5,111,111, Issued: September 30, 1991.
- Apparatus and Method for Uniform Microwave Plasma Processing Using TE<sub>11</sub> and TM<sub>01</sub> Modes, U.S. Patent No. 5,302,803, Issued: April 12, 1994.
- Apparatus and Process for Producing High Density Axially Extended Plasmas, U.S. Patent No. 5,587,038, Issued December 24, 1996.
- Method of Making Dense, Conformal, Ultra-Thin Cap layers for Nanoporous Low-k ILD by Plasma Assisted Atomic Layer Deposition, U.S. Patent No. 7,947,579, Issued May 24, 2011.
- Ultra-Thin Microporous/Hybrid Materials, U.S. Patent No. 8,187,678, Issued May 29, 2012.

## CONSULTING

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- Vista Scientific Corporation, Ivyland, PA
- Princeton Scientific Consultants, Princeton, NJ
- PA Consulting, East Windsor, NJ
- Argonne National Laboratory, Argonne, IL
- Maxwell Laboratories, San Diego, CA
- Eaton Corporation, Beverly, MA
- Ebasco Services, Incorporated, New York, NY
- EMCORE Corporation, Somerset, NJ
- SRI David Sarnoff Research Center, Princeton, NJ
- Materials Research Corporation, Orangeburg, NY
- Sigma Partners, Palo Alto, CA
- Intel Corp., Rio Rancho, NM
- Samsung Semiconductor, Korea
- LG Semiconductor, Korea
- Lucent Technologies, Bell Labs, Murray Hill, NJ
- Cravath, Swain & Moore LLP, New York, NY
- Hyundai Microelectronics, Korea
- Finnegan, Henderson, Farabow, Garrett, & Dunner LLP, Washington, DC
- Plasma Physics Corporation, Locust Valley, NY
- Baker Botts LLP, New York, NY
- Intersil Corporation, Melbourne, FL
- Hynix Microelectronics, Korea
- Townsend and Townsend and Crewe LLP, San Francisco, CA
- Applied Materials Corporation, Santa Clara, CA
- Goodwin Procter LLP, Boston, MA



- Morgan Lewis, LLP, Palo Alto, CA
- Agere Systems, Allentown, PA
- LSI Logic Corporation, Milpitas, CA
- Solar Physics Corporation, Locust Valley, NY
- Lam Research Corp., Fremont, CA
- Atmel Corporation, San Jose, CA

## OTHER PROFESSIONAL AND COMMUNITY ACTIVITIES

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- Visiting Associate Physicist, Brookhaven National Laboratory, 1976-1978
- U.S. Department of Energy Steering Committee on the Development of Advanced Limiters in Fusion Devices, 1981-1983
- Program Chairman, Symposium on Energy Removal and Particle Control in Fusion Devices, Princeton, NJ, July 26-29, 1983
- Guest Editor, Journal of Nuclear Materials, 1983, 1986
- Advisory Committee, North Carolina State University, Department of Nuclear Engineering, 1985-1987
- U.S. Department of Energy, Magnetic Fusion Advisory Committee (MFAC) Panel on DOE Technical Planning Document, 1986-1987
- Program Council, New Jersey Advanced Technology Center for Surface Engineered Materials, 1987-1994
- Executive Committee, New Jersey Advanced Technology Center for Photonic and Optoelectronic Materials, 1988-1994
- Plasma Etching Roadmap Committee, Semiconductor Research Corp., 1988-1989
- Program Chairman, Topical Research Conference on Plasma Etching, Princeton, NJ, May 14-15, 1992
- Semiconductor Industry Association Roadmap Committee, 1991-1993
- Semiconductor Industry Association National Technology Roadmap for Semiconductors: Interconnect Technical Working Group (TWG), 1993-1997
- Program Committee, Dry Process Symposium, Tokyo, Japan, 1994
- Program Committee, 3rd Inter. Conf. Reactive Plasmas/14th Symposium on Plasma Processing, Nara, Japan, 1997
- Advisory Council, Program in Plasma Physics, Princeton University, 1997-2001
- Semiconductor Industry Association International Technology Roadmap for Semiconductors (ITRS): Interconnect Technical Working Group (TWG), 1994-2000
- Program Committee, Division of Plasma Science and Technology, AVS Annual Symposium Program Committee, 1999-2000
- Program Co-Chair, New Mexico American Vacuum Society Annual Symposium, Albuquerque, NM, May 24-25, 2000
- Program Co-chair, Plasma Processing, American Institute of Chemical Engineers (AIChE) Annual Meeting, November 12-17, 2000, Los Angeles, CA
- Program Chair, Plasma Science and Technology Division, 15<sup>th</sup> International Vacuum Congress, San Francisco, CA, Oct. 29 - Nov. 2, 2001

- Director, The Science and Technology Corporation at the University of New Mexico, 2001 – present; Chairman of the Board of Directors, 2004-present
- Education Advisory Group, National Society of Professional Engineers, 2002-2006
- Member, Next Generation Economic Initiative Microsystems Cluster, 2002-2004
- Member, National Aeronautics and Space Administration (NASA), Office of Aeronautics, Council of Deans, 2004-2005
- Honorary Commander and Senior Advisor to the leadership of Kirtland Air Force Base, 2004-07
- Governing Board, The National Institute for Nano-Engineering, 2007-2010
- Member, Alexis de Tocqueville Society, United Way of Central New Mexico, 2007-2011
- Advisory Board, Noribachi, LLC, 2008-2011
- Vice Chair, Engineering Deans' Council, American Society for Engineering Education, 2009-2010
- New Mexico Clean Energy Alliance, 2010-2011
- New Mexico Department of Economic Development Technology Commercialization Working Group, 2010-2011
- Member, Massachusetts Institute of Technology (MIT) Energy Initiative Governing Board, 2011-2012.
- Member, Massachusetts Institute of Technology (MIT) Energy Initiative Executive Committee, 2011-2012.
- Greater Albuquerque Chamber of Commerce Energy, Renewables and Water Planning Council 2010-present

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## PROFESSIONAL ASSOCIATIONS

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- American Association for the Advancement of Science (AAAS)
- American Institute of Chemical Engineers (AIChE)
- American Physical Society (APS)
- American Society for Quality (ASQ)
- American Society of Engineering Education (ASEE)
  - Member, Engineering Deans Council (EDC), 2000-2010
  - Director, EDC Executive Board, 2006-2010
  - Vice Chair EDC Executive Board, 2009-2010
  - Chair, EDC K-12 Task Force, 2006-2010
  - Member, EDC Public Policy Committee, 2001-2010
  - Member, EDC Data Collection Committee, 2005-2010, Chair, 2009-2010
  - Member, Engineering Deans' Institute Program Committee 2005, 2008
- American Vacuum Society (AVS)
  - Fellow of the Society
  - National Symposium Program Committee, (1981-1983, 1986-1987, 1991-1995)
  - Executive Committee, Division of Plasma Science and Technology, (1991-1995)
  - Chair, Division of Plasma Science and Technology, 1994