

# Gottlieb S. Oehrlein

Professor

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## **Academic Experience**

Professor, University of Maryland, College Park MD, since Jan. 2000.

Institute for Research in Electronics and Applied Physics

Affiliate: Dept. of Physics

Professor, Department of Physics, State University of New York, Albany NY, Sept. 1993 to Jan. 2000.

## **Industrial Experience**

Max-Planck Institut für Plasmaphysik (IPP), Garching, Germany (Jan. – Jul. 2007, sabbatical period)

Appointed to IBM Research Staff Management, 1986.

Research Staff Member, IBM Research Division, T. J. Watson Research Center, Yorktown Heights NY,  
April 1982 to Aug. 1993.

## **Education**

Ph.D., Physics, State University of New York, Albany NY, Dec. 1981.

M.S., Physics, State University of New York, Albany NY, May 1978.

Vordiplom in Physics, Würzburg University (Germany), Sept. 1976.

## **Honors And Awards (Selected)**

2010 IBM Faculty Award;

2005 Plasma Prize, Plasma Science and Technology Division, AVS Science and Technology Society (“*For groundbreaking contributions in the development of knowledge bases for plasma surface interactions in materials processing*”);

Highly Cited Researcher in Materials Science and Engineering, ISI; more than 6300 citations, H-index of 43 (Web of Science, beg. of 2014)

UMD Office of Technology Commercialization 2003 Invention of the Year Finalist (US Patent # 7470329);

2002 IBM Faculty Award;

Fellow, International Union of Pure and Applied Chemistry (2000);

Fellow, AVS Science and Technology Society (1998);

Speaker, Tenth TOYOTA Conference, Nov. 1996;

Thinker Award of Tegal Corporation, SEMICON West (1993);

Electronics Division Award of the Electrochemical Society (1992);

Six IBM Invention Plateau Awards (1982-1993);

IBM Outstanding Technical Achievement Award for *Characterization and Control of Reactive Ion Etching Induced Damage and Contamination* (1989);

Solid State Science and Technology Young Author's Award of the Electrochemical Society (1985);

State University of New York Chancellor's *Honors Convocation Award for Academic Excellence and a Distinguished Dissertation* (1982);

Fellow, Institute of International Education, New York (1980);

State University of New York, Albany, *Presidential Fellow* (1978-1981).

### **Publications, Talks And Patents**

More than 250 journal articles, proceedings articles, chapters and edited books on low temperature plasma processing of materials, plasma etching and patterning of semiconductors, polymers, dielectrics, and metals, nanostructure fabrication, real-time in-situ surface diagnostics of plasma/surface interactions advanced materials, defects in semiconductors.

Numerous Plenary and Invited Talks at Major National and International Conferences.

Patents: 11 US patents issued.

### **Professional Activities and Organizations**

#### **Editorships and Editorial Boards:**

Guest Editor (with Qinghuang Lin and Ying Zhang) of "Special Section: Advanced Plasma-Etch Technology" in *J. Micro/Nanolith. MEMS MOEMS*, Vol. 12 (4), 041301-1, Oct-Dec 2013;

International Advisory Board, *Plasma Processes & Polymers* (2007-2013);

Associate Editor, *J. Vacuum Science and Technology* (1997-1999).

G. S. Oehrlein, K. Maex, Y.-C. Joo, S. Ogawa, and J. T. Wetzels, editors, "Materials, Technology and Reliability for Advanced Interconnects and Low-k Dielectrics", *MRS Symposium Proceedings Volume 612* (Warrendale, 2001).

#### **Advisory, Organizing and Executive Committee Memberships:**

DFG (German Research Foundation) Review Panel, "Fundamentals of Complex Plasmas" (Kiel 2013)  
National Science Foundation Review Panels: Chemical, Bioengineering, Environmental, and Transport Systems (CBET) (2013); CBET (2010); Materials Research Science and Engineering Centers (MRSEC) (2007).

Department of Energy *Low Temperature Plasma Science Workshop* (UCLA, 2008)

National Research Council Panel *Data Needs in Plasma Processing of Materials* (1995-96);

National Research Council Panel *NRL Strategic Series: Plasma Processing and Processing Science* (1993-94);

IUPAC Subcommittee Member on Plasma Chemistry (1995-1999);

Advisor of SEMATECH Plasma Etch Project (1991-93);

Industrial Advisory Board of NSF Engineering Research Center for Plasma-Aided Manufacturing, University of Wisconsin, Madison (1988 to 1993).

#### **Organizing and Program Committees:**

Chair of SPIE 2014 Advanced Lithography conference "Advanced Etch Technology for Nanopatterning III", Feb. 2014, San Jose;

Co-chair of SPIE 2013 Advanced Lithography conference "Advanced Etch Technology for Nanopatterning II", Feb. 2013, San Jose;

Established and co-chaired new SPIE Advanced Lithography conference "Advanced Etch Technology for Nanopatterning", Feb. 2012, San Jose;

Co-Chair (w/ I. Kaganovich, Y. Raitses, and D. Graves), "Workshop: Control of Distribution Functions in Low Temperature Plasmas", 2011 Gaseous Electronics Conference, Salt Lake City;

AVS Plasma Science and Technology Division Program Committee, American Vacuum Society (2003-2006);  
Member, International Organizing Committee, 6th International Conference on Reactive Plasmas joined with 23rd Symposium on Plasma Processing (ICRP-6/SPP-23), Jan. 24-27, 2006, Matsushima/Sendai, Japan.  
Member, AVS Plasma Science and Technology Division Executive Committee;  
International Organizing Committee, 16<sup>th</sup> Int. Symposium on Plasma Chemistry, Taormina (June 2003);  
Co-Organizer of Materials Research Society Symposium on “*Materials, technology and reliability for advanced interconnects and low-k dielectrics*”, San Francisco (April 2000);  
US Organizer, “Second International Workshop on Basic Aspects of Nonequilibrium Plasmas Interacting with Surfaces” (BANPIS II), Tokyo, Japan (Jan. 2000);  
Scientific Committee, International Symposium on Plasma Chemistry 1999, Prague, 1999; Chairman, 1996 Tegal Symposium on Plasma Etching;  
Member of Organizing and/or Scientific Committees of *Electronic Materials Conference*, *Gordon Research Conference on Plasma Chemistry*, and *CIPG-France* (1983 to 1993).

#### **Memberships:**

AVS Society (Fellow)  
Electrochemical Society  
International Union of Pure and Applied Chemistry (Fellow)  
Materials Research Society

#### **Graduate Student and Post-Doctoral Supervision**

6 MS Theses, 15 PhD Theses, 5 Current PhD Students, 14 Post-Doctoral Fellows, 14 Visitors and Visiting Scholar Awards.

#### **Areas of Professional Interest**

Applications of Low-Temperature Plasma to Materials Processing; Surface Chemistry and Physics of Thin Film Growth, Etching And Modification; Advanced Gas Phase and Materials Characterization Techniques; Nanoscale Structure Fabrication/Characterization; Polymers and Biomaterials; Alternative Methods Of Nanolithography; Atomic Layer Etching.

#### **Teaching Experience and Interests**

##### *University of Maryland:*

Designed and taught university courses at both undergraduate and graduate level: *Nanometer Structure of Materials*, *Nanoprocessing of Materials with Plasmas*, *The Plasma State in Nature and Civilization* (University Honors Course), *Low Temperature Plasma Processing*, and *Introduction to Engineering Design*, and *Bigger, Faster, Better: The Quest for Absolute Technology*.

##### *State University of New York:*

Designed and taught university physics courses at both undergraduate and graduate level: *Introductory Physics*, *Modern Physics*, *Plasma Processing of Electronic Materials*, *Experimental Techniques of Materials Physics*.

Instructor of *International Summer School on Plasma Chemistry, ISPC-17* (Taormina, 2003).

*1997 IEDM Short Course: Giga-Scale CMOS Technology - Dry Etching*. Organized by IEEE (Washington DC, 1997).

*Lecturer at NATO Advanced Studies Institute on Plasma Processing of Semiconductors*, (Chateau de Bonas, 1996).

*High-Density Plasma Processing of Electronic Materials*. A professional course designed and taught for the AVS (1995-2002).

*Co-organizer and instructor of International Summer School on Plasma Chemistry, ISPC-12* (Minneapolis, 1995).

## **Students, Post-Doctoral Research Fellows and Visitors**

### Current Doctoral Students/Topics:

Dominik Metzler, “Atomic layer etching of SiO<sub>2</sub> and Si”

Elliot Bartis, “Fundamental science of low temperature plasma-biological material interactions”

Chen Li, “Novel precursor gases for plasma etch of advanced dielectrics”

Andrew Knoll, “Fundamental science of atmospheric pressure low temperature plasma/surface interactions”

### **Doctoral Students Supervised (with discipline)**

N. Rueger	Physics
B.E.E. Kastenmeier	Physics
M. Doemling	Physics
Joseph L. Hernandez	Physics
M. Schaepkens	Physics
T.E.F.M. Standaert	Physics
P. J. Matsuo	Physics
P. Wrschka	Physics
Xuefeng Hua	Physics
Li Ling	Materials Science & Engineering
S. Engelmann	Materials Science & Engineering
Robert Bruce	Materials Science & Engineering
Ming-Shu Kuo	Materials Science & Engineering
Florian Weilnböck	Materials Science & Engineering
Nick Fox-Lyon	Materials Science & Engineering

### **Master’s Degree Students Supervised**

Ingo Martini	Physics
Gregor Dasbach	Physics
Eric Joseph	Physics
Eric Sanjuan	Physics
Xiang Wang	Materials Science & Engineering
Bryan Orf	Materials Science & Engineering

### **Recent Undergraduate Researchers**

Joshua Park (2014); Connor Hart (2013-2014); Priscilla Tang (2012-2013)

Kevin Mecadon, Caleb Barrett, Tanner Hamann (2011-2012)

Sivan Shachar, Nirav Kumar (2009-2011)

Olatunji Godo, Matthew Graves (2009-2010)

Kevin Dwyer, Tshikuna Muanankese, Paul Lambert (2008-2009)

Michael Sweatt (2007-08), Yin Liu (2005-07)

### **Post-Doctoral Research Fellows**

1. Dr. D. Lee (2006-2007).
2. Dr. Guido Stueber (2005 – 2006).
3. Dr. Li Xi (1998-2003).
4. Dr. Si Yi Li (1999/2000).
5. Dr. Hongjiang Sun (1994/96).
6. Dr. Sjaak Beulens (1993/95).
7. Dr. Olivier Joubert (1992/93).
8. Dr. Ying Zhang (1990/93).
9. Dr. Marco Haverlag (1991/92).
10. Dr. D. Vender (1990/92).
11. Dr. Gerrit Kroesen (1990).
12. Dr. David Angell (1989/91).
13. Dr. Timothy Bestwick (1988/90).
14. Dr. S. W. Robey (1986/88).

### **Visitors and Visiting Scholar Awards**

1. Prof. Qinyu Yang, College of Science, Donghua University, Shanghai, 201620, P.R. China (2012-2013).
2. Prof. Pengyun Zhang, School of Physics and Optoelectronic Engineering, Dalian University of Technology, Dalian, China (2012-2013).
3. Dr. Evelina Vogli, University of Dortmund, A. v. Humboldt Foundation Feodor Lynen Award (2010-2011).
4. Prof. Wang Lijun, Department of Electrical Engineering, Xi'an Jiaotong University (2009-2010).
5. Arup Pal, Institute of Advanced Study in Science and Technology, Guwahati-781035, Assam, India (March 2007- April 2008) BOYSCAST Fellowship 2007, Government of India;
6. Rajendra R. Deshmukh, Applied Physics Department, University of Mumbai, Mumbai, India (Sept. 2007 – Nov. 2007), Technical Educational Quality Improvement Program, Worldbank;
7. Masahiro Sumiya, Hitachi (Nov. 2006 – Nov. 2007) 1-year scientific stay sponsored by Hitachi, Japan;
8. Tomohiro Iguchi, Toshiba Corp (Aug. 2004 – Feb. 2005 with Prof. R. Ghoddsi);
9. Taizo Tomioka, Toshiba Corp. (Feb. 2004 – Oct. 2004, with Prof. R. Ghoddsi);
10. Ling Zheng, Assistant Faculty Researcher (Oct. 2002 – Oct. 2004);
11. Masanaga Fukasawa, SONY Research, recipient of a SONY Overseas Study Award (Aug. 2000 – October 2001);
12. Christer Hedlund, University at Uppsala, Sweden, recipient of an Overseas Scholarship Award, Swedish Board of Technical Development, (Sept. 1998 - Aug. 1999);
13. Lin Bin, Chinese Academy of Sciences, Beijing, recipient of a Visiting Scholar Award, Chinese Academy of Sciences, Beijing (Nov. 1997 - Oct. 1998);
14. M. Tokushima, NEC Central Research, recipient of an NEC Overseas Study Program Award (Nov. 1996 - Oct. 1997).

## Patents

1. *High area capacitor formation using material dependent etching*; with V. V. Patel, A. Grill, R. T. Hodgson, G. W. Rubloff. US Patent # 5155657. Issued: Oct. 13, 1992.
2. *High area capacitor formation using dry etching*; with G. W. Rubloff. US Patent # 5153813. Issued: Oct. 6, 1992.
3. *Plasma deposition of fluorocarbon*; with T. N. Nguyen, Z. A. Weinberg. US Patent # 5244730. Issued: Sept. 14, 1993.
4. *Plasma deposition of fluorocarbon*; with T. N. Nguyen, Z. A. Weinberg. US Patent # 5302420. Issued: Apr. 12, 1994.
5. *Adhesion promotion of fluorocarbon films*; with T. N. Nguyen, Z. A. Weinberg. US Patent # 5549935. Issued: Aug. 27, 1996.
6. *Method for controlling silicon etch depth*; with M. Arienzo, D. L. Haramé. US Patent # 5395769. Issued: Mar. 7, 1995.
7. *Method for hot wall reactive ion etching using a dielectric or metallic liner with temperature control to achieve process stability*; with M. Haverlag, D. Vender, Y. Zhang. US Patent # 5637237. Issued: June 10, 1997.
8. *Promotion of the adhesion of fluorocarbon films*; with T. N. Nguyen, Z. A. Weinberg. US Patent # 5788870. Issued: Aug. 4, 1998.
9. *Apparatus for hot wall reactive ion etching using a dielectric or metallic liner with temperature control to achieve process stability*; with M. Haverlag, D. Vender, Y. Zhang. US Patent # 5798016. Issued: Aug. 25, 1998.
10. *Highly selective chemical dry etching of silicon nitride over silicon and silicon dioxide*; with B. E. Kastenmeier, P. Matsuo. US Patent # 6060400. Issued: May 9, 2000.
11. *Method and Device for Plasma Processing of Materials*, with X. Hua and Ch. Stolz. US Patent # 7470329. Issued 12/30/2008.

## Invited Conference Talks and Special Lectures

1. *Early Stages of Oxygen Clustering and its Influence on Electrical Behavior of Silicon*, Fall Meeting of the Materials Research Society, Boston, Nov. 1982.
2. *Physics of Reactive Ion Etching*, March Meeting of the American Physical Society, Las Vegas, March 31 - April 4, 1986.
3. *Anisotropic Dry Etching of SiO<sub>2</sub> on Si and Its Impact on Surface and Near-Surface Properties of the Substrate*, Spring Meeting of the Materials Research Society, Palo Alto, April 1986.
4. *Reactive Ion Etching Related Si Surface Residues and Subsurface Damage: Their Relationship to Fundamental Etching Mechanisms*, National Symposium of the American Vacuum Society, Baltimore, Oct. 1986.
5. *Surface Studies of Reactive Ion Etch Processes*, 8th International Symposium on Dry Processing, Tokyo, Nov. 1986.
6. *Application of RF Plasmas to Etching and Deposition Processes in Advanced Semiconductor Technology*, 7th American Physical Society Topical Conference on Applications of RF Power to Plasmas, Kissimmee, May 1987.
7. *Surface Damage after RIE Processing*, CIPG87 4th International Conference on Plasma Etching and Deposition in Microelectronics, Antibes, June 1987.
8. *Reactive Ion Etching and the Silicon Surface*, Summer Course on Characterization Techniques for VLSI and Advanced Semiconductor Devices, Interuniversity Micro-Electronics Center, Leuven, June 1987.
9. *RIE Damage*, Plasma Etching Symposium of the Northern California Chapter of the American Vacuum Society, San Jose, Sept. 1987.
10. *Surface Modifications of Electronic Materials Induced by Plasma Etching*, 173rd Meeting of The Electrochemical Society, Atlanta, May 1988.
11. *X-ray Photoelectron Studies of Surface Modifications of Electronic Materials Caused by Reactive Ion Etching*, 1988 Fourteenth Annual Plasma Technology Seminar, San Francisco, May 1988.
12. *Plasma Based Dry Etching of Electronic Materials: Studies of Fundamental Etching Mechanisms*, 13th Nordic Semiconductor Meeting, Saltsjobaden (Sweden) June 1988.
13. *Surface Damage of Electronic Materials Caused by Reactive Ion Etching*, Gordon Research Conference on Plasma Chemistry, Tilton, Aug. 1988.
14. *In-situ Surface Studies of Reactive Ion Etch Processes*, OPTCON '88, SPIE Conference on In-situ Plasma Monitoring and Control, Santa Clara, Oct. 31 - Nov. 2, 1988.
15. *Current View of Dry Etching Damage*, SRC Topical Research Conference on Plasma Etch, Cambridge, MA, Feb. 1989.
16. *Dry Etching Damage of Silicon: A Review*, European Materials Research Society Conference, Strasbourg, May 30 - June 2, 1989.
17. *Studies of Surface Modifications of Silicon Substrates and Silicon Microstructures Caused by Reactive Ion Etching*, CIPG89, 5th International Conference on Plasma Etching and Deposition in Microelectronics, Antibes, June 1989.
18. *Silicon Damage by Dry Etching*, Sematech Plasma Etch Workshop, Austin, Jan. 1990.
19. *Surface Modifications by Low Pressure Etching Plasmas: Their Role in the Achievement of Etch Directionality and Selectivity*, 2nd International Conference on Plasma Surface Engineering, Garmisch-Partenkirchen, Sept. 1990.
20. *Plasma-Based Etching of Si-Related Electronic Materials: Mechanistic Insights From In-Situ Surface Studies*, International Seminar on Reactive Plasmas, Nagoya, June 1991.

21. *Plasma Etching and Profiling of SiGe Alloys*, 4th Japanese Symposium on Plasma Chemistry, Kyoto, June 1991.
22. *Cryogenic Reactive Ion Etching*, American Vacuum Society Plasma Etch User's Group Workshop on Low Temperature Etching, Palo Alto, July 1991.
23. *In-Situ Surface Studies of Silicon Dry Etching Processes* Australian Institute of Physics Congress, Session on Plasma Processing, Melbourne, February 1992.
24. *Ion Bombardment Effects on Silicon Surface Properties in Plasma-Assisted Etching* SEMATECH Plasma Etch Damage Workshop, Austin, April 1992.
25. *Dry Etch Damage - Current Issues*, SRC Topical Research Conference on Plasma Etching, Princeton, NJ, May 1992.
26. *Surface Studies of Reactive Ion Etching Processes in Silicon Technology: From Surface Damage to High-Resolution Depth Profiling* 181st Meeting of The Electrochemical Society, St. Louis, May 1992.
27. *The Effect of Ion Bombardment on the Fluorine-Silicon Reaction Layer*, American Vacuum Society Symposium on Advances in Plasma and Sputter Processing, Pittsburgh, June 1992.
28. *In-Situ Surface Studies of RF Diode and ECR Etching Processes*, Gordon Research Conference on Plasma Chemistry, New London, NH, Aug. 1992.
29. *High-Density Plasma Etching of Silicon Dioxide and Silicon Using Fluorocarbon Gases*, 19th Annual Tegal Plasma Seminar, San Francisco, July 1993.
30. *Study of Plasma-Surface Interactions in High-Density Plasma Etching of Silicon Dioxide and Silicon*, National Symposium of the American Vacuum Society, Orlando, Oct. 1993.
31. *Real-Time Monitoring of Silicon Surface Modifications and Chamber Status in Plasma Etching*, Fall Meeting of the Materials Research Society, Boston, Nov. 1993.
32. *Mechanistic Studies of Silicon Dioxide in High-Density Plasmas*, CIPG95, International Conference on Plasma Etching and Deposition in Microelectronics, Antibes, June 1995.
33. *Study of Plasma-Surface Interactions: Chemical Downstream Etching vs. High-Density Plasma*, IUVESTA International Workshop on Plasma Sources and Surface Interactions in Materials Processing, Fuji-Yoshida, Japan, Sept. 1995.
34. *Mechanistic Studies of SiO<sub>2</sub> Etching in High-Density Plasmas*, Corporate Distinguished Speakers Program, Micron Technology, Boise, Nov. 1995.
35. *SiO<sub>2</sub> Etching in High-Density Fluorocarbon Plasmas*, NATO Advanced Study Institute, Plasma Processing of Semiconductors, Chateau de Bonas, France, June 1996.
36. *Remote Plasma Processing*, NATO Advanced Study Institute, Plasma Processing of Semiconductors, Chateau de Bonas, France, June 1996.
37. *Mechanistic Aspects of High-Density Plasma Etching of Silicon Dioxide*, National Symposium of the American Vacuum Society, Philadelphia, Oct. 1996.
38. *Surface Processes in Low Pressure Plasmas*, The Tenth Toyota Conference on Atomic, Molecular and Electronic Dynamic Processes on Solid Surfaces, Shizuoka, Japan, Nov. 1996.
39. *Surface Processes in Selective Fluorocarbon Etching of SiO<sub>2</sub> Over Si, Si<sub>3</sub>N<sub>4</sub> and Resist Materials Using an Inductively-Coupled High-Density Plasma Reactor*, Workshop on Basic Aspects of Nonequilibrium Plasmas Interacting with Surfaces 1997 (BANPIS '97), Shirahama, Japan, Jan. 1997.
40. *Mechanistic Studies of Chemical Mechanical Polishing of Al Films*, 1997 Symposium on Chemical Mechanical Polishing, Lake Placid, Aug. 1997.
41. *Issues in Plasma-Assisted Etching Processes in the Silicon Integrated Circuit Technology*, 8. Bundesdeutsche Fachtagung, Plasma-Technologie, Dresden, Sept. 1997.
42. *Plasma-Assisted Etching: Data Needs on Elementary Processes Occuring on Planar Surfaces and in*



- Microstructures*, International Conference on Atomic and Molecular Data and their Applications (ICAMDATA), Gaithersburg, Sept. 1997.
43. *High-Density Plasma Etching of Low Dielectric Constant Materials*, MRS Spring Meeting, San Francisco, April 1998.
  44. *Plasma-surface Interaction Mechanisms in the High-density Plasma Etching of Dielectric Materials*, Gordon Research Conference on Plasma Processing Science, Tilton, NH, Aug. 1998.
  45. *Plasma-surface Interactions and Microelectronics*, American Vacuum Society (New York Chapter Annual Meeting), Albany, Sept. 1998.
  46. *Dry Etching of Low k Dielectric Materials*, European Workshop on Materials for Advanced Metallization (MAM '99), Oostende, March 1999.
  47. *Mechanistic Studies of Copper CMP Processes for Damascene Structures*. 4<sup>th</sup> International Symposium on Chemical-Mechanical Polishing, Lake Placid, NY, Aug. 1999 (presented by Ph.D. students J. Hernandez and P. Wrschka).
  48. *Plasma-Surface Interactions in Dielectric Patterning Using High-Density Sources*, 52nd Annual Gaseous Electronics Conference, Norfolk, Oct. 5-8, 1999.
  49. *Pattern Transfer into Low Dielectric Constant Materials Using High Density Plasmas*, Advanced Metallization Conference (AMC) 1999, Orlando, Sept. 28-30, 1999.
  50. *Plasma-based Pattern Transfer into Dielectric Materials: Plasma-Surface Interaction Processes*, Second International Workshop on Basic Aspects of Non-equilibrium Plasmas Interacting with Surfaces (BANPIS-2000), Nagasaki, Japan, January 2000 (presented by Ph.D. student T. Standaert).
  51. *Plasma-Assisted Etching: Elementary Processes on Planar Surfaces and in Microstructures*, Department of Energy Workshop on "Electron-Driven Processes: Scientific Challenges and Technological Opportunities", Newark, March 2000.
  52. *Oxide Etching in Inductively Coupled Fluorocarbon*, 197<sup>th</sup> Meeting of the Electrochemical Society, Toronto, May 2000 (presented by Ph.D. student M. Schaepkens).
  53. *Plasma-Assisted Etching Processes for Dielectric Materials: Technological Challenges and Elementary Processes on Planar Surfaces and in Microstructures*, 47<sup>th</sup> International Symposium of the American Vacuum Society, Boston, Oct. 2000.
  54. *High Resolution Plasma Etching of Dielectric Films for Silicon Integrated Circuit Technology*, Ninth International Symposium on Gaseous Dielectrics, Ellicott City, May 2001.
  55. *Pattern Transfer into Dielectric Films by High-Resolution Plasma Etching Techniques*, The Sixth International Symposium on Sputtering & Plasma Processes, Kanazawa, June 2001.
  56. *Current Issues in Pattern Transfer into Dielectric Films by High-Resolution Plasma Etching Techniques*, 200<sup>th</sup> Meeting of the Electrochemical Society, Philadelphia, May 2002.
  57. *Plasma-Surface Interactions of Nanoporous Silica During Plasma-Based Pattern Transfer Using C<sub>4</sub>F<sub>8</sub> and C<sub>4</sub>F<sub>8</sub>/Ar Gas Mixtures*, 31st IEEE International Conference on Plasma Science, Baltimore, June 2004 (presented by Ph.D. student X. Hua).
  58. *Investigation of Surface Modifications of 193 nm and 248 nm Photoresist Materials During Low-Pressure Plasma Etching*, International Conference on Microelectronics and Interfaces, AVS, Feb. 2005 (presented by Ph.D. student X. Hua).
  59. *Plasma Processing of Nanostructures and Nanomaterials*, SVC Annual Technical Conference, Washington DC, April 2006.
  60. *Fluorocarbon-based Plasma Etching Processes for Silicon Dioxide and Silica Dielectrics - Mechanistic Insights and Current Issues*, 2005 Plasma Prize presentation, AVS San Francisco, Nov. 2006.
  61. *Plasma Processing of Nanostructures and Nanomaterials*, Kolloquium, Max-Planck Institut für Plasmaphysik (IPP) Garching, Germany, March 2007.
  62. *Plasma Processing of Nanostructures and Nanomaterials*, Center for Plasma Science and Technology, Public Lecture, Ruhr-Universität-Bochum, Germany, June 2007.

63. *Plasma-Surface Interactions With Advanced Polymers For Nanoscale Patterning Of Materials*, 60th Annual Gaseous Electronics Conference, Arlington, VA, October 2-5, 2007.
64. *Studies of Plasma-Polymer Interactions For Nanoscale Patterning Of Materials*, 6th EU-Japan Joint Symposium on plasma processing in Okinawa, April 2008.
65. *Investigations of Plasma-Polymer Interactions For Nanoscale Patterning of Materials*, AVS International Symposium, Boston, Nov. 2008.
66. *Plasma-Polymer Interactions For Nanoscale Patterning Of Materials*, 215th Meeting of the Electrochemical Society, San Francisco, May 2009.
67. *Plasma-Polymer Interactions For Nanoscale Patterning Of Materials*, IBM Research Division, Yorktown Heights, NY, July 2009
68. *Low-Temperature Plasma Surface Interactions with Carbon-Based Materials*, Princeton Plasma Physics Laboratory, Princeton, Dec. 2009
69. *Plasma-polymer surface interactions: Towards an understanding of mechanistic origins of plasma etching-induced nanoscale surface and line edge roughness of organic resist masks*, Gordon Research Conference on Plasma Processing Science, New London, NH, Jul. 2010.
70. *Plasma-Polymer Interactions For Nanoscale Patterning Of Materials: Mechanistic Origins of Surface Roughness*, Materials Research Society Meeting, Boston, Nov. 2010
71. *Mechanisms of Plasma-Polymer Interactions For Nanoscale Patterning Of Materials*, PESM 2011, Mechelen, Belgium, May 2011
72. *Plasma-Etching: Plasma-materials Interactions – From Nanostructures To Metamaterials*, IV International Conference on Surfaces, Materials and Vacuum, Puerto Vallarta, Jalisco, Mexico, September 2011
73. *Plasma-Polymer Interactions For Nanoscale Patterning Of Materials*, SPIE Advanced Lithography, San Jose, Feb. 2012.
74. *Plasma-Polymer Interactions For Nanoscale Patterning Of Materials*, R. L. Bruce and G. S. Oehrlein, ISPlasma2012 (4th International Symposium on Advanced Plasma Science and its Applications for Nitrides and Nanomaterials), Aichi, Japan, March 2012.
75. *Plasma and Nanostructure Fabrication*, iPlasmaNano-IV (The 4th International Symposium On Plasma Nanoscience), Asilomar, CA, Aug. 2013.
76. *Low-Temperature Plasma Surface Interactions: Atomic Layer Etching And Atmospheric Pressure Plasma Jet Modification Of Biomaterials*, 66th Annual Gaseous Electronics Conference, Workshop: “Plasma-Surface Interactions: From Fusion to Semiconductor Processing”, Princeton, NJ, Sept. 2013.

## Book Chapters

G. S. Oehrlein, *Reactive Ion Etching*, in: Handbook of Plasma Processing Technology, eds. S. M. Rosnagel, J. J. Cuomo, and W. D. Westwood (Noyes Publications, Park Ridge, 1990), pp. 196.

G. S. Oehrlein, T. E. F. M. Standaert, P. J. Matsuo, Chapter 9, *Plasma etching of low dielectric constant materials*, Springer Series in Advanced Microelectronics, Vol. 9 Low Dielectric Constant Materials for IC Applications (Springer, Heidelberg, 2002).

## Journal Publications

1. G. S. Oehrlein, J. L. Lindström, and J. W. Corbett, *Electrolytical Method for Hydrogenation of Silicon*, Phys. Lett. **81A**, 246 (1981).
2. G. S. Oehrlein, D. J. Challou, A. E. Jaworowski and J. W. Corbett, *The Role of Carbon in the Precipitation of Oxygen in Silicon*, Phys. Lett. **86A**, 117 (1981).
3. G. S. Oehrlein, J. L. Lindström, and J. W. Corbett, *Carbon-Oxygen Complexes as Nuclei for the Precipitation of Oxygen in Czochralski Silicon*, Appl. Phys. Lett. **40**, 241 (1982).
4. T. S. Shi, S.N. Sahu, G.S. Oehrlein, A. Hiraki, and J.W. Corbett, *Models for the Hydrogen-Related Defect-Impurity Complexes and Si-H Infrared Bands in Crystalline Silicon*, Phys. Stat. Sol. (a) **74**, 329 (1982).
5. J. L. Lindström, G. S. Oehrlein, A.E. Jaworowski, and J.W. Corbett, *The Mechanism of the Enhancement in Divacancy Production by Oxygen During Electron Irradiation of Silicon. I. Experimental*, J. Appl. Phys. **53**, 8686 (1982).
6. G. S. Oehrlein, I. Krafcsik, J.L. Lindström, A.E. Jaworowski, and J.W. Corbett, *The Mechanism of the Enhancement of Divacancy Production by Oxygen During Electron Irradiation of Silicon. II. Computer Modeling*, J. Appl. Phys. **54**, 179 (1983).
7. G. S. Oehrlein, J.L. Lindström, I. Krafcsik, A.E. Jaworowski, and J.W. Corbett, *A Quantitative Investigation of Divacancy Production Enhancement by Interstitial Oxygen in Electron-Irradiated Silicon*, Physica **116B**, 230 (1983).
8. E. Jaworowski, G.S. Oehrlein, and J.W. Corbett, *Electron Irradiation Effects in Edge-Defined-Film-Growth Ribbon Silicon*, Physica **116B**, 287 (1983).
9. G. S. Oehrlein, *Silicon-Oxygen Complexes Containing Three Oxygen Atoms as the Dominant Thermal Donor Species in Heat-Treated Oxygen-Containing Silicon*, J. Appl. Phys. **54**, 5453 (1983).
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