Curriculum Vitae

Konstantinos P. Giapis, Ph.D.

Professor of Chemical Engineering, Caltech

Contact Information

Division of Chemistry and Chemical Engineering
California Institute of Technology
1200 E. California Blvd, Pasadena, CA 91125
Telephone: (626) 3954180 (office); (626) 3942270 (cell)
Email: giapis@caltech.edu

Expertise

Semiconductor physics, devices, and processing
Nanotechnology, nanodevices, and nanofabrication
Low temperature plasma deposition and etching
Chemical dynamics at surfaces
Thermodynamics of nanoscale confinement

Professional Preparation

National Technical University (Greece)	Chemical Engineering	Diploma, 1984
University of Minnesota (USA)	Chemical Engineering	Ph.D., 1989
Bell Laboratories, Murray Hill, NJ (USA)	Postdoctoral Fellow	10/89—3/91

Appointments

2010—now	*Professor* of Chemical Engineering, Caltech (USA)
2010	*Visiting Professor*, Mechanical Engineering, ETH (Zürich, Switzerland)
1999–2009	*Associate Professor of Chemical Engineering,* Caltech (USA)
1998	*Visiting Professor,* France Telecom, Branche CNET (Grenoble, France)
1994–1998	*Assistant Professor of Chemical Engineering,* Caltech (USA)
1992–1993	*Lacey Instructor of Chemical Engineering,* Caltech (USA)
1/92–7/92	*Consultant,* AT&T Bell Laboratories, Murray Hill, NJ (USA)
1991	*Research Associate,* Physics Department, University of Crete (Greece)

Awards and Honors

1993	Camille and Henry Dreyfus New Faculty Award
1996	National Science Foundation Career Award
1997	Camille Dreyfus Teacher-Scholar Award

Committees

External Evaluation Committee, Chemical Engineering Department, NTU, Greece (2013)
International Symposium on Advanced Fluid Information and Trans-disciplinary Fluid Integration (AFI/TFI), Japan, 2007-2014
International Conference on Ion Beam Modification of Materials (IBMM), 2009-2011
Executive Committee, Plasma Science and Technology Division, AVS, 2005-2007
International Advisory Board, Dry Process Symposium, Japan, 1998-2010
International Program Committee, Micro- and Nano-Engineering Conference, 2003-2005
International Conference on Plasma Process Induced Damage (P2ID), 1999-2001

Peer-Reviewed Publications

1. K.P. Giapis, D.C. Lu and K.F. Jensen, *Appl. Phys. Lett.* **54**, 353 (1989).
"High-quality epitaxial ZnSe and the relationship between electron mobility and photoluminescence characteristics"

2. K.P. Giapis, K. F. Jensen, J. E. Potts and S. J. Pachuta, *Appl. Phys. Lett.* **55**, 463 (1989).
"Carbon incorporation in ZnSe by metalorganic chemical vapor-deposition"

3. K.P. Giapis and K.F. Jensen, *J. Crystal Growth* **101**, 111 (1990).
"Effect of operating-conditions and precursors on optoelectronic properties of OMVPE grown ZnSe"

4. K.P. Giapis, K.F. Jensen, J.E. Potts and S.J. Pachuta, *J. Electron. Mater.* **19**, 453 (1990).
"Investigation of carbon incorporation in ZnSe - effects on morphology, electrical and photoluminescence properties"

5. K.P. Giapis, D.C. Lu, K.F. Jensen and J.E. Potts, *J. Crystal Growth* **104**, 291 (1990).
"Temperature-variations in electrical and photoluminescence properties of ZnSe grown by MOCVD"

6. K.P. Giapis, D.C. Lu, D.I. Fotiadis and K.F. Jensen, *J. Crystal Growth* **104**, 629 (1990).
"A new reactor system for MOCVD of ZnSe - modeling and experimental results for growth from dimethylzinc and diethylselenide"

7. R.A. Gottscho, B.L. Preppernau, S.J. Pearton, A.B. Emerson and K.P. Giapis, *J. Appl. Phys.* **68**, 440 (1990).
"Real-time monitoring of low-temperature hydrogen plasma passivation of GaAs"

8. K.P. Giapis, G.R. Scheller, R.A. Gottscho, W.S. Hobson and Y.H. Lee, *Appl. Phys. Lett.* **57**, 983 (1990).
"Microscopic and macroscopic uniformity control in plasma-etching"

9. S. Patnaik and K.F. Jensen and K.P. Giapis, *J. Crystal Growth* **107**, 390 (1991).
"MOVPE of ZnSe using organometallic allyl selenium precursors"

10. K.P. Giapis, R.A. Gottscho, L.A. Clark, J.B. Kruskal, D. Lambert, A. Kornblit and D. Sinatore, *J. Vac. Sci. Technol. A* **9**, 664 (1991).
"Use of light scattering in characterizing reactively ion etched profiles"

11. T. Nakano, R.A. Gottscho, N. Sadeghi, D.J. Trevor, R.W. Boswell, A.J. Perry, T.C. Lee, K.P. Giapis and J. Margot, *Jap. Soc. Appl. Phys.* **61**, 711 (1992).
"Helicon wave excited plasmas"

12. A. Dimoulas, K.P. Giapis, J. Leng, G. Halkias, K. Zekentes and A. Christou, *J. Appl. Phys.* **72**, 1912 (1992).
"Electric-field dependence of interband-transitions in $In_{0.53}Ga_{0.47}As$/ $In_{0.52}Al_{0.48}As$ single quantum wells by room-temperature electrotransmittance"

13. E. Yoon, C.A. Green, R.A. Gottscho, T.R. Hayes and K.P. Giapis, *J. Vac. Sci. Technol. B* **10**, 2230 (1992).
"Latent image diffraction from sub-micron photoresist gratings"

14. A. Dimoulas, J. Leng, K.P. Giapis, A. Georgakilas, G. Halkias and A. Christou, *Appl. Surf. Sci.* **63**, 191 (1993).
"Electric-field dependence of allowed and forbidden transitions in $In_{0.53}Ga_{0.47}As$/ $In_{0.52}Al_{0.48}As$ single quantum-wells by room-temperature modulation spectroscopy"

15. A. Dimoulas, J. Leng, K.P. Giapis, A. Georgakilas, C. Michelakis and A. Christou, *Phys. Rev. B* **47**, 7198 (1993).
"Interband transitions in $In_xGa_{1-x}As/In_{0.52}Al_{0.48}As$ single quantum wells by room temperature modulation spectroscopy"

16. E.S. Aydil, K.P. Giapis, R.A. Gottscho, V.M. Donnelly and E. Yoon, *J. Vac. Sci. Technol. B* **11**, 195 (1993).
"Ammonia plasma passivation of GaAs in downstream microwave and RF parallel plate plasma reactors"

17. K.P. Giapis, N. Sadeghi, J. Margot, R.A. Gottscho and T.C.J. Lee, J. *Appl. Phys.* **73**, 7188 (1993).
"Limits to ion energy control in high density glow discharges: measurement of absolute metastable ion concentrations"

18. E.S. Aydil, Z. Zhou, K.P. Giapis, Y. Chabal, J.A. Gregus and R.A. Gottscho, *Appl. Phys. Lett.* **62**, 3156 (1993).
"Real-time, *in-situ* monitoring of surface reactions during plasma passivation of GaAs"

19. T. Nakano, K.P. Giapis, R.A. Gottscho, T.C Lee and N. Sadeghi, *J. Vac. Sci. Technol. B* **11**, 2046 (1993).
"Ion velocity distributions in helicon wave plasmas: magnetic field and pressure effects"

20. B.J. Skromme, W. Liu and K.F. Jensen and K.P. Giapis, *J. Crystal Growth* **138**, 338 (1994).
"Effects of C incorporation on the luminescence properties of ZnSe grown by metalorganic chemical-vapor-deposition"

21. K.P. Giapis, T.A. Moore and T.K. Minton, *J. Vac. Sci. Technol. A* **13**, 959 (1995).
"Hyperthermal neutral beam etching"

22. A. Dimoulas, J. Davidow, K.P. Giapis, A. Georgakilas, G. Halkias and N. Kornelios, *J. Appl. Phys.* **80**, 3484 (1996).
"Electron density effects in the modulation spectroscopy of strained and lattice-matched InGaAs/InAlAs/InP high electron mobility transistor structures"

23. G.S. Hwang, C.M. Anderson, M J. Gordon, T.A. Moore, T.K. Minton and K.P. Giapis, *Phys. Rev. Lett.* **77**, 3049 (1996).
"Gas-surface dynamics and profile evolution during etching of silicon"

24. C.M. Anderson and K.P. Giapis, *Phys. Rev. Lett.* **77**, 2949 (1996).
"Larger two-dimensional photonic band gaps"

25. G.S. Hwang and K.P. Giapis, *J. Vac. Sci. Technol. B* **15**, 70 (1997).
"On the origin of the notching effect during etching in uniform high density plasmas"

26. G.S. Hwang and K.P. Giapis, *J. Appl. Phys.* **81**, 3433 (1997).

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"The influence of electron temperature on pattern-dependent charging during etching in high-density plasmas"

27. G.S. Hwang and K.P. Giapis, *Appl. Phys. Lett.* **70**, 2377 (1997).
"Prediction of multiple-feature effects in plasma etching"

28. G.S. Hwang and K.P. Giapis, *J. Appl. Phys.* **82**, 572 (1997).
"The influence of mask thickness on charging damage during overetching"

29. G.S. Hwang and K.P. Giapis, *J. Appl. Phys.* **82**, 566 (1997).
"Aspect-ratio-dependent charging in high-density plasmas"

30. G.S. Hwang and K.P. Giapis, *Appl. Phys. Lett.* **71**, 458 (1997).
"Aspect ratio independent etching of dielectrics"

31. G.S. Hwang and K.P. Giapis, *Phys. Rev. Lett.* **79**, 845 (1997).
"Pattern-dependent charging in plasmas: electron temperature effects"

32. T.K. Minton, K.P. Giapis and T.A. Moore, *J. Phys. Chem.* A **101**, 6549 (1997).
"Inelastic scattering dynamics of fluorine atoms on a fluorinated silicon surface"

33. C.M. Anderson and K.P. Giapis, *Phys. Rev. B* **56**, 7313 (1997).
"Symmetry reduction in group *4mm* photonic crystals"

34. G.S. Hwang and K.P. Giapis, *J. Vac. Sci. Technol. B* **15**, 1839 (1997).
"On the link between electron shadowing and charging damage"

35. G.S. Hwang and K.P. Giapis, *J. Vac. Sci. Technol. B* **15**, 1741 (1997).
"Electron irradiance of conductive sidewalls: a determining factor for charging damage"

36. G.S. Hwang and K.P. Giapis, *Appl. Phys. Lett.* **71**, 1945 (1997).
"Simulation of current transients through ultrathin gate oxides during plasma etching"

37. G.S. Hwang and K.P. Giapis, *Appl. Phys. Lett.* **71**, 1942 (1997).
"Ion mass effect on plasma-induced charging"

38. G.S. Hwang and K.P. Giapis, *J. Electrochem. Soc.* **144**, L285 (1997).
"On the origin of charging damage during etching of antenna structures"

39. G.S. Hwang and K.P. Giapis, *Appl. Phys. Lett.* **71**, 2928 (1997).
"How tunneling currents reduce plasma-induced charging"

40. G.S. Hwang and K.P. Giapis, *J. Electrochem. Soc.* **144**, L320 (1997).
"The role of the substrate on pattern-dependent charging"

41. G.S. Hwang and K.P. Giapis, *Jap. J. Appl. Phys.* **37**, 2281 (1998).
"Pattern-dependent charging and the role of electron tunneling"

42. G.S. Hwang and K.P. Giapis, *Jap. J. Appl. Phys.* **37**, 2291 (1998).
"Mechanism of charging reduction in pulsed plasma etching"

43. G.S. Hwang and K.P. Giapis, *J. Appl. Phys.* **84**, 154 (1998)
"Modeling of charging damage during interlevel oxide deposition in high-density plasmas"

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44. G.S. Hwang and K.P. Giapis, *J. Appl. Phys.* **84**, 683 (1998)
"The influence of surface currents on pattern-dependent charging and notching"

45. G.S. Hwang and K.P. Giapis, Appl. Phys. Lett. **74**, 932 (1999)
"Charging damage during latent antenna overetching"

46. G.S. Hwang and K.P. Giapis, *IEEE Trans. Plasma Sci.* **27**, 102 (1999)
"Pattern-dependent charging in plasmas"

47. G.S. Hwang and K.P. Giapis, *J. Vac. Sci. Technol. B* **17**, 999 (1999)
"Role of film conformality in charging damage during plasma-assisted interlevel dielectric deposition"

48. G.S. Hwang and K.P. Giapis, *Thin Solid Films* **374**, 175 (2000)
"Plasma interactions with high aspect ratio patterned surfaces: ion transport, scattering, and the role of charging"

49. R.M. Sankaran and K.P. Giapis, *Appl. Phys. Lett.* **79**, 593 (2001)
"Maskless etching of silicon using patterned microdischarges"

50. K.P. Giapis, G.S. Hwang and O. Joubert, *Microelec. Eng.* **61-2**, 835 (2002)
"The role of mask charging in profile evolution and gate oxide degradation"

51. R.M. Sankaran and K.P. Giapis, *J. Appl. Phys.* **92**, 2406 (2002)
"Hollow cathode sustained plasma microjets: characterization and application to diamond deposition"

52. R.M. Sankaran and K.P. Giapis, *J. Phys. D-Appl. Phys.* **36**, 2914 (2003)
"High-pressure micro-discharges in etching and deposition applications"

53. R.M. Sankaran, K.P. Giapis, M. Moselhy, and K.H. Schoenbach, *Appl. Phys. Lett.* **83**, 4728 (2003).
"Argon excimer emission from high-pressure microdischarges in metal capillaries"

54. M.J. Esplandiu, V.G. Bittner, K.P. Giapis and C.P. Collier, *Nano Lett.* **4**, 1873 (2004)
"Nanoelectrode scanning probes from fluorocarbon-coated single-wall carbon nanotubes"

55. R.M. Sankaran, D. Holunga, R.C. Flagan and K.P. Giapis, *Nano Lett.* **5**, 537 (2005)
"Synthesis of blue-luminescent Si nanoparticles using atmospheric pressure microdischarges"

56. M.J. Gordon, J. Mace and K.P. Giapis, *Phys. Rev. A* **72**, 012904 (2005)
"Charge exchange mechanisms at the threshold for inelasticity in Ne^+ collisions with surfaces"

57. M.J. Gordon and K.P. Giapis, *Rev. Sci. Instr.* **76**, 083302 (2005)
"Low-energy ion beamline scattering apparatus for surface science investigations"

58. J.Y. Chen, A. Kutana, C.P. Collier and K.P. Giapis, *Science* **310**, 1480 (2005)
"Electrowetting in carbon nanotubes"

59. A. Kutana and K.P. Giapis, *Nano Lett.* **6**, 656 (2006)
"Atomistic simulations of electrowetting in carbon nanotubes"

60. A. Kutana, M.J. Gordon and K.P. Giapis, *Nuclear Instr. Methods B* **248,** 16 (2006)
"Neutralization of hyperthermal Ne^+ on metal surfaces"

61. A. Kutana, K.P. Giapis, J.Y. Chen and C.P. Collier, *Nano Lett.* **6**, 1669 (2006)
"Amplitude response of single-wall carbon nanotube probes during tapping mode atomic force microscopy: modeling and experiment"

62. A. Kutana and K.P. Giapis, *Phys. Rev. Lett.* **97**, 245501 (2006)
"Transient deformation regime in bending of single-walled carbon nanotubes"

63. J. Mace, M.J. Gordon and K.P. Giapis, *Phys. Rev. Lett.* **97**, 257603 (2006)
"Evidence of simultaneous double-electron promotion in F^+ collisions with surfaces"

64. A. Kutana and K.P. Giapis, *Phys. Rev. B* **76**, 195444 (2007)
"Contact angles, ordering and solidification of liquid mercury in carbon nanotube cavities"

65. B.J. Lee, H. Rahaman, I. Petzenhauser, K. Frank and K.P. Giapis, *Appl. Phys. Lett.* **90**, 241502 (2007)
"Xenon excimer emission from pulsed high-pressure capillary microdischarges"

66. A. Kutana and K.P. Giapis, *J. Chem. Phys.* **128**, 234706 (2008)
"Analytical carbon-oxygen reactive potential"

67. N. Tayebi, Y. Narui, R.J. Chen, C.P. Collier, K.P. Giapis and Y. Zhang, *Appl. Phys. Lett.* **93**, 103112 (2008)
"Nanopencil as a wear-tolerant probe for ultrahigh density data storage"

68. M.J. Gordon, X. Qin, A. Kutana, and K.P. Giapis, *J. Am. Chem. Soc.,* **131**, 1927 (2009)
"Gas-surface chemical reactions at high collision energies?"

69. N. Brunelli, R.C. Flagan and K.P. Giapis, *Aerosol Sci. Technol.* **43**, 53 (2009)
"Radial differential mobility analyzer for one nanometer particle classification"

70. Y. Narui, D.M. Ceres, J. Chen, C.P. Collier and K.P. Giapis, *J. Phys. Chem. C* **113**, 6815 (2009)
"Silicon dioxide coated single-walled carbon nanotube nanoelectrode scanning probes"

71. A. Kutana and K.P. Giapis, *J. Phys. Chem. C,* **113**, 14721 (2009)
"First-principles study of chemisorption of oxygen and aziridine on graphitic nanostructures"

72. C.R.I. Chisholm, D.A. Boysen, A.B. Papandrew, S. Zecevic, S.Y. Cha, K. Sasaki, Á. Varga, K.P. Giapis, S.M. Haile, *Interface Mag*., ECS, Fall 2009, p.35
"The Development Path for Solid Acid Fuel Cells"

73. N. Tayebi, Y. Narui, N. Franklin, C.P. Collier, K.P. Giapis, Y. Nishi and Y. Zhang, *Appl. Phys. Lett.* **96**, 023103 (2010)
"Fully-inverted single-digit nanometer domains in ferroelectric thin films"

74. Á. Varga, N.A. Brunelli, M. Louie, K.P. Giapis, S.M. Haile, *J. Mater. Chem.* **20**, 6309 (2010)
"Composite Nanostructured Solid Acid Fuel Cell Electrodes via Electrospray Deposition"

75. M. Hu, K.P. Giapis, J.V. Goicochea, and D. Poulikakos, *Appl. Phys. Lett.* **97**, 153107 (2010)
"Surface segregation of bimetallic alloys in nanoscale confinement"

76. J. Jiang, M. Attui, M. Heim, N. Brunelli, P. McMurry, G. Kasper, R.C. Flagan, K.P. Giapis, and G. Mouret, *Aerosol Sci. Technol.* **45**, 480 (2011)
"Transfer functions and penetrations of five differential mobility analyzers for sub-2 nm particle classification"

77. M. Hu, K.P. Giapis, J.V. Goicochea, X. Zhang, and D. Poulikakos, *Nano Lett.* **11**, 615 (2011)
"Significant Reduction in Thermal Conductivity in Si/Ge Core-Shell Nanowires"

78. M. Hu, K.P. Giapis and D. Poulikakos, *Appl. Phys. Let.* **98**, 211904, (2011)
"Interfacial Mixing during Annealing of Zinc Oxide Nanoparticle Junctions"

79. M. Hu, X. Zhang, K.P. Giapis and D. Poulikakos, *Phys. Rev. B* **84**, 085442 (2011)
"Thermal Conductivity Reduction in Core-Shell Nanowires"

80. B.J. Lee, H. Rahaman, S.H. Nam, K.P. Giapis, M. Iberler, J. Jacoby and K. Frank, *Physics of Plasmas* **18**, 083506 (2011)
"Xenon excimer emission from multicapillary discharges in direct mode"

81. X. Zhang, M. Hu, K.P. Giapis and D. Poulikakos, *J. Heat Transfer **134**, 102402* (2012)
"Schemes for and Mechanisms of Reduction in Thermal Conductivity in Nano-structured Thermoelectrics"

82. N. Brunelli, E. Neiholdt, K.P. Giapis, R.C. Flagan and J. Beauchamp, *Analytical Chemistry **85**, 4335* (2013)
"Continuous Flow Ion Mobility Analyzer at Low Flow Rates"

83. Á. Varga, M. Pfohl, N.A. Brunelli, M. Schreier, K.P. Giapis, S.M. Haile, *Physical Chemistry Chem. Physics **15**, 15470* **(**2013)
"Carbon Nanotubes as Electronic Interconnects in Solid Acid Fuel Cells"

84. D. Alexeev, J. Chen, P. Angelikopoulos, J.H. Walther, K.P. Giapis, and P. Koumoutsakos, *Nano Lett. **15**, 5744* (2015)
"On the Kapitza Resistance between Few-Layers-Graphene and Water"

85. Y. Yao, K. P. Giapis, *ChemPhysChem* **17**, 1430-1434 (2016).
"Tuning charge transfer in ion-surface collisions at hyperthermal energies"

86. Y. Yao, K. P. Giapis, *Phys. Rev. Lett.* **116**, 253202 (2016).
"Kinematics of Eley-Rideal reactions at hyperthermal energies"

87. Y. Yao, K.P. Giapis, *Angew. Chemie Int. Ed.* **55**, 11595 (2016).
"Direct Hydrogenation of Dinitrogen and Dioxygen via Eley-Rideal Reactions"

88. Y. Yao, K.P. Giapis, *Phys. Chem. Chem. Phys.* **18**, 29858 (2016).
"*Dynamic nitroxyl formation in the NH_3 oxidation on Pt via Eley–Rideal reactions*"

89. Y. Yao, K.P. Giapis, *Astrophys. J.* **835:**67, (2017), doi:10.3847/1538-4357/835/1/67
"*Dynamic Deuterium Enrichment in Cometary Water via Eley–Rideal reactions*"

90. Y. Yao, K.P. Giapis, *Chem. Science.* **8**, 2852 (2017), doi: 10.1039/c6sc05065d.
"*Intramolecular water-splitting reaction in single collisions of water ions with surfaces*"

91. Y. Yao, K.P. Giapis, *Nature Commun.* **8**, 15298 (2017) doi:10.1038/ncomms15298
"Dynamic molecular oxygen production in cometary comae"

92. K. Shi, K. P. Giapis, *ACS Appl. Energy Mater.* **1**, 296 (2018)
"Scalable Fabrication of Supercapacitors by Nozzle-Free Electrospinning"

93. N. Radacsi, F. D. Campos, C.R.I. Chisholm, K. P. Giapis, *Nature Commun.* **9**, 4740 (2018)
"Spontaneous formation of nanoparticles on electrospun nanofibres"

94. Y. Yao, K.P. Giapis, *Nature Commun.* **9**, 2581 (2018), doi: 10.1038/s41467-018-04943-w
Reply to: "On the origin of molecular oxygen in cometary comae"

95. Y. Yao, P. Shushkov, T.F. Miller, and K.P. Giapis, *Nature Commun.* **10**, 2294 (2019); doi:10.1038/s41467-019-10342-6
"Direct dioxygen evolution in collisions of carbon dioxide with surfaces"

96. R.J. McCarty, K.P. Giapis, *Instruments* **3**, 37 (2019); doi:10.3390/instruments3030037
"An adaptable device for scalable electrospinning of low- and high-viscosity solutions"

97. N. Radacsi, K. P. Giapis, G. Ovari, P. Szabo-Revesz, R. Ambrus,. *J. Pharm. & Biomed. Analysis* **166**, 371 (2019); https://doi.org/10.1016/j.jpba.2019.01.037
"Electrospun nanofiber-based niflumic acid capsules with superior physicochemical properties"

98. R.W. Grayson, W.A. Goddard, K.P. Giapis, *Icarus* **379**, 114967 (2022);
"Reactive scattering of water group ions on ice surfaces with relevance to Saturn's icy moons"

Book Chapters

1. K.P. Giapis, Chapter 7: "Fundamentals of plasma process-induced charging and damage" in *Handbook of Advanced Plasma Processing Techniques*, edited by J. Shul and S.L. Pearton, Springer Verlag (2000).
2. R.M. Sankaran and K.P. Giapis, Chapter 18: "Materials Applications of High-Pressure Microplasmas" in *Low Temperature Plasmas*, ed. R. Hippler, H. Kersten, M. Schmidt, K.H. Schoenbach, Wiley-VCH (2008).

Papers in Refereed Archives and Conference Proceedings

1. K.P. Giapis, D.C. Lu and K.F. Jensen, 1989 Mat. Res. Soc. Symp. Proc., vol. **131**, 63.
"Effects of the selenium precursor on the growth of ZnSe by metalorganic chemical vapor deposition"

2. R.A. Gottscho, M.F. Vernon, J.A. Gregus, E. Yoon, K.P. Giapis, T.R. Hayes, W.S. Hobson, L. Clark, J. Kruskal, D. Lambert, A. Kornblit and D. Sinatore, 1991 Proceedings SPIE – Int. Society Optical Eng.; San Jose, CA; v. 1594, pp. 306-12.
"Light scattering methods for semiconductor process monitoring and control"

3. A. Dimoulas, J. Leng, K.P. Giapis, A. Georgakilas, C. Michelakis and A. Christou, 1992 Proceedings 21st Intern. Conf. Physics Semicond.; Beijing, P.R. China (eds.: P. Jiang, H.Z. Zheng), World Scientific, vol. 2, 1024.
"Parity allowed and forbidden transitions in $In_xGa_{1-x}As/In_{0.52}Al_{0.48}As$ single quantum wells by room temperature modulation spectroscopy"

4. K.P. Giapis and T.K. Minton, Diagnostic Techniques for Semiconductor Materials Processing II. Symposium 1996; Boston, MA; v. 406, pp. 33-8.
"Monitoring of direct reactions during etching of silicon"

5. A. Dimoulas, J. Davidow, K.P. Giapis, A. Georgakilas, G. Halkias and N. Kornelios, Diagnostic Techniques for Semiconductor Materials Processing II. Symposium 1996; Boston, MA; v. 406, pp. 301-6.
"Electron density effects in the modulation spectroscopy of strained and lattice-matched InGaAs/InAlAs/InP HEMTs"

6. C.M. Anderson, G.S. Hwang, M.J. Gordon and K.P. Giapis, Proceedings 1996 XI Symp. Plasma Processing; Los Angeles, CA; v. 96-12, pp. 357-61 (eds.: G.S. Mathad and D.W. Hess (The Electrochemical Society, Pennington, NJ).
"Profile evolution during neutral beam etching"

7. G.S. Hwang and K.P. Giapis, Proceedings 1997 2nd Intern. Symp. Plasma Process-Induced Damage; Monterey, CA; pp. 63-66.
"On the link between electron shadowing and charging damage"

8. G.S. Hwang and K.P. Giapis, Proceedings 1997 23rd Annual Tegal Plasma Seminar; San Francisco, CA; pp. 79-90.
"Simulation of current transients through ultrathin gate oxides during plasma etching"

9. G.S. Hwang and K.P. Giapis, Proceedings 1998 19th Dry Process Symposium; Tokyo, Japan; pp.1-8.
"The role of electron tunneling on pattern-dependent charging"

10. G.S. Hwang and K.P. Giapis, Proceedings 1998 12th Intern. Symp. Plasma Processing; San Diego, CA; pp. 66-70/vii+292.
"Mask charging effects on feature profile evolution during high-density plasma etching"

11. G.S. Hwang and K.P. Giapis, Proceedings 1998 3rd Intern. Symp. Plasma Process-Induced Damage; Honolulu, HI; pp. 164-167.
"Mechanism of charging damage during interlevel oxide deposition in high-density plasma tools"

12. G.S. Hwang and K.P. Giapis, Proceedings 1999 4th Intern. Symp. Plasma Process-Induced Damage; Monterey, CA; pp. 21-4/211.
"On the dependence of plasma-induced charging damage on antenna area"

Issued Patents

1. U.S. Patent # 5,002,631 issued on March 26, 1991 (with R. A. Gottscho and G. R. Scheller) "Plasma Etching Apparatus and Method"
2. U.S. Patent # 5,124,216 issued on June 23, 1992 (with R. A. Gottscho and C. A. Green) "Method for Monitoring Photoresist Latent Images"
3. U.S. Patent # 5,288,572 issued on 2/22/1994 (with R. A. Gottscho, and C. A. Green) "Method for Monitoring Photoresist Latent Images"
4. U.S. Patent # 5,464,664 issued on November 7, 1995, (with E. S. Aydil and R. A. Gottscho) "Downstream Ammonia Plasma Passivation of GaAs"
5. U.S. Patent # 5,883,005 issued on 3/16/99 (with T. K. Minton) "Semiconductor Etching by Hyperthermal Neutral Beams"
6. U.S. Patent # 6,700,329 issued: 3/2/04 (with M. R. Sankaran) "Method and Apparatus for Providing Flow-Stabilized Microdischarges in Metal Capillaries"
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