RÉSUME

IGNATIUS SIU TUNG TSONG

Nationality

U.S. Citizen

Education

University of Leeds,	B.Sc. in Physics (1966)
	M.Sc. in Physics (1967)
University of London,	Ph.D. in Physics (1970)
University of Leeds,	D.Sc. in Physics (1989)

Experience

Postdoctoral Research Fellow, Department of Physics, University of Essex, England (1970-1973)
Senior Tutor, Department of Physics, Monash University, Australia (1973-1976)
Research Associate, Materials Research Laboratory, The Pennsylvania State University (1976-1978)
Assistant Professor of Materials Research, The Pennsylvania State University (1978-1979)
Associate Professor of Materials Research, The Pennsylvania State University (1979-1981)
Professor of Physics, Arizona State University (1981-present)
Affiliate Professor of Materials Engineering, Arizona State University (2000-present)
Resident Visitor, Bell Laboratories, Murray Hill (1980-1982)
Guest Scientist, Philips Research Laboratories, Eindhoven, The Netherlands (1991)
Guest Professor, Fachbereich Physik, Universität Osnabrück, Germany (1992)
Guest Scientist, Max-Planck-Institut für Plasmaphysik, Garching, Germany (1993)
Visiting Professor, Institute for Materials Research, Tohoku University, Japan (1997-1998, 2004)
Visiting Professor, Technical University of Brno, Czech Republic (1999-2000)
Visiting Professor, Hokkaido University, Japan (2005)

Honors

Van Houten Fellow, Philips Research Laboratories, The Netherlands (1991)
National Science Foundation Center for Global Partnership (NSF-CGP) Fellow (1997)
Japan Society for Promotion of Science (JSPS) Fellow (2005)

Professional Activities

Member, American Physical Society
Member, American Ceramic Society
Member, American Vacuum Society
Member, American Chemical Society
Member, Materials research Society
Member, Kaiserlich-Königliche Böhmische Physikalische Gesellschaft
Member, Executive Committee, American Vacuum Society, Arizona Chapter (1981-1998)
Chairman, 6th International Conference on Ion Beam Analysis (1983)
Member, program committee of Gordon Conference on Particle-Solid Interactions (1982-1984)
Member, International Committee of Ion Beam Analysis Conference (1981-1997)
Member, Program Committee of Atomic Collisions in Solids conference (1985)
Member, editorial board of Nuclear Instruments and Methods (1987-1992)
Associate editor, Superlattices and Microstructures (1991-1994)
Chairman, US-Japan Symposium for Surface Science (1998)

Subject Editor, The Encyclopedia of Materials, Eisevier (1998-2001)
Chairman, US-Japan Seminar on Mesoscopic Phenomena on Surfaces (2000)

Invited Talks and Seminars

Over 120 from 1976 to present

Graduate Students (At Pennsylvania State University)

N.A. Yusuf	Ph.D. (1981)	Seiji Tsuji	M.S. (1980)
R.C. Ross	Ph.D. (1981)	G.A. Smith	M.S. (1981)
C.A. Houser	Ph.D. (1983)	G.L. Power	M.S. (1981)

Graduate Students (At Arizona State University)

D.G. Tonn	Ph.D. (1986)	Y. Wei	Ph.D. (1995)
T.L. Porter	Ph.D. (1988)	L. Li	Ph.D. (1995)
J.W. Christiansen	Ph.D. (1988)	Y. Hong	Ph.D. (1997)
C.S. Chang	Ph.D. (1988)	S. Hearne	Ph.D. (2000)
N.J. Zheng	Ph.D. (1990)	D. Delli Carpini	M.S. (1983)
V. Bissessur	Ph.D. (1990)	R.H. Hay	M.S. (1987)
D.M. Cornelison	Ph.D. (1990)	N. Freed	M.S. (1998)
M.S. Worthington	Ph.D. (1992)	J.L. Edwards	Ph.D. candidate
J.L. Stevens	Ph.D. (1992)	M.A. Lamb	Ph.D. (2001)
B.E. Steele	Ph.D. (1993)	R. Roucka	Ph.D. (2004)
		A. Blake	M.S. (2008)

Post-doctoral Research Associates

C.M. Loxton	(1981-1984)	J. Fritsch	(1996-1998)
B.V. King	(1982-1984)	P. Fuchs	(1996-1998)
C.S. Chang	(1988-1991)	A. Pavlovska	(1996-1999)
C. Linsmeier	(1995-1996)	V.M. Torres	(1999-1999)
S. Horch	(1995-1996)	C.-W. Hu	(1999-2006)
J. Tolle	(2003-2005)	P.-L. Liu	(2004-2006)

Research Specialist

U. Knipping (1983-2003)

Technical Assistant

C. Bardin (1981-1986)

Visiting Professors

M. Szymonski, Jagellonian University, Poland (1982)
F. Freund, University of Cologne, Germany (1983-85)
I.H. Wilson, University of Surrey, England (1987-88; 1990)
S.V. Teplov, Donetsk State University, USSR (1987-88; 1990-91)
W. Heiland, Universität Osnabrück, Germany (1990)
M.H. Tsai, National Sun Yat-Sen University, Taiwan (1998-99)
T. Sikola, Technical University of Brno, Czech Republic (1999)

H. Hibino, NTT Basic Research Laboratories, Japan (2000-2001)

Visiting Scholars

R. Bergmans, Eindhoven University of Technology, The Netherlands (1989-1990)
M.J. Mietus, Eindhoven University of Technology, The Netherlands (1993)
R. Kliese, Ruhr-Universität Bochum, Germany (1993-94)
C. Röthig, Universität Osnabrück, Germany (1993-94)
K. Wurm, Technische Universität Clausthal, Germany (1993-94)
T. Müller, Technische Universität Clausthal, Germany (1994)
T. Hecht, Humboldt Universität, Berlin, Germany (1996-1997)
R. Roucka, Technical University of Brno, Czech Republic (1999-2002)
F. Lopour, Technical University of Brno, Czech Republic (2000)
P. Babor, Technical University of Brno, Czech Republic (2001-02)

Research Support (PI/PD only; co-PI support and university matching excluded)

Total research funds received from the National Science Foundation, Office of Naval Research, U.S. Army Research Office, U.S. Department of Energy, Solar Energy Research Institute, Gas Research Institute and other sources including industries, universities and national laboratories from 1977 to present: over $7.5 million; $7 million since joining ASU.

Current Research Support

National Science Foundation
"Partnership for Innovation (PFI): Gallium nitride quantum-dot light emitting diodes"
Total award: $660,000 from 1/16/06 to 1/31/09
Co-PIs: J. Kouvetakis, P.C. Johnson.

Publications (Refereed Papers)

1. D.I. Bower, E. Claridge and I.S.T. Tsong. Low-Temperature Elastic Constants and Specific Heats of f.c.c. Nickel-Iron Alloys. Phys. Stat. Sol. **29**, 617-625 (1968).

2. J.A. Pryde and I.S.T. Tsong. Thermodynamic Data and Kinetics of Evolution for Dilute Solutions of Hydrogen in Tantalum. Trans. Faraday Soc. **65**, 2766-2771 (1969).

3. J.A. Pryde and I.S.T. Tsong. Thermodynamic Functions and Phase Diagrams of Tantalum + Hydrogen and Tantalum + Deuterium Systems. Trans. Faraday Soc. **67**, 297-304 (1971).

4. J.A. Pryde and I.S.T. Tsong. A Theory of the Resistivity of High Concentration Interstitial Alloys with Application to the Tantalum- Hydrogen and Tantalum-Deuterium Systems. Acta Metall. **19**, 1333-1338 (1971).

5. I.S.T. Tsong. Photon Emission from Sputtered Particles During Ion Bombardment. Phys. Stat. Sol. (a) **7**, 451-458 (1971).

6. I.S.T. Tsong and D.J. Barber. Development of the Surface Topography on Silica Glass Due to Ion Bombardment. J. Mat. Sci. **7**, 687-693 (1972).

7. I.S.T. Tsong and D.J. Barber. Review: Sputtering Mechanisms for Amorphous and Polycrystalline Solids. J. Mat. Sci. **8**, 123-135 (1973).

8. D.J. Barber, F.C. Frank, M. Moss, J.W. Steeds and I.S.T. Tsong. Prediction of Ion-Bombarded Surface Topographies Using Frank's Kinematic Theory of Crystal Dissolution. J. Mat. Sci. **8**, 1030-1040 (1973).

9. I.S.T. Tsong and A.C. McLaren. Quantitative Spectrochemical Analysis of Feldspars by Ion Bombardment. Nature **248**, 43-45 (1974).

10. I.S.T. Tsong and A.C. McLaren. An Ion Beam Spectrochemical Analyzer - With Application to the Analysis of Silicate Minerals. Spectrochim. Acta **30B**, 343-351 (1975).

11. I.S.T. Tsong, A.C. McLaren and B.E. Hobbs. Determination of Hydrogen in Silicates Using the Ion Beam Spectrochemical Analyzer: Application to Hydrolytic Weakening. Amer. Mineral. **61**, 921-926 (1976).

12. N.H. Tolk, I.S.T. Tsong and C.W. White. In Situ Spectrochemical Analysis of Solid Surfaces by Ion Beam Sputtering. Anal. Chem. **49**, 16A-30A (1977).

13. I.S.T. Tsong, C.A. Cornelius and D.J. Karoly. A Quantitative Demonstration of the Coriolis Effect. Phys. Education **12**, 117-120 (1977).

14. P.R.W. Hudson and I.S.T. Tsong. Hydrogen Impurity in Natural Gem Diamond. J. Mat. Sci. **12**, 2389-2395 (1977).

15. I.S.T. Tsong. The Excitation Efficiency of Atoms Ejected During Ion Beam Sputtering. Surface Sci. **69**, 609-618 (1977).

16. I.S.T. Tsong and R.B. Leibert. The Use of Sputter-Induced Emission Spectroscopy for the Analysis of Hydrogen in Solids. Nucl. Instrum. Method **149**, 523-527 (1978).

17. I.S.T. Tsong and A.S. Bhalla. Hydrogen and Fluorine Profiles in GdF_3 Films Measured by Sputter-Induced Optical Emission. Appl. Phys. Lett. **32**, 381-383 (1978).

18. A. Corredor, I.S.T. Tsong and W.B. White. Flame-Excited Luminescence and Radical Recombination Luminescence of Tb^{3+} and Eu^{3+} in Rare Earth Oxide Phosphors and Silicate Glasses. Proceedings of 13th Rare Earth Research Conference, Plenum Press, New York (1978) 573-580.

19. I.S.T. Tsong. Reply to "Photon Emission from Sputtered Atoms - The Observation of Apparent Local Thermodynamic Equilibrium" by MacDonald et al., Surface Sci. **75**, 159-160 (1978).

20. D.D. Allred, C.W. White, G.J. Clark, B.R. Appleton and I.S.T. Tsong. Measurement of Hydrogen Profiles in SiO_2 by a Nuclear Reaction Technique, in 'The Physics of SiO_2 and its Interfaces.' S.T. Pantelides, Ed., Pergamon Press, New York (1978) 210-214.

21. A.S. Bhalla, L. Tongson, I.S.T. Tsong and L.E. Cross. Characterization of Films Deposited by Chemical Reaction on Ferroelectric-Ferroelastic Gadolinium Molybdate (GMO) Surfaces. Thin Solid Films **53**, 55-62 (1978).

22. I.S.T. Tsong, C.A. Houser, N.A. Yusuf, R.F. Messier, W.B. White and J.W. Michels. Obsidian Hydration Profiles Measured by Sputter-Induced Optical Emission. Science **201**, 339-341 (1978).

23. I.S.T. Tsong, A. Corredor, W.B. White, N.H. Tolk and J.S. Kraus. An Estimation of the Quantum Yield in the Candoluminescence Process by Low Energy H^+ Ion Bombardment. J. Electrochem. Soc. **125**, 2015-2019 (1978).

24. G.J. Clark, C.W. White, D.D. Allred, B.R. Appleton and I.S.T. Tsong. Hydrogen Concentration Profiles in Quartz Determined by a Nuclear Reaction Technique. Phys. Chem. Minerals **3**, 199-211 (1978).

25. I.S.T. Tsong and N.A. Yusuf. Absolute Photon Yields in the Sputter- Induced Optical Emission Process. Appl. Phys. Lett. **33**, 999-1001 (1978).

26. C.A. Houser, I.S.T. Tsong and W.B. White. Characterization of Leached Surface Layers on Simulated High-Level Waste Glasses by Sputter-Induced Optical Emission, in 'Scientific Basis for Nuclear Waste Management, Vol. 1,' G.J. McCarthy, Ed., Plenum Press, New York (1979) 131-140.

27. I.S.T. Tsong and N.A. Yusuf. Does Local Thermodynamic Equilibrium Exist in the Excitation Process of Sputtered Atoms? Surface Sci. **90**, 417-428 (1979).

28. J.W. Michels and I.S.T. Tsong. Obsidian Hydration Dating: A Coming of Age. Advances in Archaelogical Method and Theory, Vol. 3., M.B. Schiffer, Ed., Academic Press (1980) 405-444.

29. D.W. Hoffman, I.S.T. Tsong and G.L. Power. Analytic Correction of Edge Effects in Ion-Beam Sputtered Depth Profiles. J. Vac. Sci. Technol. **17**, 613-620 (1980).

30. I.S.T. Tsong, G.L. Power, D.W. Hoffman and C.W. Magee. Edge-Effects Correction In Depth-Profiles Obtained by Ion-Beam Sputtering. Nucl. Instrum. Meth. **168**, 399-404 (1980).

31. I.S.T. Tsong and N.A. Yusuf. Velocity Measurements of Sputtered Atoms in Excited States. Nucl. Instrum. Meth. **170**, 357-362 (1980).

32. P. Williams, I.S.T. Tsong and S. Tsuji. A Comparison of Absolute Yields of Excited Neutrals and Positive Ions from Ion-Bombarded Surfaces. Nucl. Instrum. Meth. **170**, 591-595 (1980).

33. D.M. Fell, L.L. Tongson, S.V. Krishnaswamy, R. Messier and I.S.T. Tsong. Characterization of Commercial Black Chrome Coatings. J. Vac. Sci. Technol. **17**, 358-361 (1980).

34. I.S.T. Tsong and S. Tsuji. The Effect of Adsorbed and Recoil Implanted Oxygen on Sputtered Excited Atoms. Surface Sci. **94**, 269-280 (1980).

35. I.S.T. Tsong, C.A. Houser and S.S.C. Tong. Depth-Profiles of Interdiffusing Species in Hydrated Glasses. Phys. Chem. Glasses. **21**, 197- 198 (1980).

36. C.A. Houser, J.S. Herman, I.S.T. Tsong, W.B. White and W.A. Lanford. Sodium-Hydrogen Interdiffusion in Sodium Silicate Glasses. J. Non-Cryst. Solids. **41**, 89-98 (1980).

37. I.S.T. Tsong, C.A. Houser, W.B. White and S.S.C. Tong. Glass Leaching Studies by Sputter-Induced Photon Spectrometry (SIPS). J. Non-Cryst. Solids **38-9**, 649-654 (1980).

38. T.R. Lundquist, R.P. Burgner, P.R. Swann and I.S.T. Tsong. Quantitative Hydrogen Depth-Profiling Using SIMS. Appl. Surf. Sci. **7**, 2-6 (1981).

39. I.S.T. Tsong, M.D. Monkowski, J.R. Monkowski, P.D. Miller, C.D. Moak, B.R. Appleton and A.L. Wintenberg. Investigation of Hydrogen and Chlorine at the SiO_2/Si Interface, in 'The Physics of MOS Insulators, G. Lucovsky, S.T. Pantelides and F.L. Galeener, Eds., Pergamon Press (1980) 321-325.

40. I.S.T. Tsong, J.R. Monkowski and D.W. Hoffman. Ion-Beam-Induced Atomic Mixing at the SiO_2/Si Interface, Nucl. Instrum. Meth. **182**, 237-240 (1981).

41. I.S.T. Tsong. Quantitative Aspects of Outer-Shell Excitation in Ion- Surface Collisions, in 'Inelastic Ion-Surface Collisions,' Eds. W. Heiland and E. Taglaur, Springer-Verlag (1981) 258-276.

42. J.A. Costello, R.E. Tressler and I.S.T. Tsong. Boron Redistribution in Sintered Alpha SiC During Thermal Oxidation. J. Amer. Ceram. Soc. **64**, 332-335 (1981).

43. N.A. Yusuf and I.S.T. Tsong. Kinetic Energies of Excited Atoms Ejected from Ion-Bombarded Surfaces. Surface Sci., **108**, 578-586 (1981).

44. S. Tsuji, I.S.T. Tsong and S.V. Krishnaswamy. The Influence of Oxygen on the Continuum Emission from Ion-Bombarded Metal Surfaces. Spectrochim. Acta **36B**, 1005-1014 (1981).

45. I.S.T. Tsong, G.A. Smith, J.W. Michels, A.L. Wintenberg, P.D. Miller, C.D. Moak. Dating of Obsidian Artifacts by Depth-Profiling of Artificially Hydrated Surface Layers. Nucl. Instrum. Meth. **191**, 403-407 (1981).

46. I.S.T. Tsong, M.D. Monkowski, J.R. Monkowski, A.L. Wintenberg, P.D. Miller and C.D. Moak. Hydrogen and Chlorine Detection at the SiO_2/Si Interface. Nucl. Instrum. Meth. **191**, 91-95 (1981).

47. J.W. Michels, E. Atzeni, I.S.T. Tsong and G.A. Smith. Sardinian Archaeology and Obsidian Dating, in 'Studies in Sardinian Archaeology,' Ed. M.S. Balmuth, Univ. of Michigan Press, 83-114 (1984).

48. I.S.T. Tsong, N.H. Tolk, T.M. Buck, J.S. Kraus, T.R. Pian and R. Kelly. Outershell Electronic Processes in Ne^+ Collisions With a Ni(110) Surface. Nucl. Instrum. Meth. **194**, 655-658 (1982).

49. I.S.T. Tsong, C.A. Houser, W.B. White, A.L. Wintenberg, P.D. Miller and C.D. Moak. Evidence for Interdiffusion of Hydronium and Alkali Ions in Leached Glasses. Appl. Phys. Letters **39**, 669-670 (1981).

50. C.A. Houser, I.S.T. Tsong, W.B. White, A.L. Wintenberg, P.D. Miller and C.D. Moak. Ion-Beam Depth-Profiling Studies of Leached Glasses. Rad. Effects **64**, 103-108 (1982).

51. J.W. Michels, C.M. Stevenson, I.S.T. Tsong and G.A. Smith. Hydration Rate for Easter Island, in 'Recent Developments in Easter Island Archaeology,' Ed. W.S. Ayers, Univ. of Oregon Anthropological Papers (in press).

52. E. Minford, J.A. Costello, I.S.T. Tsong and R.E. Tressler. Oxidation Effects on Crack Growth and Blunting in SiC Ceramics. Fracture Mechanics of Ceramics, Vol. 6. Ed. R.C. Bradt, F. Lang, D.P.H. Hasselman and A.G. Evans. Plenum Press (1983) 511-522.

53. R.C. Ross, I.S.T. Tsong, R. Messier, W.A. Lanford, C. Burman. Quantification of Hydrogen in aSi:H Films by IR Spectrometry, ^{15}N Nuclear Reaction and SIMS. J. Vac. Sci. Technol. **20**, 406-409 (1982).

54. M.D. Monkowski, J.R. Monkowski, I.S.T. Tsong, J. Stach and R.E. Tressler. Microstructural Development During the Thermal Oxidation of Silicon in Chlorine Containing Ambients. J. Non-Cryst. Solids **49**, 201-207 (1982).

55. M.G. Justice, E.K. Graham, R.E. Tressler and I.S.T. Tsong. The Effect of Water on High-Temperature Deformation in Olivine. Geophys. Res. Lett. **9**, 1005 (1982).

56. J.W. Michels, C.W. Marean, I.S.T. Tsong and G.A. Smith. Invisible Hydration Rims on Obsidian Artifacts: A Test Case. Soc. Arch. Sci. Newsletter **6**(2), 1-4 (1982).

57. J.W. Michels, I.S.T. Tsong and C.M. Nelson. Obsidian Dating and East African Archaeology. Science **219**, 361-366 (1983).

58. J.R. Monkowski, M.D. Monkowski, I.S.T. Tsong and J. Stach. Hydrogen/Chlorine Distribution in Silicon Dioxide - Detection and Model. Semiconductor Processing: A Symposium, D.C. Gupta, Ed., ASTM (1983) 245-259.

59. C.M. Loxton, I.S.T. Tsong and S.H. Lin. Comment on 'Molecule Formation During Sputtering by Two Body Associative Ionization with Diabatic Curve Crossing.' Phys. Rev. Lett. **50**, 1331 (1983).

60. J.W. Michels, I.S.T. Tsong and G.A. Smith. Experimentally Derived Hydration Rates in Obsidian Dating. Archaeometry **25**, 107-117 (1983).

61. A.R. Ziv, S.H. Lin, M. Skiff, B.P. Nigam, M. Szymonski, C.M. Loxton and I.S.T. Tsong. Theory of Inelastic Processes in Energetic Ion Impact on Solid Surfaces. J. Molecular Sci. **1**, 55-70 (1983).

62. I.S.T. Tsong. Depth-Profiling Studies on Glasses and Ceramics by Ion Beam Teachniques. Materials Science Research, Vol. 15. Advances in Materials Characterization. Plenum Press (1983) 39-57.

63. S.H. Lin, I.S.T. Tsong, A.R. Ziv, M. Szymonski and C.M. Loxton. Theoretical Studies of Non-Cascade Sputtering Processes. Phys. Scripta **T6**, 106-110 (1983).

64. I.S.T. Tsong. Studies of Surface of Materials Using Low Energy Ion Beams. IEEE Trans. Nucl. Sci. **30**, 1266-1270 (1983).

65. C.M. Loxton, I.S.T. Tsong and H.W. Pickering. The Effect of Oxygen Adsorption on Cu-Ni Alloys During Irradiation Studied by SIMS, SIPS and ISS. Nucl. Instrum. Meth. **218**, 340-346 (1983).

66. A.R. Ziv, B.V. King, S.H. Lin and I.S.T. Tsong. Kinetic Energy Distributions of Sputtered Particles in Non-Cascade Sputtering Processes. Nucl. Instrum. Meth. **218**, 742-746 (1983).

67. B.V. King and I.S.T. Tsong. The Influence of Atomic Mixing on SIMS Depth Profiling of Thin Buried Layers. Nucl. Instrum. Meth. **218**, 687-690 (1983).

68. C.M. Loxton, I.S.T. Tsong and D.A. Reed. Excitation of Molecules Formed by Ion Bombardment of Surfaces. Nucl. Instrum. Meth. **B2**, 465-469 (1984).

69. C.M. Loxton and I.S.T. Tsong. A comparison of Secondary Ion and Photon Yields from Ion Bombarded Cu-Ni Alloys. Surface Sci. **139**, 435-462 (1984).

70. B.V. King, D.G. Tonn, I.S.T. Tsong and J.A. Leavitt. The Effect of Atomic Mixing in the Depth Profiles of Metal Markers in Silicon. Mat. Res. Soc. Symp. Proc. **27**, 103-108 (1984).

71. B.V. King and I.S.T. Tsong. The Depth Resolution of Sputter Profiling. Ultramicroscopy **14**, 75-78 (1984).

72. B.V. King and I.S.T. Tsong. A Model for Atomic Mixing and Perferential Sputtering Effects in SIMS Depth Profiling. J. Vac. Sci. Technol. **A2**, 1443-1447 (1984).

73. B.V. King, D.G. Tonn and I.S.T. Tsong. Temperature Effects in Atomic Mixing of Metal-Silicon Multilayers Measured by SIMS. Nucl. Instrum. Meth. **B7/8**, 607-615 (1985).

74. B.V. King and I.S.T. Tsong. Deconvolution of Atomic Mixing Effects from SIMS Depth Profiles. Nucl. Instrum. Meth. **B7/8**, 793-797 (1985).

75. B.V. King, A.R. Ziv, S.H. Lin and I.S.T. Tsong. Mass Distribution of Ejected Molecules and Clusters in Non-Cascade Sputering Processes. J. Chem. Phys. **82**, 3641-3635 (1985).

76. I.S.T. Tsong, U. Knipping, C.M. Loxton, C.W. Magee and G.W. Arnold. Carbon on Surfaces of Magnesium Oxide and Olivine Single Crystals - Diffusion from the Bulk or Surface Contamination? Phys. Chem. Minerals **12**, 261-270 (1985).

77. B.V. King, A.R. Ziv, S.H. Lin and I.S.T. Tsong. Interpretation of the Mass Distribution of Ejected $(CsI)_nCs^+$ Clusters by the Non-Cascade Sputtering Model. Surface Sci. **167**, 18-26 (1986).

78. U. Knipping and I.S.T. Tsong. The Mobility of Implanted Hydrogen and Carbon in Magnesium Oxide Single Crystals. Rad. Effects **97**, 209-214 (1986).

79. J.W. Christiansen, D. Delli Carpini and I.S.T. Tsong. Sputtering of Ices by keV Ions. Nucl. Instrum. Meth. **B15**, 218-221 (1986).

80. D.G. Tonn, O.F. Sankey and I.S.T. Tsong. SIMS Analysis of Thermal and Ion-Beam Induced Broadening of Thin Metal Markers in Silicon. Nucl. Instrum. Meth. **B15**, 193-197 (1986).

81. I.S.T. Tsong and U. Knipping. Comment on "Solute Carbon and Carbon Segregation in Magnesium Oxide Single Crystals - a Secondary Ion Mass Spectrometry Study" Phys. Chem. Minerals **13**, 277-279 (1986).

82. I.S.T. Tsong, J.W. Christiansen, S.H. Lin and B.V. King. Mechanisms of Desorption of Large Molecules and Clusters by Energetic Particle Bombardment. In "Mass Spectrometry in the Analysis of Large Molecules," C.J. McNeal, ed. (Wiley, 1986), 67-87.

83. C.S. Chang, U. Knipping and I.S.T. Tsong. Shadow Cones Formed by Target Atoms Bombarded by 1 to 3 keV He^+, Li^+, Ne^+ and Na^+ Ions. Nucl. Instrum. Meth. **B18**, 11-15 (1986).

84. J.W. Christiansen, I.S.T. Tsong and S.H. Lin. Ion-Induced Desorption of $(H_20)_nH^+$ Ion Clusters. J. Chem. Phys. **86**, 4701-4705 (1987).

85. B.V. King, I.S.T. Tsong and S.H. Lin. Mechanisms of Ion-Induced Desorption of Molecules and Clusters. Int. J. Mass Spec. Ion Proc. **78**, 347-356 (1987).

86. C.S. Chang, U. Knipping and I.S.T. Tsong. Shadow Cones Formed by Target Atoms Calculated for 1 to 3 keV H^+, He^+, Li^+, Ne^+ and Na^+ Ion Bombardment. Nucl. Instrum. Meth. **B28**, 493-496 (1987).

87. T.L. Porter, C.S. Chang, U. Knipping and I.S.T. Tsong. Impact-Collision Ion-Scattering Spectrometry Study of Ni Layers Deposited on Si(111) at Room Temperature. Phys. Rev. **B36**, 9150-9154 (1987).

88. N.J. Zheng, U. Knipping, W.T. Petuskey, J.C. Barry and I.S.T. Tsong. Scanning Tunneling Microscopy of ß-SiC and $YBa_2Cu_3O_{7-x}$ Ceramic Surfaces. J. Vac. Sci. Technol. **A6**, 457-460 (1988).

89. T.L. Porter, C.S. Chang, U. Knipping and I.S.T. Tsong. Room Temperature Growth of Ultrathin Ni Films on Si(111). J. Vac. Sci. Technol. **A6**, 2034- 2036 (1988).

90. J.W. Christiansen, I.S.T. Tsong and S.H. Lin. Ion-Beam-Induced Desorption of Ar^+_n Ion Clusters. J. Vac. Sci. Technol. **A6**, 699-702 (1988).

91. N.J. Zheng, U. Knipping, I.S.T. Tsong, W.T. Petuskey, S.H. Kong and R.F. Davis. Scanning Tunneling Microscopy of Cubic Silicon Carbide Surfaces. J. Vac. Sci. Technol. **A6**, 696-698 (1988).

92. T.L. Porter, C.S. Chang and I.S.T. Tsong. Si(111)-(√3x√3)Ag Surface Structure Studied by Impact Collision Ion Scattering Spectrometry. Phys. Rev. Lett. **60**, 1739-1742 (1988).

93. G. Gillen, J.W. Christainsen, I.S.T. Tsong, B. Kimball and P. Williams. Sputter Yields of Ammonia Chloride and Solid Glycerol. Rapid Comm. Mass Spec. **2**, 67-68 (1988).

94. I.H. Wilson, N.J. Zheng, U. Knipping and I.S.T. Tsong. Effects of Isolated Atomic Collision Cascades on $Si0_2$/Si Interfaces Studied by Scanning Tunneling Microscopy. Phys. Rev. **B38**, 8444-8450 (1988).

95. S.V. Teplov, T.L. Porter, C.S. Chang, U. Knipping and I.S.T. Tsong. Mechanisms of Recoil Ejection of Ni^+ Ions from a Ni(100) Surface. Phys. Rev. **B38**, 2225-2231 (1988).

96. S.V. Teplov, C.S. Chang, P.P. Kajarekar, T.L. Porter and I.S.T. Tsong. Energy Distribution of Ni^+ Ions Recoiled from a Ni(100) Surface. Nucl. Instrum. Meth. **B35**, 151-155 (1988).

97. I.H. Wilson, N.J. Zheng, U. Knipping and I.S.T. Tsong. Scanning Tunneling Microscopy of an Ion-Bombarded PbS (001) Surface. Appl. Phys. Lett. **53**, 2039-2041 (1988).

98. N.J. Zheng, I.H. Wilson, U. Knipping, D.M. Burt, D.H. Krinsley and I.S.T. Tsong. Atomically Resolved Scanning Tunneling Microscopy Images of Dislocations. Phys. Rev. **B38**, 12780-12782 (1988).

99. C.S. Chang, T.L. Porter and I.S.T. Tsong. In-Plane Geometry of the Si(111)-(√3 x √3)Ag Surface. J. Vac. Sci. Technol. **A7**, 1906-1909 (1989).

100. I.H. Wilson, N.J. Zheng, U. Knipping and I.S.T. Tsong. Scanning Tunneling Microscopy Microscopy of Ion Impacts on Surfaces. J. Vac. Sci. Technol. **A7**, 2840- 2844 (1989).

101. N.J. Zheng and I.S.T. Tsong. Resonant Tunneling Theory of Imaging Close- packed Metal Surfaces by Scanning Tunneling Microscopy. Phys. Rev. **B41**, 2671-2677 (1990).

102. C.S. Chang, T.L. Porter and I.S.T. Tsong. Impact Collision Ion Scattering Spectrometry Studies of Thin Metal Overlayers on Si(111) Surfaces. Vacuum **39**, 1195-1199 (1989).

103. D.M. Cornelison, C.S. Chang and I.S.T. Tsong. Impact Collision Ion Scattering Spectrometry Studies of the Si(111)-($\sqrt{3}$x$\sqrt{3}$)In Surface. Nucl. Instrum. Meth. **B45**, 393-397 (1990).

104. T.L. Porter, D.M. Cornelison, C.S. Chang and I.S.T. Tsong. Impact- Collision Ion-Scattering Spectrometry Studies of the $NiSi_2$(111) Surface. J. Vac. Sci. Technol. **A8**, 2497-2500 (1990).

105. D.M. Cornelison, C.S. Chang and I.S.T. Tsong. Surface Reconstructions Induced by Thin Overlayers of Indium on Si(111). J. Vac. Sci. Technol. **A8**, 3443-3448 (1990).

106. V. Bissessur and I.S.T. Tsong. Velocity Distributions of Sputtered Potassium Atoms. Nucl. Instrum. Meth. **B52**, 129-135 (1990).

107. C.S. Chang, N.J. Zheng, I.S.T. Tsong, Y.C. Wang and R.F. Davis. Scanning Tunneling Microscopy of Cubic Silicon Carbide Surfaces. J. Am. Ceram. Soc. **73**, 3264-3268 (1990).

108. T.G. Sharp, N.J. Zheng, I.S.T. Tsong and P.R. Buseck. Scanning Tunneling Microscopy of Defects in Ag- and Sb-bearing Galena. Amer. Mineral **75**, 1438-1442 (1990).

109. C.S. Chang, N.J. Zheng, I.S.T. Tsong, Y.C. Wang and R.F. Davis. Studies of ß-SiC (001) and (111) Surfaces by Scanning Tunneling Microscopy. J. Vac. Sci. Technol. **B9**, 681-684 (1991).

110. D.M. Cornelison, M.S. Worthington and I.S.T. Tsong. The Si(111)-(4x1)In Surface Reconstruction Studied by Impact-Collison Ion Scattering Spectrometry. Phys. Rev. **B43**, 4051-4056 (1991).

111. C.S. Chang, I.S.T. Tsong, Y.C. Wang and R.F. Davis. Scanning Tunneling Microscopy and Spectroscopy of Cubic ß-SiC(111) Surfaces. Surface Sci. **256**, 354-360 (1991).

112. M.S. Worthington, J.L. Stevens, C.S. Chang and I.S.T. Tsong. Surface Reconstructions of the Sn/Si(111) System Investigated by Ion-Scattering Spectrometry and Scanning Tunneling Microscopy. Nucl. Instrum. Meth. **B64**, 566-571 (1992).

113. M.H. Tsai, C.S. Chang, J.D. Dow and I.S.T. Tsong. Electronic Contributions to Scanning Tunneling Microscopy Images of an Annealed ß-SiC(111) Surface. Phys. Rev. **B45**, 1327-1332 (1992).

114. H.J.W. Zandvliet, H.B. Elswijk, E.J. van Loenen and I.S.T. Tsong. Atomically Resolved Imaging of Ion-Bombarded Surfaces. Secondary Ion Mass Spectrometry - SIMS VIII, John Wiley and Sons, 3-9 (1992).

115. H.J.W. Zandvliet, H.B. Elswijk, E.J. van Loenen and I.S.T. Tsong. Scanning Tunneling Microscopy and Spectroscopy of Ion-Bombarded Si(111) and Si(100) Surfaces. Phys. Rev. **B46**, 7581-7587 (1992).

116. M.S. Worthington, J.L. Stevens, C.S. Chang and I.S.T. Tsong. Surface Reconstructions Induced by Submonolayers of Tin on Si(111). SPIE Proc. "Scanning Probe Microscopies" **1639**, 68-73 (1992).

117. M.S. Worthington, J.L. Stevens, C.S. Chang and I.S.T. Tsong. Si(111)- (2$\sqrt{3}$x2$\sqrt{3}$)Sn Reconstructions Studied by Ion-Scattering Spectrometry and Scanning Tunneling Microscopy. J. Vac. Sci. Technol. **A10**, 657-663 (1992).

118. H. Feil, H.J.W. Zandvliet, M.H. Tsai, J.D. Dow and I.S.T. Tsong. Random and Ordered Defects on Ion-Bombarded Si(100)-(2x1) Surfaces. Phys. Rev. Lett. **69**, 3076-3079 (1992).

119. I.S.T. Tsong. Atomic Level Characterization of Cubic Silicon Carbide Surfaces - A Review. J. Amer. Ceram. Soc. **76**, 269-272 (1993).

120. J.L. Stevens, M.S. Worthington and I.S.T. Tsong. 4x1 Reconstruction of Indium Deposited on Vicinal Si (111) Surfaces. Phys. Rev. **B47**, 1453-1459 (1993).

121. B.E. Steele, L. Li, J.L. Stevens and I.S.T. Tsong. Structure of the Si(100)-(2x2)In Surface. Phys. Rev. **B47**, 9925-9927 (1993).

122. I.S.T. Tsong and P. Bedrossian. Scanning Tunneling Microscopy Studies of Ion-Bombarded Surfaces. Proc. Royal Danish Acad. (Mat. Fys. Medd. Dan. Vid. Selsk.) **43**, 209-222 (1993).

123. Y. Wei, M.H. Tsai, J.D. Dow and I.S.T. Tsong. A Straight Domain Boundary of Single-atom Width on a Si(111)-(7x7) Surface. Surf. Sci. Lett. **296**, L15-L20 (1993).

124. Y. Wei, W.E. Packard, J.D. Dow and I.S.T. Tsong. Scanning Tunneling Microscopy Studies of Electromigration on Si(100) Surfaces Under External Strain. Non-Destructive Characterization of Materials VI, R.E. Green et al. eds., Plenum Press, New York (1994) 765-772.

125. M. Hammar, B.E. Steele and I.S.T. Tsong. Impact-Collision Ion-Scattering Spectrometry Studies of the $VC_{0.8}$(111)-(8x1) Surface. Nucl. Instrum. Meth. **B85**, 429-434 (1994).

126. B.E. Steele, D.M. Cornelison, L. Li and I.S.T. Tsong. The Structure of the Si(100)-(4x3)In Surface Studied by STM and ICISS. Nucl. Instrum. Meth. **B85**, 414-419 (1994).

127. L. Li, Y. Wei and I.S.T. Tsong. Reconstruction, Step-bunching and Faceting of a Vicinal Si(100) Surface Induced by Indium Adsorption. Surf. Sci. **304**, 1-11 (1994).

128. K. Wurm, R. Kliese, Y. Hong, B. Röttger, Y. Wei, H. Neddermeyer and I.S.T. Tsong. Evolution of Surface Morphology of Si(100)-(2x1) During Oxygen Adsorption at Elevated Temperatures. Phys. Rev. **B50**, 1567-1574 (1994).

129. L. Li, C. Koziol, Y. Wei, K. Wurm, Y. Hong, E. Bauer and I.S.T. Tsong. Surface Morphology of Growth and Melting of Pb Overlayers on Si(100)-(2x1). Phys. Rev. **B50**, 10834-10842 (1994).

130. L. Li, Y. Wei and I.S.T. Tsong. Surface Morphology Induced by Ga and Sn Overlayers on Si(100) and Si(311) Surfaces. J. Vac. Sci. Technol. **A13**, 1473-1477 (1995).

131. Y. Wei, L. Li and I.S.T. Tsong. Surface Morphology of Si(111)-(7x7) Under an External Isotropic Tensile Stress. J. Vac. Sci. Technol. **A13,** 1609-1612 (1995).

132. Y. Wei, L. Li and I.S.T. Tsong. Etching of Si(111)-(7x7) and Si(100)-(2x1) Surfaces by Atomic Hydrogen. Appl. Phys. Lett. **66**, 1818-1820 (1995).

133. E. Bauer, Y. Wei, T. Müller, A. Pavlovska and I.S.T. Tsong. Reactive Crystal Growth in Two Dimensions: Silicon Nitride on Si(111). Phys. Rev. **B51**, 17891-17901 (1995).

134. Y. Wei, Y. Hong and I.S.T. Tsong. Oxygen Etching of the Si(100)-(2x1) Surface. Appl. Surf. Sci. **92**, 491-496 (1996).

135. Y. Wei, L. Li and I.S.T. Tsong. Surface Atomic Vacancies Created by Ion Bombardment and Desorption. Nucl. Instrum. Meth. **115**, 572-576 (1996).

136. L. Li and I.S.T. Tsong. Atomic Structures of 6H-SiC(0001) and (000 $\bar{1}$) Surfaces. Surf. Sci. **351**, 141-148 (1996).

137. R. M. Tsong, M. Schmid, C. Nagl, P. Varga, R. F. Davis and I.S.T. Tsong. Atomic Structures of Niobium Carbide (100) and (110) Surfaces. Surf. Sci. **366**, 85-92 (1996).

138. L. Li and I.S.T. Tsong. Surface Structure and Morphology Induced by Ultrathin Ti Films on 6H-SiC(0001) and (000 $\bar{1}$). Surf. Sci. **364**, 54-60 (1996).

139. I.S.T. Tsong. LEEM/STM Studies of Non-reactive and Reactive Growth on Silicon Surfaces. Surf. Rev. Lett. **3**, 1305-1314 (1996).

140. D.E. Jones, J.P. Pelz, Y. Hong, E. Bauer and I.S.T. Tsong. Striped Phase and Temperature Dependent Step Shape Transition on Highly B-doped Si(001) Surfaces. Phys. Rev. Lett. **77**, 330-333 (1996).

141. L. Li, Y. Hasegawa, T. Sakurai and I.S.T. Tsong. Field-ion Scanning Tunneling Microscopy Study of the Atomic Structure of 6H-SiC(0001) Surfaces. J. Appl. Phys. **80**, 2524-2526 (1996).

142. D.E. Jones, J.P. Pelz, Y. Hong, I.S.T. Tsong, Y.H. Xie and P.J. Silverman. Strain Field Imaging of Si/SiGe(001)-(2x1) Surfaces by LEEM and STM. Appl. Phys. Lett. **69**, 3245-3247 (1996).

143. L. Li, Y. Hasegawa, I.S.T. Tsong and T. Sakurai. Structures of 6H-SiC Surfaces. J. Physique IV **6(C5)**, 167-172 (1996).

144. C.M. Roland, M.G. Wensell, Y. Hong and I.S.T. Tsong. Control of Si(100) Sublimation with Dopants. Phys. Rev. Lett. **78**, 2608-2611 (1997)

145. H.J.W. Zandvliet and I.S.T. Tsong. Surface Morphology of Ion Bombarded Si(001) and Ge(001) Surfaces, in "Morphological Organizations during Epitaxial Growth and Removal", eds. Z. Zhang and M.G. Lagally, World Scientific, pp. 485-498 (1998).

146. M.H. Tsai, Y.S. Tsai, C.S. Chang, Y. Wei and I.S.T. Tsong. Optimum Widths of Dimer Vacancy Lines on Si(001) - (2x1). Phys. Rev. B **56**, 7435-7438 (1997).

147. V.M. Torres, M. Stevens, J.L. Edwards, D.J. Smith, R.B. Doak and I.S.T. Tsong. Growth of AlN and GaN on 6H-SiC(0001) using a He Supersonic Beam Seeded with NH_3. Appl. Phys. Lett. **71**, 1365-1367 (1997).

148. Q.K. Xue, Q.Z. Xue, Y. Hasegawa, I.S.T. Tsong and T. Sakurai. Initial Stages of Cubic GaN Growth on the Ga As (001) Surface Studied by Scanning Tunneling Microscopy. Jpn. J. Appl. Phys. **36**, L1486-L1489 (1997).

149. A. Pavlovska, E. Bauer, V.M. Torres, J.L. Edwards, R.B. Doak, I.S.T. Tsong, V. Ramachandran and R.M. Feenstra. In Situ Real-Time Studies of GaN Growth on 6H-SiC (0001) by Low-Energy Electron Microscopy (LEEM). J. Cryst. Growth **189/190**, 310-316 (1998).

150. J.P. Pelz, C. Ebner, D.E. Jones, Y. Hong, E. Bauer and I.S.T. Tsong. Comment on "Step Faceting at the (001) Surface of Boron Doped Silicon." Phys. Rev. Lett. **81**, 5473 (1998).

151. S. Hearne, E. Chason, J. Han, J.A. Floro, J. Figiel, J. Hunter, H. Amano and I.S.T. Tsong. Stress Evolution During Metal-Organic Chemical Vapor Deposition of GaN. Appl. Phys. Lett. **74**, 356-358 (1999).

152. V.M. Torres, J.L. Edwards, B.J. Wilkins, D.J. Smith, R.B. Doak and I.S.T. Tsong. Influence of 6H-SiC (0001) Substrate Surface Morphology in the Growth of AlN Epitaxial Layers. Appl. Phys. Lett. **74**, 985-987 (1999).

153. Q.Z. Xue, Q.K. Xue, Y. Hasegawa, I.S.T. Tsong and T. Sakurai. Two-step Preparation of 6H-SiC (0001) Surface for Epitaxial Growth of GaN Thin Films. Appl. Phys. Lett. **74**, 2468-2470 (1999).

154. Q.K. Xue, Q.Z. Xue, R. S. Bakhtizin, Y. Hasegawa, I.S.T. Tsong, T. Sakurai and T. Ohno. Structures of GaN (0001) 2x2, 4x4 and 5x5 Surface Reconstructions. Phys. Rev. Lett. **82**, 3074-3077 (1999).

155. D.C. Nesting, J. Kouvetakis, S. Hearne, E. Chason and I.S.T. Tsong. Real-time Monitoring of Structure and Stress Evolution of Boron Films Grown on Si (100) by UHV-CVD. J. Vac. Sci. Technol. A **17**, 891-894 (1999).

156. Q.Z. Xue, Q.K. Xue, R.Z. Bakhtizin, Y. Hasegawa, I.S.T. Tsong, T. Sakurai and T. Ohno. Atomistic Investigation of Various GaN(0001) Phases on the 6H-SiC(0001) Surface. Phys. Rev. B **59**, 12604-12611 (1999).

157. V.M. Torres, R.B. Doak, B.J. Wilkens, D.J. Smith and I.S.T. Tsong. Selected Energy Epitaxial Deposition of GaN and AlN on SiC (0001) Using Seeded Supersonic Free-Jets of NH_3 in Helium. J. Vac. Sci. Technol. A **17**, 1570-1576 (1999).

158. A. Pavlovska, V.M. Torres, R.B. Doak, E. Bauer, I.S.T. Tsong, D.B. Thomson and R.F. Davis. Low-Energy Electron Microscopy Observations of GaN Homoepitaxy Using a Supersonic Jet Source. Appl. Phys. Lett. **75**, 989-991 (1999).

159. A. Pavlovska, V.M. Torres, J.L. Edwards, E. Bauer, D.J. Smith, R.B. Doak, I.S.T. Tsong, D.B. Thomson and R.F. Davis. Homoepitaxial GaN Layers Studied by LEEM, AFM and TEM. Phys. Stat. Sol. (a) **176**, 469-473 (1999).

160. J.N. Stirman, F.A. Ponce, A. Pavlovska, I.S.T. Tsong and D.J. Smith. Polarity Determination and Atomic Arrangements at a GaN/SiC Interface using High-resolution Image Matching. Appl. Phys. Lett. **76**, 822-824 (2000).

161. S.J. Hearne, J. Han, S.R. Lee, J.A. Floro, D.M. Follstaedt, E. Chason and I.S.T. Tsong. Brittle-ductile Relaxation Kinetics of Strained AlGaN/GaN Heterostructures. Appl. Phys. Lett. **76**, 1534-1536 (2000).

162. M.H. Tsai, O.F. Sankey, K..E. Schmidt and I.S.T. Tsong. Electronic Structures of Polar and Nonpolar GaN Surfaces. Mat. Sci. Eng. B **88**, 40-46 (2002).

163. D.C. Jordan, I.S.T. Tsong, D.J. Smith, B.G. Wilkens and R.B. Doak. III-N Semiconductor Growth with Activated Nitrogen: a State-Specific Study of $A^3\sum_u^+$ Metastable N_2 Molecules. Appl. Phys. Lett. **77**, 3030-3032 (2000)

164. C.W. Hu, D.J. Smith, R.B. Doak and I.S.T. Tsong. Morphological Control of GaN Buffer Layers Grown by Molecular Beam Epitaxy on 6H-SiC (0001). Surf. Rev. Lett. **7**, 565-570 (2000)

165. M. Chirita, H. Xia, R. Sooryakuma, J.B. Tolle, V.M. Torres, B.J. Wilkens, D.J. Smith, J. Kouvetakis and I.S.T. Tsong. Elastic Properties of Nano-crystalline Zirconium-silicon-boron Thin Films. J. Appl. Phys. **89**, 4349-4353 (2000).

166. C.W. Hu, H. Hibino, T. Ogino ed I.S.T. Tsong. Hysteresis in the (1x1)-(7x7) first-order phase transition on the Si(111) surface. Surface Sci. **487**, 191-200 (2001).

167. H. Hibino, C.W. Hu, T. Ogino and I.S.T. Tsong. Decay kinetics of two-dimensional islands and holes on Si (111) studied by low-energy electron microscopy. Phys. Rev. B **63**, 245402 (2001).

168. V.M. Torres, D.C. Jordan, I.S.T. Tsong and R.B. Doak. Supersonic beam epitaxy of wide bandgap semiconductors in "Atomic and Molecular Beams - The State of the Art 2000", R. Camparque (Ed.), Springer-Verlag (2000), pp. 945-958.

169. J.-F. Nielsen, J.P. Pelz, H. Hibino, C.W. Hu and I.S.T. Tsong. Enhanced terrace stability for preparation of step-free Si(001)-(2x1) surfaces. Phys. Rev. Lett. **87**, 136103 (2001).

170. H. Hibino, C.W. Hu, T. Ogino and I.S.T. Tsong. Diffusion barrier caused by (1x1)-(7x7) on Si(111) during phase transition. Phys. Rev. B **64**, 245401 (2001).

171. R.Z. Bakhtizin, Q.Z. Xue, Q.K. Xue, Y. Hasegawa, I.S.T. Tsong and T. Sakurai. STM study of controlling heteroepitaxial growth of nitride semiconductor films on an atomic scale. Phys. Low-dimensional Structures, **3-4**, 243-256 (2001).

172. Q.K. Xue, Q.Z. Xue, S. Kuwano, K. Nakayama, T. Sakurai, I.S.T. Tsong, X.G. Qiu and Y. Segawa. Surface superstructures and optical properties of wurtzite GaN grown on 6H-SiC. J. Cryst. Growth **229**, 41-47 (2001).

173. J.-F. Nielsen, J.P. Pelz, C.-W. Hu, H. Hibino, I.S.T. Tsong and J. Kouvetakis. Controlled striped phase formation on ultra-flat Si(001) surfaces during diborane exposure. Appl. Phys. Lett. **79**, 3857-3859 (2001).

174. Q.K. Xue, Q.Z. Xue, S. Kuwano, T. Sakurai, T. Ohno, I.S.T. Tsong, X.G. Qiu and Y. Segawa. Imaging wurtzite GaN surfaces by molecular beam epitaxy – scanning tunneling microscopy. Thin Solid Films **367**, 149-158 (2000).

175. R. Roucka, J. Tolle, D.J. Smith, P. Crozier, I.S.T. Tsong and J. Kouvetakis. Low-temperature growth of SiCAlN films of high hardness on Si(111) substrates. Appl. Phys. Lett. **79**, 2880-2882 (2001).

176. R. Roucka, J. Tolle, A.V.G. Chizmeshya, P.A. Crozier, C.D. Poweleit, D.J. Smith, I.S.T. Tsong and J. Kouvetakis. Low-temperature epitaxial growth of the quaternary wide band gap semiconductor SiCAlN. Phys. Rev. Lett. **88**, 206102 (2002).

177. J. Tolle, R. Roucka, P.A. Crozier, A.V.G. Chizmeshya, I.S.T. Tsong and J. Kouvetakis. Growth of SiCAlN on Si(111) via a crystalline oxide interface. Appl. Phys. Lett. **81**, 2181-2183 (2002).

178. C.W. Hu, A. Bell, F.A. Ponce, D.J. Smith and I.S.T. Tsong. Growth of self-assembled GaN quantum dots via the vapor-liquid-solid mechanism. Appl. Phys. Lett. **81**, 3236-3238 (2002).

179. H. Hibino, C.W. Hu, T. Ogino and I.S.T. Tsong. A study of mass transport on Si(111) surfaces by low-energy electron microscopy. J. Surf. Sci. Soc. Jpn. **23**, 277-284 (2002).

180. J. Tolle, R. Roucka, A.V.G. Chizmeshya, P.A. Crozier, D.J. Smith, I.S.T. Tsong and J. Kouvetakis. Novel synthetic pathways to wide band gap semiconductors in the Si-C-Al-N system. Solid State Sci. **4**, 1509-1519 (2002).

181. L. Torrison, J. Tolle, J. Kouvetakis, S.K. Dey, D. Gu, I.S.T. Tsong and P.A. Crozier. Stoichiometric and non-stoichiometric films in the Si-O-N system: mechanical, electrical and dielectric properties. Mat. Sci. Eng. B **97**, 54-58 (2003).

182. R. Roucka, J. Tolle, A.V.G. Chizmeshya, C.D. Poweleit, D.J. Smith, J. Kouvetakis and I.S.T. Tsong. Epitaxial growth of the pseudo-binary wide band gap semiconductor SiCAlN. Appl. Surf. Sci. **212/213**, 872-878 (2003).

183. L. Torrison, J. Tolle, I.S.T. Tsong and J. Kouvertakis. Growth and optical properties of epitaxial GaN films on Si(111) using single-source MBE. Thin Solid Films **434**, 106-111 (2003).

184. C.W. Hu, J.L. Taraci, J. Tolle, M.R. Bauer, P.A. Crozier, I.S.T. Tsong and J. Kouvetakis. Synthesis of highly coherent SiGe and Si_4Ge nanostructures by molecular beam epitaxy of H_3SiGeH_3 and $Ge(SiH_3)_4$. Chem. Mater. **15**, 3569-3572 (2003).

185. J. Tolle, R. Roucka, C. Ritter, P.A. Crozier, A.V.G. Chizmeshya, I.S.T. Tsong and J. Kouvetakis. Epitaxial growth of group III nitrides on silicon substrates via a reflective lattice-matched zirconium diboride buffer layer. Appl. Phys. Lett. **82**, 2398-2400 (2003).

186. C.W. Hu, A. Bell, L. Shi, F.A. Ponce, D.J. Smith and I.S.T. Tsong. Structural and optical properties of coherent GaN islands grown on 6H-SiC(0001)-($\sqrt{3}$x$\sqrt{3}$). Appl. Phys. Lett. **82**, 2889-2891 (2003).

187. C.W. Hu, A.V.G. Chizmeshya, J. Tolle, J. Kouvetakis and I.S.T. Tsong. Nucleation and growth of epitaxial ZrB_2(0001) on Si(111). J. Cryst. Growth **267**, 554-563 (2004).

188. J. Tolle, J. Kouvetakis, D.-W. Kim, S. Mahajan, A. Bell, F.A. Ponce, I.S.T. Tsong, M.L. Kottke and Z.D. Chen. Epitaxial growth of $Al_xGa_{1-x}N$ on Si(111) via a ZrB_2(0001) buffer layer. Appl. Phys. Lett. **84**, 3510-3512 (2004).

189. H. Hibino, Y. Homma, C.W. Hu, M. Uwaha, T. Ogino and I.S.T. Tsong. Structural and morphological changes on surfaces with multiple phases studied by low-energy electron microscopy. Appl. Surf. Sci. **237**, 51-57 (2004).

190. R. Roucka, J. Tolle, A.V.G. Chizmeshya, I.S.T. Tsong and J. Kouvetakis. Epitaxial film growth of zirconium diboride on Si(001). J. Cryst. Growth **277**, 364-371 (2005).

191. J. Tolle, J. Kouvetakis, D.-W. Kim, S. Mahajan, A.V.G. Chizmeshya, C.-W. Hu, A. Bell, F.A. Ponce and I.S.T. Tsong. Epitaxial growth of ZrB_2(0001) on Si(111) for III-nitride applications: A review. Chinese J. Phys. **43**, 233-248 (2005).

192. C.J. Ritter, C.W. Hu, A.V.G. Chizmeshya, J. Tolle, D. Klewer, I.S.T. Tsong and J. Kouvetakis. Synthesis and fundamental studies of $(H_3Ge)_xSiH_{4-x}$ molecules: precursors to semiconductor hetero- and nanostructures on Si. J. Am. Chem. Soc. **127**, 9855-9864 (2005).

193. R.A. Trivedi, J. Tolle, A.V.G. Chizmeshya, R. Roucka, C. Ritter, J. Kouvetakis and I.S.T. Tsong. Low-temperature GaN growth on silicon substrates by single gas-source epitaxy and photo-excitation. Appl. Phys. Lett. **87**, 072107 (2005).

194. C.-W. Hu, I.S.T. Tsong, V. D'Costa, J. Menendez, P.A. Crozier, J. Tolle and J. Kouvetakis. Synthesis of Si-Ge nanoscale structures via deposition of single-source $(GeH_3)_{4-n}SiH_n$ hydrides. Appl. Phys. Lett. **87**, 083101 (2005).

195. C.-W. Hu, J. Menendez, I.S.T. Tsong, J. Tolle, A.V.G. Chizmeshya, C. Ritter and J. Kouvetakis. Low-temperature pathways to Ge-rich $Si_{1-x}Ge_x$ alloys via single-source hydride chemistry. Appl. Phys. Lett. **87**, 181903 (2005).

196. R. Trivedi, P.-L. Liu, R. Roucka, J. Tolle, A.V.G. Chizmeshya, I.S.T. Tsong and J. Kouvetakis. Mismatched heteroepitaxy of tetrahedral semiconductors with Si via ZrB_2 templates. Chem. Mater. **17**, 4647-4652 (2005).

197. H. Hibino, Y. Watanabe, C.-W. Hu and I.S.T. Tsong. Thermal decay of superheated 7x7 islands and supercooled "1x1" vacancy islands on Si(111). Phys. Rev. B **72**, 245424 (2005).

198. Y. Yamada-Takamura, Z.T. Wang, Y. Fujikawa, T. Sakurai, Q.K. Xue, J. Tolle, P.-L. Liu, A.V.G. Chizmeshya, J. Kouvetakis and I.S.T. Tsong. Surface and interface studies of GaN epitaxy on Si(111) via ZrB_2 buffer layers. Phys. Rev. Lett. **95**, 266105 (2005).

199. P.-L. Liu, A.V.G. Chizmeshya, J. Kouvetakis and I.S.T. Tsong. First-principles studies of GaN(0001) heteroepitaxy on ZrB_2(0001). Phys. Rev. B **72**, 245335 (2005).

200. A.V.G. Chizmeshya, C.J. Ritter, C.-W. Hu, J.B. Tice, J. Tolle, R.A. Nieman, I.S.T. Tsong and J. Kouvetakis. Synthesis of butane-like SiGe hydrides: Enabling precursors for CVD of Ge-rich semiconductors. J. Am. Chem. Soc. **128**, 6919-6930 (2006).

201. Z.T. Wang, Y. Tamada-Takamura, Y. Fujikawa, Q.K. Xue, J. Tolle, J. Kouvetakis, I.S.T. Tsong and T. Sakurai. Effect of nitridation on the growth of GaN on ZrB_2(0001)/Si(111) by molecular beam epitaxy. J. Appl. Phys. **100**, 033506 (2006).

202. J. Tolle, A.V.G. Chizmeshya, Y.-Y. Fang, J. Kouvetakis, V.R. D'Costa, C.-W. Hu, J. Menendez and I.S.T. Tsong. Low temperature chemical vapor deposition of Si-based compounds via $SiH_3SiH_2SiH_3$: Metastable SiSn/GeSn/Si(100) heteroepitaxial structures. Appl. Phys. Lett. **89**, 231924 (2006).

203. C.D. Poweleit, C.-W. Hu, I.S.T. Tsong, J. Tolle and J. Kouvetakis. Optical characterization of $Si_{1-x}Ge_x$ nanodots grown on Si substrates via ultrathin SiO_2 buffer layers. J. Appl. Phys. **101**, 114312 (2007).

Patents

"Vibration-free Levitated Platform," U.S. Patent Number 5,726,512 issued on March 10, 1998. W.K. Chu, Q.Y. Chen, K. Ma, M.A. Lamb, C.K. McMichael and I.S.T. Tsong.

"Method for Forming a Low-defect Epitaxial Layer in the Fabrication of Semiconductor Devices," U.S. Patent number 6,306,675 issued on October 23, 2001. I.S.T. Tsong, D.J. Smith, V.M. Torres, J.L. Edwards and R.B. Doak.

"Super Hard Dielectric Compounds and Methods of Preparation", U.S. Patent number 7,374,738 issued on May 20, 2008 . J. Kouvetakis, I.S.T. Tsong, J. Tolle, and L. Torrison.

"Low-temperature Epitaxial Growth of Quaternary Wide Band Gap Semiconductors"' U.S. Patent number 6,911,084 issued on June 28, 2005. J. Kouvetakis, I.S.T. Tsong, R. Roucka and J. Tolle.

"Growth of SiCAlN on Si(111) via a Crystalline Oxide Interface", U.S. Patent application filed on May 16, 2003, serial # 60/380,998 (ASU case # M1-062). J. Kouvetakis, I.S.T. Tsong, R. Roucka and J. Tolle.

"Epitaxial Growth of Group III Nitrides on Silicon Substrates via a Reflective Lattice-Matched Zirconium Diboride Buffer Layer". U.S. Patent application filed on February 12, 2004, (ASU case # M3-037). I.S.T. Tsong, J. Kouvetakis, J. Tolle and R. Roucka.

"Germanium-Tin Alloys and Ordered Phases with Direct Tunable Bandgaps Grown Directly on Silicon". US Patent application filed on June 14, 2004, (ASU case # M3-059). J. Kouvetakis, M. Bauer, J. Menendez, C.-W. Hu, I.S.T. Tsong and J. Tolle.