CURRICULUM VITAE

NAME Alex Ignatiev

BIRTHDATE February 14, 1945
Wehingen, Germany
U.S. Citizen

EDUCATION

Ph.D.	Cornell University	1972	Materials Science
B.S.	University of Wisconsin	1966	Applied Mathematics and Engineering Physics

PROFESSIONAL EXPERIENCE

1998-Present	Professor of Physics, Chemistry and Electrical and Computer Engineering, University of Houston
1988-Present	Director, Space Vacuum Epitaxy Center, University of Houston
1987-Present	Task Leader, Texas Center for Superconductivity
1986-1988	Associate Director, Space Vacuum Epitaxy Center, University of Houston
1984-1989	Associate Director, Magnetic Information Research Laboratory, University of Houston
1983-present	Professor of Physics and Chemistry, University of Houston
1983	Senior Fullbright Scholar, University of Split, Yugoslavia
1982-1983	Professor of Physics, University of Houston
1977-1978	Visiting Lektor/Associate Professor, Institute of Physics, Aarhus University, Aarhus, Denmark
1977-1982	Associate Professor of Physics, University of Houston
1974-present	Member, Energy Laboratory, University of Houston
1974-1977	Assistant Professor of Physics, University of Houston
1972-1974	Research Associate, State University of New York at Stony Brook
1967-1971	Graduate Research Assistant, Cornell University
1966	Industrial Consultant, Pope Scientific Company, Menomenee Falls, Wisconsin
1966-1967	Graduate Research Assistant, University of Wisconsin
1964-1966	Undergraduate NSF Research Assistant, University of Wisconsin

CREDITS

Honors:

1994 UH Alumni Award - Dallas Area UH Alumni Group

1994 UH College of Natural Science and Mathematics Alumni Achievement Award

1994 City of Houston “Alex Ignatiev Day” Recognition Award

1994 NASA - JSC Group Achievement Award

1995 City of Houston Science Recognition Award

1997 Texas State Senate Recognition Award

Editorial:

Associate Editor “Vacuum”

Associate Editor “Space Forum”

Associate Editor “Research Trends”

MANUSCRIPT REVIEW:

Physical Review

Surface Science

Solar Energy

Thin Solid Films

Journal of Vacuum Science and Technology

Solar Energy Materials

Physical Review Letters

Solid State Communications

Journal of Applied Physics

Applied Physics Letters

PROPOSAL REVIEW:

National Science Foundation

Department of Energy

Solar Thermal Test Facility User's Association

Stanford Synchrotron Radiation Laboratory

U.S. Army Research Office

NASA

ORGANIZING COMMITTEES:

32 National Symposium, American Vacuum Society (Local Arrangements Chairman, 1985)

V International Conference on Ion Beam Analysis (1981)

Southwest Spectroscopy Conference (1980 and 1983)

American Vacuum Society - Texas Chapter Executive Committees (1984-1987)

Space Processing Technical Committee - American Institute of Aeronautics and Astronautics [AIAA] (1988 -)

Materials Research Society - Symposium on Space Compatible Materials (1989)

2nd Int. Conf. on CBE (1989) [ICCBE-2]

Space Technology, Commerce and Communication (1987, 1988, 1989)

Annual Meeting of Centers for the Commercial Development of Space (1992)

Space Processing Symposium, Space Commercialization Conference (1995), (1996), (1997)

International Aeronautica Federation Symposium IAA Materials Science Program Chair (1997, 1998, 1999)

International Aeronautica Federation Symposium Space Power Program Chair (1999)

PROFESSIONAL AND HONORARY SOCIETIES

American Physical Society

American Vacuum Society

Sigma Xi

The American Association for the Advancement of Science

American Chemical Society

The Materials Research Society

American Institute of Aeronautics and Astronautics

American Astronautical Society

International Society of Optical Engineering

Institute for Electrical and Electronic Engineers

PATENTS

1. Freundlich, A. Bensaoula, M. Vileila, and A. Ignateiv, “Tnadem Solar Cell with Imporoved Tunnel Junction”, Patent Number: 5,407,491

2. He Lin, Alex Ignatiev, Nai Juan Wu, “ Three-terminal non-volatile ferroelectric/superconductor thin film field effect transistor” Patent Number: 5,686,745, Nov. 11, 1997

3. S. Q. Liu, N. J. Wu, A. Ignatiev, “A method of observing the objects in an extremely bright background” (Approved by US Patent Office, 1998)

4. N. J. Wu, Y. S. Chen, A. Ignatiev, “ Thin film deposition by multi-beam pulsed laser deposition” (Approved by US Patent Office, 1998)

5. N. J. Wu and A. Ignatiev, “Treating Retinal Damage by Implanting Thin Film Optical Detectors”, Patent Number : 5,873,901

REFEREED PUBLICATIONS

1. A. Ignatjevs, J. B. Pendry and T. N. Rhodin, "Crystalline Xenon -A Kinematic Low-Energy Electron-Diffraction Spectrum," Phys. Rev. Lett. 26, 189 (1971).

2. A. Ignatjevs, T. N. Rhodin, S. Y. Tong, B. I. Lundquist and J. B. Pendry, "LEED Spectra Study of Temperature Effects in Crystalline Xenon Surfaces," Sol. State Comm. 9, 1851 (1971).

3. A. Ignatiev, A. V. Jones and T. N. Rhodin, "LEED Investigations of Xenon Single Crystal Films and Their Use in Studying the Ir(100) Surfaces," Surf. Sci. 30, 573 (1972).

4. A. Ignatiev and T. N. Rhodin, "The Energy and Temperature Dependence of Low-Energy Electron-Diffraction from Xenon Single Crystals," Phys. Rev. B8, 893 (1973).

5. S. Y. Tong, T. N. Rhodin and A. Ignatiev, "Layer-Dependence Surface Mean-Square Vibration Amplitudes by Low-Energy Electron Diffraction," Phys. Rev. B8, 906 (1973).

6. A. Ignatiev, F. Jona, D. W. Jepsen and P. M. Marcus, "The Structure of Overlayers. I. Se on Ag (001)," Surf. Sci. 40, 439 (1973).

7. A. Ignatiev, S. Y. Tong and T. N. Rhodin, "LEED Investigations of the Krypton (III) Surface," Surf. Sci. 42, 37 (1974).

8. A. Ignatiev and F. Jona, "Surface Debye Temperature of the Si(001) 2x2 Structure," Surf. Sci. 42, 605 (1974).

9. A. Ignatiev, F. Jona, D. W. Jepsen and P. M. Marcus, "The Atomic Arrangement in the 1x1 Structure of a Silicon Ordered Monolayer on Mo(001)," J. Vac. Sci. Tech. 12, 226 (1975).

10. A. Ignatiev, F. Jona, D. W. Jepsen and P. M. Marcus, "The Structure of Overlayers II, Si on Mo(001)," Surf. Sci. 49, 189 (1975).

11. A. Ignatiev, F. Jona, D. W. Jepsen and P. M. Marcus, "The Structure of Overlayers III, Nitrogen on Mo(001)," Surf. Sci. 49, 189 (1975).

12. A. Ignatiev, F. Jona, D. W. Jepsen and P. M. Marcus, "The Structure of the Clean Mo(001) Surface," Phys. Rev. B11, 4287 (1975).

13. B. W. Lee, A. Ignatiev, S. Y. Tong and M. A. Van Hove, "Surface Contraction of the Clean W(001) Face," J. Vac. Sci. Tech. 14, 291 (1977).

14. C. Doland, P. O'Neill and A. Ignatiev, "The Particulate Nature of Solar Absorbing Film of Gold Black," J. Vac. Sci. Technol. 14, 259 (1977).

15. A. Ignatiev, F. Jona, M. Debe, D. C. Johnson, S. J. Whitt and D. P. Woodruff, "Three Independent LEED Studies of Clean Si(100) Surfaces," J. Phys. C 10, 1109 (1977).

16. F. Jona, H. D. Shih, A. Ignatiev, D. Jepsen and P. Marcus, "Probable Atomic Structure of Reconstructed Si(001) 2x1 Surfaces Determined by LEED," J. Phys. C 10, L67 (1977).

17. P. O'Neill, C. Doland and A. Ignatiev, "The Structural Composition and Optical Properties of Solar Blacks: Gold Black," App. Opt. 16, 2822 (1977).

18. P. O'Neill, A. Ignatiev and C. Doland, "The Dependence of Optical Properties on the Structural Composition of Solar Absorber," So1ar Energy 21(6), (1978).

19. R. Alsenz, B. W. Lee, A. Ignatiev and M. A. Van Hove, "The State of the Surface of Martensitially Transforming Cobalt Single Crystals," So1. State Comm. 25, 641 (1978).

20. B. W. Lee, R. Alsenz, A. Ignatiev and M. A. Van Hove, "Surface Structure of the Two Allotropic Phases of Cobalt," Phys. Rev. B 17, 1510 (1978).

21. J. A. Taylor, G. M. Lancaster, A. Ignatiev and J. W. Rabalais, "Interactions of Ion Beams with Surfaces: Reactions of Nitrogen with Silicon and its Oxides," J. Chem. Phys. 68, (1978).

22. G. M. Lancaster, J. A. Taylor, A. Ignatiev and J. W. Rabalais, "Vacuum Ultraviolet Resonance Line Radiation Source from Rare Gas Atoms and Ions for UHV Photoelectron Spectroscopy," J. Elec. Spectro. 14, 143 (1978).

23. P. O'Neill and A. Ignatiev, "The Influence of Microstructure on the Optical Properties of Particulate Materials: Gold Black," Phys. Rev. B 15, (1978).

24. P. O'Neill, A. Ignatiev and C. Doland, "The Structural Composition and its Influence on the Optical Properties of Gold Black," AIP Conf. Proc. 40, 288 (1978).

25. A. Ignatiev, P. O'Neill, C. Doland and G. Zajac, "Microstructure Dependence of the Optical Properties of Solar Absorbing Black Chrome," App. Phys. Lett. 34, 42 (1979).

26. A. Ignatiev, P. O'Neill and G. Zajac, "The Surface Microstructure-Optical Properties Relationship in Solar Absorbers: Black Chrome," So1. Energy Mat. 1, 69 (1979).

27. G. Zajac and A. Ignatiev, "The Relationship of Optical Degradation to Surface Morphology Changes in Solar Absorbers," J. Vac. Sci. Technol. 16, 233 (1979).

28. A. Ignatiev and E. Bogh, "The Surface Sensitivity of MeV Ion Scattering," IEE Trans. on Nucl. Sci. 26, 1829 (1979).

29. A. Ignatiev, H. Nielsen and D. Adams, "Similar Surface Structures for CO and N_2 Adsorbed on W(210)," J. Phys. C 11, L833 (1978).

30. A. Ignatiev and T. Matsuyama, "Relationship of Surface Composition to Enhanced Methanation Activity over Cobalt Single Crystals," J. Catal. 5, 328 (1979).

31. M. Passler, A. Ignatiev, F. Jona, D. Jepsen and P. M. Marcus, "Determination of the Ni{001} C(2x2)-CO Structure by Low Energy Electron Diffraction, Phys. Rev. Lett. 43, 360 (1979).

32. G. Zajac and A. Ignatiev, "High Temperature Optical and Structural Degradation of Black Chrome," Sol. Energy Mat. 2, 239 (1980).

33. B. W. Lee, A. Ignatiev, J. A. Taylor and J. W. Rabalais, "Atomic Structure Sensitivity of XPS: The Oxidation of Cobalt," Sol. State Comm. 33, 1205 (1980).

34. S. Tougaard and A. Ignatiev, "Electron Energy Loss Studies of the Valence Band Density State of Scandium," Surf. Interface Anal. 3, 3 (1981).

35. G. B. Smith and A. Ignatiev, "Relative Merits of Black Cobalt and Black Chrome as High Temperature Selective Absorbers," Solar Energy Mat. 2, 461 (1980).

36. G. Zajac, G. B. Smith and A. Ignatiev, "Refinement of Solar Absorbing Black Chrome and its Relationship to Optical Degradation Mechanisms," J. Appl. Phys. 51, 5544 (1980).

37. G. B. Smith and A. Ignatiev, "Black Chromium Molybdenum: A New Stable Solar Absorber," Solar Energy Mat. 4, 119 (1981).

38. G. B. Smith, A. Ignatiev and G. Zajac, "Solar Selective Black Cobalt: Preparation, Structure and Thermal Stability," J. Appl. Phys. 51, 4186 (1980).

39. T. Matsuyama and A. Ignatiev, "LEED-AES Study of the Temperature Dependent Oxidation of the Cobalt (0001) Surface," Surf. Sci. 102, 18 (1981).

40. S. Tougaard, A. Ignatiev and D. L. Adams, "Surface Structure of Scandium (0001)," Proc. 4th Intl. Conf. Solid. Surf. (Cannes, 1980).

41. M. A. Passler, A. Ignatiev, B. W. Lee, D. L. Adams and M. A. Van Hove, "Surface Structure of W{100} C(1x1)-H," Proc. Conf. Surf. Str. Deter. (Academic Press NY, 1981).

42. M. A. Passler, T. M. Lin and A. Ignatiev, "Surface Structure of the Ni(100)-C(2x2)NO System," J. Vac. Sci. Technol. 18, 481 (1981).

43. G. B. Smith, G. Zajac and A. Ignatiev, "High Flux Photochemical Change in Black Chrome Solar Absorbing Coatings," Solar Energy 29, 279 (1982).

44. G. Zajac, A. Ignatiev and G. B. Smith, "Photodesorption Studies of CO and CO_2 from the Solar Absorber Black Chrome," J. Vac. Sci. Technol. 18, 379 (1981).

45. D. L. Adams, H. B. Nielsen, M. A. Van Hove and A. Ignatiev, "LEED Study of the Pt(100)-(1x2) Surface," Surf. Sci. 104, 87 (1981).

46. M. A. Passler, A. Ignatiev, J. A. Schultz and J. W. Rabalais, "Molecular and Atomic Adsorption on Surfaces: Can SIMS Differentiate Between the Two Cases?" Nucl. Inst. Meth. 191, 323 (1981).

47. M. A. Passler, A. Ignatiev, J. A. Schultz and J. W. Rabalais, "SIMS Differentiation of Molecular Adsorption of NO on a Ni(001) Surface," Chem. Phys. Let. 82, 198 (1981).

48. G. B. Smith, G. Zajac, A. Ignatiev and J. W. Rabalais, "Surface Composition of Solar Selective Black Chrome Films as Determined by SIMS," Surf. Sci. 114, 614 (1981).

49. Y. Fukuda and A. Ignatiev, "Characteristic Electron Energy Loss Structure for Clean and Oxidized Chromium Surfaces," Sol. State Comm. 41, 597 (1982).

50. N. J. Wu and A. Ignatiev, "LEED Structural Determination of the Graphite (0001) Surface," Phys. Rev. B 25, 2983 (1982).

51. N. J. Wu and A. Ignatiev, "Low-Energy-Electron-Diffraction Study of Crystalline Graphite and Potassium Overlayers on Graphite," J. Vac. Sci. Technol. 20, 896 (1982).

52. M. A. Passler, B. W. Lee and A. Ignatiev, "Surface Structure of the W(001) C(1x1)-H System," Surf. Sci. 150, 46 (1985).

53. S. Tougaard and A. Ignatiev, "Atomic Structure of the Scandium (0001) Surface," Surf. Sci. 115, 279 (1982).

54. G. Zajac and A. Ignatiev, "The High Temperature Effects of Substrate Oxidation on the Optical Responses of a Selective Solar Absorber," Thin Solid Films 9, 131 (1982).

55. A. Ignatiev, G. Zajac and G. B. Smith, "Solar Absorber Material Stability Under High Solar Flux," Proc. SPIE LA '82 Sym. 324, 170 (1982).

56. G. B. Smith, A. Ignatiev and D. Bacon, "An Introduction and Overview of Two Studies of Substrate Influence on Selective Absorber Structure and Stability," Solar Energy Mat. 9, 1 (1983).

57. D. Bacon and A. Ignatiev, "The Role of the Substrate in the Optical Degradation of Solar Absorbing Black Chrome," Solar Energy Mat. 9, 3 (1983).

58. A. Bensaoula, J. C. Wolfe, J. A. Oro and A. Ignatiev, "Deposition and Reactive Ion Etching of Molybdenum," Appl. Phys. Lett. 41, 122 (1983).

59. G. Zajac and A. Ignatiev, "Percolation-Type Behavior in Black Chrome Selective Solar Films," Appl. Phys. Lett. 41, 435 (1982).

60. S. Tougaard and A. Ignatiev, "Background Intensities in XPS Spectra from Homogeneous Metals," Surf. Sci. 124, 183 (1983).

61. S. Tougaard and A. Ignatiev, "Concentration Profiles by XPS: A New Approach," Surf. Sci. 129, 355 (1983).

62. N. J. Wu and A. Ignatiev, "Layer-by-Layer Intercalation of Potassium into the Graphite (0001) Surface," Sol. State Comm. 46, 59 (1983).

63. N. J. Wu and A. Ignatiev, "Potassium Absorption into the Graphite (0001) Surface: Intercalation," Phys. Rev. B 28, 7288 (1983).

64. A. Zomorrodian, S. Tougaard and A. Ignatiev, "Range Distributions of Low Energy Nitrogen Ions in Metals," Phys. Rev. B 30, 3124 (1984).

65. A. Zomorrodian, S. Tougaard and A. Ignatiev, "Range Distribution of Low Energy Ions in Silver and Copper," IEEE Trans. Nucl. Sci., NS-30, 1066 (1983).

66. A. Zomorrodian, S. Tougaard and A. Ignatiev, "Ion Beam Enhanced Diffusion at Surfaces," J. Vac. Sci. Technol. Al, 339 (1983).

67. A. Zomorrodian, S. Tougaard and A. Ignatiev, "Depth Profiles of Implanted Low Energy Ions in Metals," Phys. Scripta I6, 76 (1983).

68. J. Lang, K. Jamison, F. Dunning, G. Walters, M. Passler, A. Ignatiev, E. Tamura and R. Feder, "Spin Polarization in Low Energy Electron Diffraction from Ni(001) and Ni(001) C(2x2) Te," Surf. Sci. 123, 247 (1982).

69. A. Ignatiev, "Selective Solar Absorbing Coatings by Ion Implantation," in Proc. Conf. Ion Asst. Surf. Tech., (The Metals Society, London 1982).

70. A. Ignatiev, "The Optical Properties-Microstructure Relationship in Particulate Media: Optical Tailoring of Solar Absorbers," in Solar Materials Science, ed, L. E. Murr (Academic Press, New York, 1980).

71. L. Kornblit and A. Ignatiev, "The Size Effect in Radiation-Induced Segregation of Solutes in Binary Metallic Alloys," J. Nucl. Mater. 22, 2 (1984).

72. A. Ignatiev, "The Dependence of the High Temperature, High Solar Flux Stability of Materials on Surface Structure and Composition," Proc. 2nd Israel Mater. Eng. Conf., (Beer Sheva, Israel, 1982).

73. Z. P. Hu and A. Ignatiev, "Lithium Adsorption on the Graphite (0001) Surface," Phys. Rev. B 30, 4856 (1984).

74. S. Tougaard, A. Zomorrodian, L. Kornblit and A. Ignatiev, "Defect-Induced Segregation of Nitrogen Implanted in Cu," Surf. Sci. 152, 8 (1985).

75. N. J. Wu and A. Ignatiev, "Vibrational Properties of the Graphite (0001) Surface," Surf. Sci. 163, 51 (1985).

76. A. Bensaoula, J. Wolfe, A. Ignatiev, F. O. Fong and T. S. Leung, "Direct Current-Magnetron Deposition of Molybdenum and Tungsten with r.f.-Substrate Bias," J. Vac. Sci. Technol. A2, 389 (1984).

77. A. Mesarwi and A. Ignatiev, "Surface Temperatures Under High Solar Flux Illumination," Solar Energy Mater. 11, 353 (1985).

78. L. Kornblit and A. Ignatiev, "Photodesorption Threshold Energies in Semiconductors," Surf. Sci. 136, L57 (1984).

79. L. Kornblit, A. Zomorrodian, S. Tougaard and A. Ignatiev, "Low Temperature Radiation Induced Surface Segregation," Rad. Effects 91, 97 (1985).

80. N. J. Wu and A. Ignatiev, "The Graphite (0001)-(2x2)K Surface Intercalated Structure," in The Structure of Solid Surfaces-I, ed. M. Van Hove and S. Y. Tong (Springer, 1985).

81. S. Tougaard, A. Zomorrodian, L. Kornblit and A. Ignatiev, "Defect Induced Segregation of Nitrogen," J. Vac. Sci. Technol. A3, 819 (1985).

82. A. Mesarwi and A. Ignatiev, "Photodesorption Studies from Aluminum Oxide and from Adsorbates on Aluminum," J. Vac. Sci. Technol. A3, 1641 (1985).

83. N. J. Wu and A. Ignatiev, "A UHV Universal Manipulator with Direct Cooling," Rev. Sci. Insti. 56, 782 (1985).

84. L. Kornblit and A. Ignatiev, "The Surface Free Energy of Crystalline Solids," Physica 141A, 466 (1987).

85. A. Mesarwi and A. Ignatiev, "Photodesorption Studies of Adsorbate covered Aluminum Surfaces," Surface Sci. 166, 75 (1986).

86. T. Pavlovic and A. Ignatiev, "Optical and Microstructual Properties of Anodically Oxidized Aluminum", Thin Solid Films 138, 97 (1986).

87. Z. P. Hu, N. J. Wu and A. Ignatiev, "Cesium Adsorption on the Graphite (0001) Surface: The Phase Diagram," Physical Rev. B 33, 7683 (1986).

88. T. Pavolvic and A. Ignatiev, "Optical Properties of Spectrally Selective Anodically Coated Electrolytically Colored Aluminum Surfaces," Solar Energy Materials 16, 319 (1987).

89. Z. P. Hu, N. J. Wu and A. Ignatiev, "Cs Induced Work Function Changes on the Graphite (0001) Surface," Surface Science 177, L956 (1986).

90. A. Ignatiev and W. C. Fan, "The Lattice Parameter of Metallic Monolayers," J. Vac. Science and Technol. A4, 1415 (1986).

91. N. M. Nahar, G. H. Mo and A. Ignatiev, "A Spectrally Selective High Temperature Stable Al_2O_3-Co Solar Absorber Coating," Solar Energy Mat. 14, 129 (1986).

92. J. S. Liu and A. Ignatiev, "Optical Tailoring of Solar Absorbers by Ion Implantation," Solar Energy Materials 13, 399 (1986).

93. J. S. Liu and A. Ignatiev, "Spectrally Selective Thin Film Thermal Radiation Coatings," Thin Solid Films (in print).

94. N. M. Nahar, Y. Q. Wang, G. H. Mo, R. L. Meng, A. Ignatiev and C. W. Chu, "Perpendicular Magnetic Anistrophy in Anodized Al_2O_3 Thin Films Colored with Co," J. Vac. Sci. Technol. (in print).

95. A. Mesarwi, Y. Sun and A. Ignatiev, "High Flux Photo-Degradation of Materials: Stainless Steel," Energy 12, 269 (1987).

96. E. Ekwelundu and A. Ignatiev, "Low Energy Photodesorption from Si(100) Exposed to CO, CO_2, NO, O_2 and SO_2," Surface Sci. 179, 119 (1987).

97. A. Mesarwi and A. Ignatiev, "Photo-Enhanced Oxidation of Nickel," Solid State Comm. 65 319 (1988).

98. A. Bensaoula, J. Strozier, A. Ignatiev, J. Yu, and J. Wolfe, "Ion Enhanced Etching of Tungsten Single Crystals and Films with XeF_2," J. Vac. Sci. Technol. A5, 1921 (1987).

99. A. Moshfegh and A. Ignatiev, "Photo-Enhancement of the Catalytic Methanation Reaction," Energy 12, 277 (1987).

100. A. Ignatiev and A. Moshfegh, "Photo-Enhanced Catalytic Reactions," SPIE Proc. 653, 254 (1986).

101. A. Moshfegh and A. Ignatiev, "Photo-Enhanced Catalysis: The Methanation Reaction," J. Vac. Sci. Technol. A5, 820 (1987).

102. R. Meng, Y. Wang, C. Liu, A. Bensaoula, C. Chu, P. Hor and A. Ignatiev, "Study of He-Enhancement in Co-Modified γFe_2O_3 Films," AIP Proc. 31st Annual MMM Conf. (1987).

103. E. Grossman, A. Bensaoula and A. Ignatiev, "XeF_2 Dry Etching of W(100) Induced Binding Energy Shifts: An XPS Study Surface Science 201, 269 (1988).

104. E. Ekwelundu and A. Ignatiev, "Electron Stimulated Desorption from GaAs(100) Surface", J. Vac. Sci. and Technol. A6(1), 51 (1988).

105. E. Grossman. A. Bensaoula and A. Ignatiev, "An XPS Study of XeF_2 Dry Etching of Tungsten Silicide", Surface Science 197, 99 (1988).

106. A. Bensaoula, E. Grössman and A. Ignatiev, "Etching of Tungsten with XeF_2: An X-ray Photo-electron Spectroscopy Study", J. Appl. Phys. 62, 4587 (1987).

107. E. Ekwelundu and A. Ignatiev, "Electron-Stimulated Desorption of O^+ ions from a Gas Covered Cds(0001) Surface", Phys. Rev. B38, 3671 (1988).

108. W. C. Fan and A. Ignatiev, " Growth of an Orientationally Ordered Incommensurate Potassium Overlayer and Its Order-disorder Transition on the Cu(111) Surface", Phys. Rev. B37, 5274 (1988).

109. W. C. Fan and A. Ignatiev, "Phase Transition and Phase Diagrams of K and Cs Overlayers on a Reconstructed and Unreconstructed Cu(110) Surface", Phys. Rev. B38, 366 (1988).

110. E. Ekwelundu and A. Ignatiev", Photodesorption from CdS(0001) exposed to NO and Co", J. Vac. Sci. Technol. A6, 735(1988).

111. W. C. Fan and A. Ignatiev, "Ordered Phases and Phase Transitions of Cesium on the Cu(111) Surface", J. Vac. Sci. Technol. A6(3), 1986 (1988).

112. W. C. Fan, J. Strozier and A. Ignatiev, "Island Formation of Alumina on the Graphite (0001) Surface: LEED and AES Study Surface Science 195, 226 (1988).

113. A. Z. Moshfegh and A. Ignatiev, "Combined high-pressure photocatalytic reactor - UHV system and sample transfer device", Rev. of Sci. Inst. 59, 2702 (1988).

114. E. C. Ekwelundu and A. Ignatiev, "Electron Stimulated Desorption of Positive Ions from an Adsorbate-Covered Si(100) Surface", Surface Science 215, 91 (1989).

115. A. Mesarwi and A. Ignatiev, "Photodesorption from Stainless Steel", J. Vac. Sci. Technol. A6, 942 (1988).

116. A. Moshfegh and A. Ignatiev, "Photo-Enhancement of the Catalytic Methanation Reaction," Energy 12, 277 (1987).

117. W. C. Fan and A. Ignatiev, "Phase Diagrams of K and Cs on Cu(110) and Cu(111) Surfaces", Langmiur, 5, 582 (1989).

118. W. C. Fan and A. Ignatiev, "Order-Disorder Critical Behavior of Orientationally Ordered Incommensurate Overlayers of Cesium and Potassium on the Cu(111) Surface", Phys. Rev., B39, 10 (1989).

119. Z. P. Hu, Jia Li, N. J. Wu and A. Ignatiev, "C(0001)-(_3x_3)R30°-Cs Structure Determination: R-Factor Analysis", Surf. Sci., 218, 283-92 (1989).

120. Z. P. Hu, Jia Li, N. J. Wu and A. Ignatiev, "Surface Structure of the C(0001)-(2x2) Cs System: LEED Dynamical Calculation", Physical Review, B39, 18 (1989).

121. N.M. Nahar, G. H. Mo and A. Ignatiev, "Development of an Al_2O_3-Co Selective Absorber for Solar Collectors", Thin Sol. Films 172, 19-25 (1989).

122. N.M. Nahar, G.H. Mo and A. Ignatiev, "A Spectrally Selective High Temperature Stable Al2O3-Co Solar Absorber Coating", Solar Energy Mat. 14, 129 (1986).

123. K. Jamison, A. Bensaoula, A. Ignatiev and W. S. Chan, "Epitaxial Growth of InSb(111) on Sapphire (0001)", Appl. Phys. Lett 54, 19 (1989).

124. A. Ignatiev," Surface Physics- Materials Science Research Possibilities on a Lunar Base", AIP Conf. Proc. 202, 85 (1989)

125. A. Ignatiev, "Epitaxial Thin-Film Crystal Growth in Space Ultra-Vacuum", Adv. Mat. & Mfg.. Processes, 3(4), 599-615 (1988).

126. A. Ignatiev and C.W. Chu, "A Proposal for Epitaxial Thin Film Growth in Outer Space", Metal. Trans. A., 19A, 2639 (1988).

127. A. Ignatiev and C. W. Chu, "Commercial Aspects of Epitaxial Thin Film Growth in Outer Space", Proc. 25th Space Congress (Coco Beach, 1991).

128. J. A. Schultz, H. Schmidt, L. Anderson P. Murray, A. Ignatiev and G. Rau, "Rapid and Quantitative Direct Recoil Analysis of of H, C, O, Si, Ga and As Surface Structure During Reaction of Methanol with GaAs(100)", J. Vac. Si. Technol. (1988).

129. A. Bensaoula, K. D. Jamison, H. C. Chen and A. Ignatiev, "The Influence of Sb Doping on the Growth and Electronic Properties of GaAs(100) and AlGaAs(100)", Matl. Res. Soc. Symp. Proc., 144 , 85 (1989).

130. J. A. Schultz, H. Schmidt, A. Ignatiev and P. T. Murray, "Surface Analysis of H, C, O, Y, Ba and Cu in Pressed and Laser Evaporated YBCO", J. Vac. Sci. Technol. (1991).

131. A. Mesarwi and A. Ignatiev, " Laser-Enhanced Oxidation of Nickel", J. Vac. Sci. Technol. A7(3), 1754 (1989).

132. W. C. Fan, A. Ignatiev, H. Huang and S. Y. Tong, "Observation and Structural Determination of R 30° Reconstruction of the Si(111) Surface" Phys. Rev. Lett., 62, 1516 (1989).

133. W. C. Fan, N. J. Wu and A. Ignatiev, "Observation of Ordered Structures of Sr on the Si(100) Surface", Phys. Rev. B42, 1254 (1990).

134. A.Z. Moshfegh and A. Ignatiev, "Photo-enhanced Catalytic Decomposition of Isopropanol on V_2O_5", Catalysis Letters 4, 113-122 (1990).

135. K. D. Jamison, A. Bensaoula, H-D Shih and A. Ignatiev, "Electrical and Structural Properties of InSb (111) Epitaxially Grown on Al_2O_3(0001)", Vacuum (in print 1991).

136. A. Mesarwi and A. Ignatiev, "Photoenhanced Oxidation of Stainless Steels: An Auger Electron Spectroscopy, X-Ray Photoelectron Spectroscopy and Scanning Electron Microscopy Study", Thin Solid Films, 189, 347 (1990).

137. W. C. Fan, A. Ignatiev and N-J Wu, "Growth of Bismuth on the Si(100) Surface: AES, and LEED, Study", Surf. Sci., 235, 169 (1990).

138. K. D. Jamison, J. S. Resh, C. C. Horton, A. Bensaoula and A. Ignatiev, "Interesting Aspects of Reflection High-energy Electron Diffraction Oscillations during Growth of GaAs(100)", J. Vac. Sci. Technol. B8, 2, (1990).

139. W. C. Fan and A. Ignatiev, "Metal-adsorbate-induced Si(111)-(1x3) Reconstruction", Phys. Rev. B41, 3592 (1990).

140. J. S. Resh, K.D. Jamison, J. Strozier and A. Ignatiev, "Multiple reflection high-energy electron diffraction beam intensity measurement system", Rev. Sci. Instrum. 61, 2 (1990).

141. A. Mesarwi, W. C. Fan and A. Ignatiev, "Oxidation of the Si(100) Surface Promoted by Sr Overlayer: An XPS Study", Jour. of App. Phys., 68, 3609 (1990).

142. E. A. Bering III and A. Ignatiev, "Particle Radiation Near the Orbit of the Vacuum Wake Shield", J. Spacecraft, 27, 1 (1989)

143. J. Resh, K. D. Jamison, J. Strozier, A. Bensaoula and A. Ignatiev, "Phase of Reflection High-energy Electron-diffraction Intensity Oscillations During Molecular-Beam-Epitaxy Growth of GaAs(100)", Phys. Rev. B40, 17 (1989).

144. W. C. Fan and A. Ignatiev, "Reconstruction of the Clean and Metal-adsorbed Ge(111) Surface", Phys. Rev. B40, 5479 (1989).

145. Z. P. Hu, B. C. Pan, W. C. Fan and A. Ignatiev, "Structure Analysis of the Cu(110)-(1x2) Surface Reconstruction induced by Alkali-metal Adsorption", Phys. Rev. B41, 9692 (1990).

146. W. C. Fan, A. Mesarwi and A. Ignatiev, "The Effect of Surface Roughness on RHEED Rocking Curves and Impact on RHEED Intensity Oscillations", Journ. Vac. Sci. and Tech., A8, 347(1990).

147. W.C. Fan, and A. Ignatiev, "Adsorption of Ba on the GaAs (110) Surface and its Effect on Surface Oxidation", J. Appl. Phys., 70, 2833 (1991).

148. W. C. Fan, and A. Ignatiev, "The Effect of Sr and Bi on the Si(100) Surface Oxidation: AES, LEED and XPS Study", Journ. Vac. Sci. and Tech. A,A8, 4017 (1990).

149. N. J. Wu, Z. P. Hu, and A. Ignatiev, "Orientational Ordering of a Cesium Monolayer on Graphite", submitted to Phys. Rev. B43, 3805 (1991).

150. A. Moshfegh, and A. Ignatiev, "Formation and Characterization of Thin Film Vanadium Oxides: AES, WPS, XRD, SEM, and Optical Reflectance Studies", Thin Solid Films 190, 251 (1991).

151. J. Resh, K. Jamison, J. Strozier, A. Bensaoula, and A. Ignatiev, "Phase of Reflection High-energy Electron-diffraction Intensity Oscillations During Molecular Beam Epitaxy Growth of GaAS (100)", Phys. Rev. B.,40, 11799 (1989).

152. A. Mesarwi, and A. Ignatiev, "X-Ray Photoemission Study of Y-Promoted Oxidation of the Si(100) Surface", Surf. Sci., 244, 15 (1991).

153. W. C. Fan, and A. Ignatiev, "The Effect of Surface Roughness on Reflection High-energy Electron -diffraction Rocking Curves and Impact on RHEED Oscillations", J. Vac. Sci. Technol., A8, 3479 (1990).

154. A. Mesarwi and A. Ignatiev, "X-ray Photoemission Study of the Ba/Si(100) Interface and the Oxidation of Si Promoted by Ba Overlayers", J. Vac. Sci Technol., A-9, 2264 (1991).

155. J. Wosik, T. Robin, M. Davis, J. Wolfe, K. Forster, S. Deshmukh, A. Bensaoula, R. Sega, D. Economu, A. Ignatiev, "Dependence of Millimeter Wave Surface Resistance on the Deposition Parameters of Laser Ablated YBaCuO Thin Films" Proc. 2nd Conf. Sci, Technol. Thin Film Superconductors (Denver) (1990).

156. A. Moshfegh, Y.Q. Wang,Y. Y. Sun, P. Hor and A. Ignatiev, "Co-deposited Thin FIlm of YBaCuO-Ag", Physica C, 218, 396 (1993).

157. W.C. Fan, N.-J. Wu and A. Ignatiev, "Determination of Bi-Induced (1x1) Reconstruction of the Si(100) Surface, Phys. Rev. B 45, 1416F (1992).

158. W. C. Fan and A. Ignatiev, "The Effect of Ba or The Oxidation of the Si(100) Surface, "Phys. Rev. B 44, 3110 (1991).

159. K. Krishen and A. Ignatiev, "Future Superconductivity Applications in Space: A Review". Proceedings: First World Congress on Superconductivity (Houston), (1988).

160. W. C. Fan and A. Ignatiev, "Identification Ordered Atomic Structure of Ba on the Si(100) Surface", Surface Science 253, 297 (1991).

161. W. C. Fan, A. Ignatiev and B. Hu, "Ordered-Disordered Critical Behavior of Orientationally Ordered Incommensurate Overlays of Cs and K on the Cu(111) Surface", Phys. Rev. B39, 6816 (1989).

162. A. Bensaoula, H. Hansen, H. C. Chen, J. Zborowski, K. Jamison, A. Ignatiev and H. D. Shih, "A RHEED and XPS Study of InGaAs on GaAs Grown by CBE; J. Crystal Growth 105, 227 (1990).

163. A. Ignatiev, H.D. Shih, M. Daniels, R. Sega and T. Bonner, "Space Vacuum Processing", 29th Aerospace Science Meeting, 91-0310 (1991).

164. A. Moshfegh and A. Ignatiev, "A Temperature Programmed Desorption Study of the H2O/V2O5 System", Surface Sci. Letters, 275, L650 (1992).

165. H. Hansen, A. Bensaoula,S. Tougard, J. Zborowski and A. Ignatiev, "The Temperature Dependent Variation of Bulk and Surface-Stoichiometry of InGaAs on GaAs Grown by CBE and Studied by RHEED, XPS and XRD", Jour. Crystal Growth 116, 271 (1992).

166. T. Robin, A. Mesarwi, N.-J. Wu, W. C. Fan, L. Espoir, R. Sega and A. Ignatiev, "YBCuO Growth on Thin Y-Enhanced SiO2 Buffer Layers on Silicon", Applied Phys. Letters 59, 2323(1991).

167. R. M. Sega and A. Ignatiev, “A Space Ultra-vacuum Experiment - Application to Material Processing”, Proc. Joint AIAA - IKI Conf. on Space Processing, (Moscow,1991).

168. A. Mesarwi, L. L. Levinson and A. Ignatiev; "Oxygen Desorption from YBCO and BCSCO Superconductors", J. Appl. Phys. 70, 1591 (1991).

169. A. Mesarwi and A. Ignatiev, “Oxygen-induced Al Surface Segregation in AlGaAs and the Effect of Y Overlayers on the Oxidation of the Y / AlGaAs Interface”, J. Appl. Phys., 71, 1943 (1992).

170. N. J. Wu, A. Ignatiev, M. Hartig, A. Mesarwi, H. D. Shih, "Growth and Characterization of Pb(Zr,Ti)O3 Thin Films on Si(100) and on Yttrium-treated Si(100)," Proc. of the Fourth International Symp. on Integrated Ferroelectrics, pp 392 (1992).

171. A. Mesarwi, N. J. Wu, H. Fredricksen, A. Ignatiev, "Thin Barrier Technology for the Integration of YBa2Cu3O7-x Thin Films to Semiconductors", Proc. of the MRS Spring Meeting, Symp. San Francisco, California, (April 28-May 1, 1992).

172. A. Ignatiev, "Industry Impact of Thin Film Electronic Materials Growth in Space", Proc. 4th Internat'l Conference on Commercial Use of Space, pp231 (Gordon & Breach, Montreaux) 1992.

173. N. J. Wu, A. Ignatiev, A. Mesarwi, "PZT Thin Film Growth on Yttrium-treated Si(100)", submitted to Integrated Ferroelctrics, 3, 139 (1993).

174. N. J. Wu, A. Ignatiev, A. Mesarwi, H. Lin, H.D. Shih, "Heterostructures of Pb(ZrxTi1-x)O3 and YBa2Cu3O7-x on MgO substrates prepared by Pulsed Laser Ablation", submitted to, Jpn. Jour. Appl. Phys., 32, 5019 (1993).

175. S. L. Bud'ko, H. H. Feng, M. F. Davis, J. C. Wolfe, N. J. Wu, A. Ignatiev and P. H. Hor, "Temperature dependence of persistent photoconductivity in oxygen deficient YBa2Cu3O7-x Thin Films," Phys. Rev. B (1995).

176. A. Ignatiev and A. Freundlich, "Solar Cells for Lunar Applications by Vacuum Evaporation of Lunar Regolith Materials", Proc. 43 Congress of Internat'l Astro. Federation, IAA 92-0158 (1992).

177. A. Mesarwi and A. Ignatiev, “Interaction of Y Overlayers with the GaAs (100) Surface and Oxidation of the Y/GaAs Interface”, Surf. Sci. 282, 371 (1993).

178. J. Strozier, Y.A. Zhang, C. Horton, A. Ignatiev and H. D. Shih, "Effect of Disorder on the Optical Properties of short Period Superlattices", Appl. Phys. Lett. 62, 3426 (1993).

179. J. Strozier, Y. A. Zhang, C. Horton, A. Ignatiev and H.D. Shih, "Model Calculations of Optical Properties for Disordered GaAs/AlAs Superlattices", J.Vac. Sci. Technol, A11, 923 (1993).

180. W.C. Fan and A. Ignatiev, "Reconstruction of the Si(111) Surface Induced by Alkali Metal Atoms", Surface Sci. 276, 352 (1992).

181. R. Y.A. Zhang, J. Strozier, C Horton, and A. Ignatiev, "Luminescence Properties of Periodic Disordered Thin Layer GaAs/AlAs Superlattices", Mat. Res. Soc. Symp. Proc., 358, 999 (1995).

182. T. C. Zhao, S. Y. Tong and A. Ignatiev, "Determination of Linear-chain Multiple Bound State Resonances in Reflection High-Energy Electron Diffraction", Surf. Rev. and Letters, 1, 261 (1994).

183. T. C. Zhao, A. Ignatiev, and S. Y. Tong, "Dynamical Effects in Reflection High-Energy Electron Diffraction Intensity Oscillations", Surf. Rev. and Letters, 1, 253 (1994).

184. C. Justiz, R. Sega, C. Dalton, and A. Ignatiev, "Return Flux Contamination of an Outgassing Spacecraft in Low Earth Orbit", Proc. 31st AIAA Aeorspace Sciences Meeting, 93-0725, (1993).

185. W. T. Taferner, A. Freundlich, A. Bensaoula, A. Ignatiev, K. Waters, K. Eipers-Smith, M. Guehenneuc, and J.A. Schultz, "Real Time Observation of Ge(001) and Ge/Si(001) Using Low Energy Ion Scattering", J. Vac. Sci. Technol. (1994).

186 C. Justiz, R. Sega, C. Dalton and A. Ignatiev, DSMC- and BGK-based Calculations for Return Flux Contamination of Outgassing Spacecraft", J. Thermophysics, 8, 802 (1994).

187. N. J. Wu, H. Lin, K. Xie, X. Y. Li, A. Ignatiev, "A comparison study of (100) and (110) Ba0.5Sr0.5TiO3 epitaxial thin films grown on Superconducting YBa2Cu3O7-x Thin Film Substrates," Phys. C 232, 151 (1994).

186. N. J. Wu, H. Lin, K. Xie, X. Y. Li, J. Li, A. Ignatiev, "Study of Ba1-xSrxTiO3(100) epitaxial thin films prepared by laser deposition," Proc. of the 9th IEEE Intl. Symp. on the Applications of Ferroelectrics, 7-10 Aug. 1994, University Park, Pennsylvania, P. 464.

188. H. Fredricksen, D. Ritums, N. J. Wu, X. Y. Li, A. Ignatiev, "High transition temperature superconducting surface acoustic wave devices," Appl. Phys. Lett. 64, 3033 (1994).

190. J. Feller, M. Levy, B. K. Sarma, H. Fredricksen, D. Ritums, N. J. Wu, X. Y. Li, A Ignatiev, "High Tc SAW devices and measurements near the superconducting transition," IEEE Intl. Ultrasonics Symp., (Cannes, France, Nov. 1-4, 1994).

191. H. Lin, N. J. Wu, K. Xie, X. Y. Li, A. Ignatiev, "Ferroelectric switching and fatigue behavior for PZT/YBCO thin film heterostructures," Integrated Ferroelectrics, Integrated Ferroelectrics 5, 3033 (1994).

192. N. J. Wu, H. Lin, K. Xie, A. Ignatiev, "PZT/YBCO integration and characterization of a three terminal device," Ferroelectrics, 156, 73(1994).

193. He Lin, N. J. Wu, K. Xie, X. Y. Li, A. Ignatiev, "The Transient behavior and memory effect of a PZT/YBCO three terminal device," Appl. Phys. Lett. 65, 953 (1994).

194. Q. Zhong, P.C. Chou, Q.L. Li G.S. Taraldsen, A. Ignatiev, "High-rate growth of purely a-axis oriented YBCO high-Tc thin films by photo-assisted MOCVD," Phsica C, 246, 288 (1995).

195. H. Lin, N. J. Wu, F. Geiger, K. Xie, A. Ignatiev, "Photoresponse and fast optical read-out for a PbZrxTi1-xO3/YBa2Cu3O7-x thin film heterostructure capacitor," Appl. Phys. Lett., 66, 1172 (1995).

196. X. Y. Li, N. J. Wu, K. Xie, J. S. Liu, H. Lin, T. Q. Hung and A. Ignatiev, "The effect of YBa2Cu3O7-x target on superconductive properties of laser ablation deposited thin films," Physica C, 248, 281 (1995).

197. Q. Zhong, P.C. Chou, Q.L. Li and A. Ignatiev, "A'Jc expectation rule' for YBCO thin film prepared by MOCVD and laser ablation," Modern Physics Lett. B8, 1367 (1994).

198. P.C. Chou, Q. Zhong, Q.L. Li and A. Ignatiev, "Optimization of Jc for photo-assisted MOCVD prepared YBCO thin films by Robust design," Mat. Res. Sypm. Proc. 335, 279 (1994).

199.

200. A. Zomorrodian, A. Mesarwi, N. J. Wu and A. Ignatiev, "XPS oxygen line broadening in lead zirconium titanate and related materials," Appl. Surf. Sci., 90, 343 (1995).

201. A. Ignatiev, N. J. Wu, H. Lin, T. Q. Hung and X. Y. Li, "Non-volatile ferroelectric-superconducting field effect transistor," in the Proc. of 7th Intl. Symp. on Integrated Ferroelectrics, Colorado Springs. Colorado, (March 20-22, 1995).

202. A. Zomorrodian, N. J. Wu**,** H. Lin, T. Q. Huang, X. Y. Li and A. Ignatiev, "Temperature dependence of infrared photocurrent in $Pb(Zr_{0.52}Ti_{0.48})O_3$," J. Appl. Phys. 76, 4780 (1995).

203. N. J. Wu, X. Y. Li, J. Li, H. Lin, H. Fredricksen, K. Xie, A. Ignatiev and H. D. Shih, "Thin film growth and interface characterization of YBCO on $LiNbO_3$ substrate," J. Mat. Research 10, 3009 (1995).

204. H. Lin, N. J. Wu, A. Ignatiev, "A ferroelectric-superconducting Photo-detector," J. Appl. Phys. 12, 7130 (1996).

205. H. Lin, A.R. Zomorrodian, N. J. Wu, T. Q. Huang, D. Liu, X.Y. Li and A. Ignatiev, "A pyroelectric current method for high temperature retention behavior measurement of a ferroelectric memory cell," Integrated Ferroelectrics,12, 47 (1996).

206. A.R. Zomorrodian, H. LIn, N. J. Wu, T. Q. Huang, S. Endicter, X. Y. Li, D. Liu and A. Ignatiev, "Memory and retention behavior of a $PbZr_xTi_{1-x}O_3/YBa_2Cu_3O_{7-x}$ FSuFET by admittance spectroscopy and DC measurement," J. Appl. Phys., (1996).

207. A. Ignatiev, “The Wake Shield Facility and Space-Based Thin Film Science and Technology”, Earth Space Review, 4, 10 (1995).

208. A. Zomorrodian, H. Lin, N.J. Wu, T. Q. Huang, D. Liu, X. Li and A. Ignatiev, “High Temperature Polarization Retention of PZT/YBCO”, Applied Phys. Letters, 12, 1789 (1996).

209. A. Ignatiev, C. Horton, M. Sterling, R. Sega, A. Bensaoula, A. Freundlich and S. Pei, "Advanced II-V Materials Processing in the Vacuum of Space", Proc. IEEE GaAs IC Conference, 94CH34488, 13 (1994).

210. C. Horton, A. Ignatiev, M. Sterling, a. Bensaoula, A. Freundlich, S. Pei, R. Sega, "II-V Compound Semiconductor Film Growth in Low Earth Orbit on the Wake Shield Facility", AIP Conf. Proc. 325, 305 (1995).

211. M. Desai, R. Forrest, C. Horton, A. Ignatiev, M. Sterling, J. Strozier, C.Justiz, and R. Sega, "Vacuum and Flow Field Results from the Wake Shield Facility Flight Experiment", AIP Conf. Proc. 325, 323 (1995).

212. A. Ignatiev, C. Horton, M. Sterling, R. Sega, A. Bensaoula, A. Freundlich and S. Pei, " Advanced III-V Materials Processing in the Ultra-vacuum of Space", Proc. Sym. Large Area Wafer Growth and Process. (Electrochemical Soc. Meeting, 1994).

213. C. Justiz, A. Ignatiev, M. Sterling, and R. Sega, "The Wake Shield Flight Experiment - Preliminary Results of Shuttle Flight One", Proc. 19th Intl. Symp. Rarified Gas Dynamics (London, England, 1994).

214. H. Fredricksen, D. Ritums, N. J. Wu, X. Y. Li, J. Willis, A. Ignatiev, J. Feller, B.K. Sarma and M. Levy, "Design dependent transition behavior for superconducting transducers and reflectors," Proc. of 1995 IEEE Ultrasonics Symp., Nov. 7-10, Seattle Washington, Vol.1, PP. 555-558.

215. A. Ignatiev, N. J. Wu, H. Lin, T. Q. Hung and X. Y. Li, "Non-volatile ferroelectric-superconducting field effect transistor," Integrated Ferroelectrics, 10 (1995), 327.

216. N.J. Wu, H. Lin, A.R. Zomorrodian, D. Liu, A. Ignatiev, "High temperature retention properties of ferroelectric PZT/YBCO heterostructures investigated by pyroelectric current and phase detection," Proc. of 10^{th} Intl. Symp. On the Appl. Ferroelectrics, East Brunswick, NJ, Aug.,18-21, 1996.

217. N. J. Wu, D. Liu, Y.S. Chen, H. Lin, A.R. Zomorrodian, A. Ignatiev, "Infrared photocurrent study of PZT/YBCO and PMSZT/YBCO heterostructure", Proc. of 10^{th} Intl. AeroSense Symp. - 96 SPIE, Orlando, Florida, April 8-12, 1996.

218. N. J. Wu, H. Lin, T. Q. Hung, S. Endicter, D. Liu, A. Ignatiev, " Study of ferroelectric-superconductor field effect transistor", Proc. Of Oxide Superconductor Physics and Nano-engineering II, SPIE's Photonics West '96, Symp., 27 Jan.-2 Feb., 1996, San Jose, CA.

219. P. C. Chou, Q. Zhong, Q. L. Li, K. Abazajian, A. Ignatiev, C. Y. Wang, E. E. Deal, and J. G. Chen, "Optimization of J_c of YBCO Thin Films Prepared by Photo-assisted MOCVD Through Statistical Robust Design:, Physica C 254, 93 (1995).

220. A. Z. Moshfegh, A. H Fattollahi,Y. Q. Wang, Y. Y. Sun, P. H. Hor, and A. Ignatiev, "Comprehensive XRD Study of YBCO Thin Films", J. J. Appl. Phys. 34, 6036 (1995).

221. Y. A. Zhang, J. A. Strozier, and A. Ignatiev, "Low Temperature Photoluminscence of Disordered Thin-layer GaAs/AlAs Superlattices: Experiment", Phys Rev B, 53, 7426 (1996).

222. Y. A. Zhang, J. A. Strozier, and A. Ignatiev, "Low Temperature Photoluminscence of Disordered Thin-layer GaAs/AlAs Superlattices: Kinetic Model", Phys Rev B, 53, 7434 (1996).

223. D. L. Ritums, D. Liu, N. J. Wu, A. Ignatiev, "Epitaxially deposited $SrVO_3$ conducting films by laser ablation and MOCVD," Proc. of 10^{th} IEEE Intl. Symp. on Appl. Ferroelectrics (East Brunswick, NJ, Aug.,18-21, 1996).

224. N.J. Wu, H. Lin, A.R. Zomorrodian, D. Liu, A. Ignatiev, "High temperature retention properties of ferroelectric PZT/YBCO heterostructures investigated by pyroelectric current and phase detection," Proc. of 10^{th} IEEE Intl. Symp. on Appl. Ferroelectrics (East Brunswick, NJ, Aug.,18-21, 1996).

225. N. J. Wu, D. Liu, Y.S. Chen, H. Lin, A.R. Zomorrodian, A. Ignatiev, "Infrared photocurrent study of PZT/YBCO and PMSZT/YBCO heterostructure", Infrared Detectors and Focal Plane Arrays IV,.SPIE-Vol. 2746, PP. 172-177 (1996).

227. N. J. Wu, H. Lin, T. Q. Hung, S. Endicter, D. Liu, A. Ignatiev, " Study of ferroelectric-superconductor field effect transistor", Oxide Superconductor Physics and Nano-engineering II, SPIE Vol. 2697, P.502 (1996).

228. A. Ignatiev, Q. Zhong, P. Chou, X. Zhang, J. Liu and W. Chu, "Thick Film YBCO Growth by Phot-assisted MOCVD: Jc Enhancement by Ion Irradiation", Proc. 10^{th} Anniversary HTS Workshop, pp147 (Houston, TX 1996).

229. A. Ignatiev, M. Sterling, C. Horton, A. Freundlich, S. Pei, and R. Hill, "Thin Film Microelectronics Materials Production in the Vacuum of Space" AIP Conf. Proc. 387, 685 (1997).

230. Y. S. Chen, N. J. Wu, D. Liu, J. Fan, S. Dordevic, and A. Ignatiev, "Uncooled Infrared Detectors for Space Monitoring Applications" AIP Conf. Proc. 387, 813 (1997).

231. A. Ignatiev, Q. Zhong, P.C. Chou, X. Zhang, J.R. Liu, and W. K. Chu, " Large Jc Enhancement for Thick YBCO Films Prepared by Photo-Assisted MOCVD", Appl. Phys. Lett., 70, 1474 (1997).

232. A. Ignatiev, "The Wake Shield Facility – Advanced Thin Film Materials Processing in the Ultra-Vacuum of Space", Proc. 48^{th} International Astronautical Congress, Turin (1997)

233. Y. Q. Xu, A. Ignatiev and N.J. Wu, "Oxide thin film heterostructure IR detectors," Proc. of ISAF XI-'98, Electroceramics VI '98 (in press).

234. Y. M. Chen, D. Ritums, W. W. Zhuang, N. J. Wu, and A. Ignatiev, " Dielectric properties of (Ba,Sr)TiO3 films deposited by Photo-Assisted Metal Organic Chemical Vapor Deposition," Journal of the European Ceramic Society (in press).

235. X. Chen, N. J. Wu, and A. Ignatiev, "Structure and conducting properties of La1-xSrxCoO3-δ films," Journal of the European Ceramic Society (in press).

236. R. Zomorrodian, N. J. Wu, H. Lin, A. Ignatiev, "The role of as-grown defects and electrode materials on polarization orientation of $Pb(Zr_{0.52}\ Ti_{0.48})O_3$(PZT) on $YBa_2Cu_3O_{7-x}$(YBCO)," Thin Solid Films, 335, 225 (1998).

237. X. Chen, N. J. Wu, Z. H. Zhang, A. Ignatiev, "Structure and conducting properties of $La_{0.5}Sr_{0.5}CoO_{3-x}$ films on YSZ substrate," Thin Solid Films (in press).

238. N. J. Wu, A. Ignatiev, Y.Q. Xu, Y.S. Chen, "(Mn,Sb) doping-Pb(Zr,Ti)O_3/$YBa_2Cu_3O_7$ heterostructure infrared detectors," Integrated Ferroelectrics, 22, 489 (1998).

239. W. W. .Zhuang, N. J. Wu, D. Ritums, Y. M. Chen and A. Ignatiev, "The Integration of $Ba_{0.5}Sr_{0.5}TiO_3$ with silicon by the use of metallic buffers" Integarted of Ferroelectrics, 21, 167 (1998).

240. Y. S. Chen, N. J. Wu, A Ignatiev, " Dependence of infrared photoresponse of pyroelectric thin film detector with respect to chopper frequency," Proc. of 1st Intl. Conf. on New Theories, Discoveries, and Applications of Superconductors and Related Materials, Feb. 19-24, 1998, Baton Rouge, Louisiana.

241. N. J. Wu, A. Ignatiev, Y.S. Chen, Y. Q. Xu, "Perovskite oxide thin film heterostructures for IR detector," Proc. of 1st Intl. Conf. on New Theories, Discoveries, and Applications of Superconductors and Related Materials, Feb. 9-24, 1998, Baton Rouge, Louisiana.

242. A. Ignatiev, Y. Q. Xu, N. J. Wu, D. Liu, "Pyroelectric, ferroelectric and dielectric properties of Mn and Sb-doped PZT thin films for uncooled IR detectrors," Material Science and Engineering B56, 191-194 (1998).

243. Y.Q. Xu, N.J. Wu, D. Liu and A. Ignatiev, "(Mn,Sb) doped-PZT/$YBa_2Cu_3O_{7-x}$ heterostructure for IR detector array," Mat. Res. Soc. Proc. Vol. 493, 481 (1998).

244. G. Neu, M. Tessiere, A. Freundlich, C. Horton, A. Ignatiev, "Donor acceptor pair spectroscopy of GaAs grown is space ultra vacuum", Applied Physics Letters, (in print)

245. A. Freundlich, T. Kubricht and A. Ignatiev," Lunar Regolith Thin Films: Vacuum Evaporation and Properties", American Institute of Physics Proceeding 420, "Space Technology and Applications International Forum 98 ", p660 (1998)

246. A. Ignatiev and A. Freundlich, "Solar Cell Development on the Surface of the Moon", Proc. 49th International Astronautical Congress, IAA-98-IAA. 13.2.03 (1998)

247. A. Ignatiev, "Thin Films Semiconductor Growth in the Ultra-vacuum of Space" Proc. 49th International Astronautical Congress, IAA-98-IAA. 12.1.05 (1998)

248. A. Freundlich, M. Vilela, C. Monier, and A. Ignatiev, "High Efficincy Radiation Hard Solar Cells for Space Power Satellites" Proc. 49th International Astronautical Congress, IAF-98-R. 1.08 (1998)

249. A. Ignatiev, P.C. Chou, Q. Zhong, X. Zhang and Y.M. Chen, "Photo-assisted MOCVD Growth of YBCO Thick Films for Wire Applications", Applied Superconductivity, 4, 455 (1998).

250. A. Ignatiev, P.C. Chou, Q. Zhong, X. Zhang, and Y. M. Chen, "Photo-Assisted Fabrication of YBCO Thick Films and Budffer Layers on Flexible Substrates for Wire Applications", International Journal of Modern Physics B, 12, 3162 (1998).

251.

PUBLICATIONS

1. "Secondary Electron Spectroscopy: A Surface Sensitive Tool," A. Ignatiev and T. N. Rhodin, Am. Lab 5(3), 12 (1973).

2. "Surface Analysis by Low-Energy Electron Diffraction (LEED)," A. Ignatiev. Am. Lab 5(3), 12 (1973).

3. "Secondary Electron Spectroscopy: A Surface Sensitive Tool," A. Ignatiev, Proc. 125th Electro. Chem. Soc. Meet., Boston, MA., Oct. (1973).

4. "The Structural Composition and Optical Properties of Good Solar Black: Gold Black," P. O'Neill, C. Doland and A. Ignatiev, Proc.: Opt. Phen. Infr. Mat., Op. Soc. Am., Annapolis, MD., (1976).

5. "LEED Observations of the State of the Surface of Martensitically Transforming Cobalt," A. Ignatiev, R. Alsenz, B. W. Lee and M. W. Van Hove, Proc. 3rd Internl. Conf. Sol. Surf. (Vienna, 1977).

6. "The Surface Structure of Epitaxially Grown Cobalt Oxide Films," A. Ignatiev, B. W. Lee and M. A. Van Hove, Proc. 3rd Intrnl. Conf. Sol. Surf. (Vienna, 1977).

7. "Photoelectron Spectroscopy," A. Ignatiev, Proc. Sol. State Exp. Meth. (Copenhagen, 1978).

8. "Black Chrome Surface Morphology," A. Ignatiev Proc. DOE Workshop on Selective Absorber Coatings, p. 189 (Golden, CO., 1977).

9. "The Surface Microstructure—Optical Properties Relationship in Solar Absorbers," A. Ignatiev, Proc. 2nd Conf. Abs. Surf. (SERI, 1979).

10. "Similar Surface Structures for CO and N_2 Adsorbed on the W(210) Surface," A. Ignatiev, J. Vac. Sci. Technol. (1979).

11. "Epitaxial Thin Film Growth in Outer Space," A. Ignatiev and C.W. Chu, Space Commerce '88 Symposium-Montreux, Gordon and Breach (1988).

12. "Surface Physics - Materials Science Research Possibilities on a Lunar Base," A. Ignatiev, AIP Conf. Proc. 202, Physics & Astrophysics From Lunar Base (AIP, New York) 1990.

13. "Proposed Epitaxial Thin Film Growth in the Ultra-Vacuum of Space," A. Ignatiev, AIP Conf. Proc. 192, Vacuum Mechatronics (AIP, New York) 1989.

14. "Thin Film Semiconductors and their Growth in the Ultra-Vacuum of Space," A. Ignatiev, R. Sega and H. D. Shih, Space Commerce '90 (Gordon & Breach, Montreaux) 1990.

15. “To Make a Vacuum Cleaner” F. Kuznik and A. Ignatiev, Air & Space, pp70, July (1995).

COMMITTEES AND ADMINISTRATIVE SERVICE, UNIVERSITY OF HOUSTON

1976-1977	Chairman, Graduate Studies Committee, Physics Department
1976-1978	Member, Undergraduate Council

1978-1979	Secretary, Faculty Senate
1978-1980	Member, Chancellor's Research Advisory Committee
1978-1981	Member, University Resource Reallocation Committee
1979	Associate Chairman, Physics Department
1980	Member, Faculty Senate Executive Committee
1981	Member, Campus 6-year Plan Council
1981	Member, Search Committee, Dean, Natural Science and Mathematics
1980-1983	Member, University Fringe Benefits Committee
1981	Member, Senior Vice Chancellor Assessment Committee
1983	Chairman, Faculty Affairs Committee, Faculty Senate
1983	Chairman, Faculty Club Committee
1984	Vice-Chairman, Faculty Senate
1984-1986	Member, President's Advisory Committee
1984-1985	Member, Provost Search Committee
1985	President-Elect, Faculty Senate
1986	President, Faculty Senate
1986	Member, President's Financial Review Committee
1986	Chair, Chancellor's Advisory Committee
1987	Chair, Committee on Committees
1988-89	Member, University Club Board of Directors
1988-91	Member, University Budget Council
1988-89	Chair, University Budget Council
1989-90	Member, Search Committee, Dean-Natural Sciences and Mathematics
1989-90	Member, President Search Committee
1991-93	Member, University Budget Council
1989-92	Member, University Club Board of Directors
1992-93	NSM Dean’s Distinguished Chairs Committee

1995	Faculty Senate Past Presidents Advisory Committee
1997	Faculty Senate Budget Committee
1997	Chair, Search Committee, Senior Vice Chancellor for Academic Affairs and Senior Vice President for Academic Affairs
1998	Faculty Senate Faculty Affairs Committee

STUDENTS

M.S. Degree	Year
Richard Alsenz	1976
Charles Doland	1977
Toshiro Matsuyama	1978
Debra Bacon	1981
Abed Mesarwi	1983
Jay Resh	1989
Marc Bronzetti	1990
Gert Rau	1990
A.-H. Bensaoula	1991
Q. L. Charlie Li	1994
X. Y. Louie Li	1994
Scott Endicter	1998
Anges Tempes	1998

Ph.D. Degree	
Patrick O'Neill	1977
Gerald Zajac	1981
Ali Zomorrodian	1983
Emanuel Ekwelundu	1988
W.C. Fan	1988

Abed Mesarwi	1989
A. Bensaoula	1986
A. Moshfegh	1990
Jay Resh	1993
Ruth Zhang	1994
Abdelhakim Bensaoula	1995
Waltrud Taferner	1995
Esther Kim	1998
Inna Serdiukova	1998
Dwight Ritums	1998

POST DOCTORALS AND VISITORS

B. S. Lee Associate Professor, Department of Electrical Engineering
1975-1977 Rutgers University, Princeton, NJ

M. Passler Assistant Professor, Department of Physics
1978-1981 Colorado School of Mines, Golden, CO

D. Adams Physics Institute,1978
Aarhus University, Aarhus, Denmark

S. Tougaard Physics Institute
1978-1979 Odense University
1981-1982 Odense, Denmark
1989

M. Van Hove Department of Chemistry
1978 niv. of California, Berkeley, CA

Y. Fukuda Department of Chemistry
1977 Osaka University, Osaka, Japan

P. O'Neill Martin-Marietta Co.
1977-1978 NASA-JSC, Houston, TX

G. B. Smith, Professor, New South Wales Inst. of Technology
1978-1979 N.S.W., Australia

N. J. Wu Institute of Physics
1980-1982 Academy of Science
1984 China
1989-1992

V. Kumykov Dept. of Physics
1981-1982 Kabardino-Balkaviar, State Univ., USSR

J. U. Ro Dept. of Physics
1981-1982 Pusan Univ., Pusan, South Korea

G. Zajac Scientist, Amoco
1981-1983 Research Laboratories, Naperville, IL

L. Kornblit Dept. of Materials Engineering
1982-1983 Ben Gurion Univ., Beer Sheva, Israel

Z. P. Hu Assistant Prof., Department of Physics
1983-1985 Univ. of Science and Technology, Hefei, China

S. Mohan Dept. of Applied Physics
1984 India Institute of Science, India

J. S. Liu Scientist, Vacuum Div.
1983-1985 Shanghai Machinery Co., China
1986-88

A. Zomorrodian Dept. of Physics
1984 Ferdowsi University, Mashhad, Iran
1989
1994-95 (sabbatical)

T. Pavlovic Scientist,
1984-1985 Univ. of Nic, Yugoslavia

V. Nahar Scientist, Central Arid Zone Research Institute
1985 Jodhpur, India

J. Strozier Associate Professor, Empire College
1985-1986 Stony Brook, NY
1988
1990
1991
1992
1993
1994-95 (sabbatical)
1995
1996
1997

E. Grossman Department of Materials Engineering
1986-1987 Ben gurion Univ., Beer Sheva, Israel

Y. Sun Materials Analysis Lab
1986-1987 Central Radio & T.V. Univ., Beijing, China

J. Ocampo Department of Physics
1986-1987 National Autonomas University of Mexico, Temixco, Mexico

C. Horton Department of Physics
1988-90 Case Western Research University, Cleveland, OH

P. Ruzakowski Department of Physics
1989 University of Florida, Gainesville, FL
H. Hansen Physics Institute
1989 Odense University, Odense, Denmark

D. Talwar Department of Physics
1988 Indiana University of Penn., Indiana, PA

A. Barski Riber Inst.
1988 Paris, France
1989

W. Chen Electro-Optek Corp.
1988 Los Angeles, CA

W. Tsang AT&T Bell Labs
1989 Murray Hill, NJ

S. Y. Tong University of Wisconsin
1990 Milwaukee, WIS
1992
1993

Derrick Chen , University of Houston
1990-1992

Charles Horton, Case Western University
1991

H. Lin, Rice University
1993-1995

K. Xie, Beijing University
1993-94

D. Liu, Fudan University, Shanghia, China
1994-1995

Y. S. Chen, Chinese Academy of Sciences, Beijing, China
1996
1997
1998

Y.M. Chen, Chinese Academy of Sciences
1996-

W. W. Zhang, University of Houston
1997-

Yuqing Xu, Clemson University
1997-

S. Q. Liu, Chinese Academy of Sciences
1997-

GRANTS AND CONTRACTS

1. The Research Corporation, (1974), "Investigation of the Initiation of Martensitic-Type Phase Transformations at Surfaces by Low-Energy Electron Diffraction," $7,243.

2. National Science Foundation (1975), "Investigation of the Initiation of Solid-State Structural Phase Transformations at Crystal Surfaces by Low-Energy Electron-Diffraction," $14,655.

3. U.S. Army Research Office (1975-78), "Investigation of the Initiation of Solid State Structural Phase Transformations at Crystal Surfaces by Low-Energy Electron-Diffraction," $100,925.

4. R.A. Welch Foundation (1975-78), "Chemical Interaction of Adsorbed Molecular Species with Metal Surfaces," $54,000.

5. Petroleum Research Fund (1977-78), "Surface Atomic Structure of Metal Substrate-Adsorbate Systems," $24,000.

6. U. of H. Energy Institute (1976-77), "Interaction of Ion Beams with Surfaces," $29,000.

7. Solar Energy Laboratory (1975-77), "Investigation of a High-Temperature Solar Adsorber," $28,626.

8. Energy Research and Development Administration (1977-78), "Surface Morphologies of Efficient Solar Energy Absorbing Materials," $72,362.

9. Department of Energy (1978-79), "Surface Morphologies of Efficient Solar Energy Absorbing Materials," $87,000.

10. R.A. Welch Foundation (1979-82), "Chemical Interaction of Adsorbed Molecular Species with Metal Surfaces," $72,500.

11. Solar Thermal Users Group (1979-1981), "High Flux Degradation Tests at White Sands Solar Furnace," $22,500.

12. Energy Foundation of Texas (1980), "High Flux Solar Simulator Research," $10,000.

13. Department of Energy (1979-80), "Solar Radiation Dependent Degradation of Solar Energy Related Materials," $102,000.

14. Petroleum Research Fund (1980-82), "Surface Atomic Structure of Metal-Adsorbate System," $30,000.

15. Energy Laboratory (1980-81), "Solar Dish Operation Support," $21,500.

16. Department of Energy (1980-81), "Solar Radiation Dependent Degradation of Solar Absorbers," $120,000.

17. International Research and Exchange Board (1981), "Stipend Grant for Russian Scholar," $6,450.

18. Department of Energy (1981-83), "Solar Energy Radiation Dependent Degradation of Solar Energy Related Materials," $148,800.

19. R.A. Welch Foundation (1983-86), "Chemical Interaction of Adsorbed Atomic and Molecular Species with Metal Surfaces," $67,500.

20. Department of Energy (1984), "Solar Energy Radiation Dependent Degradation of Materials," $96,000.

21. International Business Machines (1985), "Postdoctoral Support for Research in Surface Physics," $24,000.

22. University of Houston/Energy Lab (1984-86), "Support for Initiation of the Magnetic Information Research Laboratory," (with C.W. Chu) $223,000.

23. Department of Energy (1985), "Solar Radiation Dependent Degradation of Solar Energy Related Materials," $120,000.

24. Council International Exchange of Scholars (1985), "Development of Selective Surfaces by Vacuum Deposition," $12,700.

25. Department of Energy (1985), "High Flux Photo-Enhancement of Catalytic Processes," $60,000.

26. Department of Energy (1986), "High Flux Degradation Effects in Materials," $80,000.

27. Department of Energy (1986), "Photo-Enhanced Catalysis," $90,000.

28. Control Data Corp. (1986), "Magnetic Materials Research," $50,000.

29. NASA (1986-1990), "Space Vacuum Epitaxy Center," (with C.W. Chu) $5,500,000.00.

30. SVEC Consortium, FY-87 (together with C.W. Chu) $1,080,000.

31. SVEC Consortium Support, FY-87 (together with C. W. Chu) $1,724,760.

32. Department of Energy (1987), "Photo-Enhanced Catalysis," $90,000.

33. Department of Energy (1987), "Photodegeneration in Materials," $90,000.

34. NASA (1987), "Surface Measurements of LEO Atomic Oxygen Exposed Polymers," $10,000.

35. R. A. Welch Foundation (1987-90), "Interaction of Adsorbed Molecules with Surfaces", $75,000.

36. NASA SVEC (1988) $1,374,000.

37. SVEC Consortium Support (1988) $660,000.

38. Texas Center for Superconductivity (1988) $526,000.

39. NASA SVEC (1989) $1,376,000.

40. NASA SVEC WSF (FY-90) $1,050,000.

41. Texas Center for Superconductivity (FY-90) $150,000.

42. R.A. Welch Foundation (1990-1993) "Interaction of Molecules with Surfaces", $90,000.

43. NASA-SVEC support (FY-91) $1,415,000.

44. Texas Center for Superconductivity (FY-91) $240,000.

45. NASA-WSF Free Flyer Space experiment (FY-91) $3,335,000.

46. NASA-SVEC support (FY-92) $1,000,000.

47. NASA-WSF Free Flyer Space experiment (FY-92) $4,115,000.

48. NSF (1991-1992) Research Experience for undergraduate (w/L. Vant Hull), $114,000.

49. NASA-SVEC support (FY-93) $1,000,000.

50. NASA-WSF support (FY93) $4,565,000.

51. NASA Comet program support (FY-93) $150,000.

52. NASA Research support (FY93) $ 141,500.

53. TcSUH Support (FY93) $ 358,412.

54. SVEC State Line Item (FY93) $ 350,000.

55. Texas Space Grant Consortium (FY93) $ 50,000.

56. SVEC Consortium Member Contribution (FY93) $ 765,600.

57. NASA-SVEC support (FY94) $ 900,000.

58. NASA-WSF support (FY94) $ 3,900,000.

59. University of Tennessee Research Support (FY94) $ 80,100.

60. R.A. Welch Foundation (1994-1996) $102,000.

61. TcSUH Research Support (FY94) $ 290,000.

62. SVEC State Line Item Support (FY94) $ 350,000.

63. SVEC Consortium Support (FY94) $ 619,600.

64. NASA-SVEC support (FY95) $ 880,000.

65. NASA-WSF support (FY95) $ 3,973,100.

66. NASA-JSC support (FY95) $ 100,000.

67. TcSUH Research Support (FY95) $ 422,822.

68. SVEC Consortium Support (FY95) $ 700,000.

69. Texas Space Grant Consortium (FY-95) $ 95,800

70. Honeywell Space Systems (FY-95) $ 80,250

71. SVEC Consortium Support (FY-96) $ 650,000

72. NASA SVEC Support (FY-96) $5,995,000

73. NASA JSC Lunar Solar Cells (FY-96) $57,600

74. TcSUH Research Support (FY-96) $337,000

75. SVEC State Line Item Support (FY-96) $ 488,492

76. Shell Interdisciplinary Scholar Grant (FY-96) $100,000

77. Texas Instruments (FY-96) $10,000

78 NASA SVEC Support (FY-97) $3,500,000

79 SVEC State Line Item Support (FY-97) $488,492

80. Electric Power Research Institute (FY-97) $ 100,000

81. Shell Interdisciplinary Scholar Grant (FY-97) $100,000

82. TcSUH Research Support (FY-97) $ 316,000

83. NASA SVEC Support (FY-98) $1,000,000

84. TcSUH Research Support (FY-98) $ 290,000

85. SVEC Special Item Funding (FY-98) $ 485,000

86. NASA SVEC Support (FY-99) $1,000,000

87. TcSUH Research Support (FY-99) $ 280,000

88. Department of Energy (FY-99) $158,000

89. Welch Foundation (FY-99 – 02) $135,000

90. Texas ARP (FY-98-99) $165,000

91. SVEC Special Item Funding (FY-99) $ 485,000