

Curriculum Vita

Virginia M. Ayres, Ph.D.

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<http://www.egr.msu.edu/ebnl>

I. Education:

| | | | |
|------|-------|------------|-----------------------------------------|
| 1985 | Ph.D. | Physics | Purdue University, West Lafayette, IN |
| 1977 | B.A. | Physics | Johns Hopkins University, Baltimore, MD |
| 1977 | B.A. | Biophysics | Johns Hopkins University, Baltimore, MD |

IIa. Professional Experience - Academic Positions:

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|--------------|-------------------------------------------------------------------------------------------------------|
| 1997-Present | Associate Professor, Departments of Electrical & Computer Engineering, Michigan State University |
| 2005-2006 | Visiting Associate Professor, Tokyo Institute of Technology Japan (Chaired position) |
| 1997-2001 | Adjunct Associate Professor, Department of Materials Science and Mechanics, Michigan State University |
| 1989-1990 | Visiting Scholar, Department of Physics & Astronomy, Dartmouth College |

IIb. Professional Experience – Government Laboratory:

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|-----------|-----------------------------------------------------------------------|
| 1985-1997 | Research Physicist, U.S. Navy White Oak Laboratory, Silver Spring, MD |
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IIc. Professional Experience – Leadership:

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| 2005 -2008 | College of Science Alumni Board, Purdue University |
| 1995-1997 | Program Director for Quantum Electronics, Plasmas & Electromagnetics, National Science Foundation, Arlington, VA |
| 1993-1994 | Science and Technology Agent, “Interactive Space Technologies: Behavior of Systems in the Space Environment”, Office of Innovative Science and Technology, Strategic Defense Initiative |

III. Research Interests: <http://www.egr.msu.edu/ebnl>

- Scanning probe microscope instrumentation development.
- Nanobiology of regenerative medicine
- Quantum electronic properties and self-assembly mechanisms of nitride nanowires
- Nano-tribological properties and self-assembly mechanisms of carbon onions
- Nanomaterials and nanocircuits in extreme environments

IV. Selected Awards and Honors:

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|-------------|------------------------------------------------------------------------------------|
| 2006 | Purdue University Department of Physics Outstanding Alumnus Award |
| 2005 | Chair of International Cooperation, Tokyo Institute of Technology, Japan |
| 2004 | NASA Faculty Fellowship Award |
| 2003 | Invitational Visit to Japan, Takano Company |
| 2003 | NASA Faculty Fellowship Award |
| 1998 | NSF Director’s Award for Collaborative Integration: Plasma Working Group |
| 1997 & 1996 | NSF Outstanding Performance Award |
| 1996 | Japan Society for Promotion of Science Invitation Fellowship for Research in Japan |
| 1995 | Navy Certificate of Achievement for Exemplary Performance |
| 1988 & 1986 | Navy Quality Step Increase for Outstanding Performance |
| 1987 | Navy Sustained Superior Performance Award |

V. Professional Activities and Organizations:

Va. Advisory

Royal Society, UK:

University Research Fellowship

National Institutes of Health (NIH):

Reviewer for (2007 – present):

Nanotechnology Study Section BST-M, Bioengineering Sciences & Technologies Integrated Review Group, Center for Scientific Review

National Science Foundation (NSF):

Reviewer for (1990 – present):

Engineering Research Centers (ERC)
Experimental Program to Stimulate Competitive Research (EPSCoR)
Integrative Graduate Education and Research Training (IGERT)
Integrative Hybrid and Complex Systems Program
Major Research Instrumentation (MRI)
Nanomanufacturing Program
Nanoscale Science and Engineering Centers (NSEC)
Nanotechnology Education for Undergraduates (NEU)
Partnerships for International Research and Education (PIRE)
Quantum Electronics, Waves and Beams Program

Site Visit Team, Center for Plasma-Aided Manufacturing, University of Wisconsin, 1996

National Research Council (NRC):

Reviewer for:

National Materials Advisory Board Review of Air Force Office of Scientific Research Materials Research Proposals

U.S. Civilian Research and Development Foundation (CRDF):

Cooperative Grants Program

U.S.-Israel Binational Science Foundation (BSF):

Cooperative Research Program

State of Texas Advanced Research Program and Advanced Technology Program:

Advanced Research Program

Editorships and Journal Referee:

Referee: Journal of Applied Physics
Referee: Diamond and Related Materials
Referee: IEEE Transactions in Nanotechnology
Referee: International Journal of Nanomanufacturing

Vb. Organizing

- 2008 Session Chair: "Coatings, Films and Fibres", 6th International Symposium on Nanomanufacturing (<http://www.isnm2008.org/>), 12-14 November 2008, Athens, Greece
- 2008 International Program Committee, 6th International Symposium on Nanomanufacturing (<http://www.isnm2008.org/>), 12-14 November 2008, Athens, Greece

- 2006 Technical Committee, 5th International Symposium on Nanomanufacturing (<http://www.isnm2006.org/>), 01-03 November 2006, Massachusetts Institute of Technology, Cambridge, MA
- 2003 International Organizing Committee, 2003 International Conference on Plasma Science, June 2-5, 2003, Jeju, Korea
- 2002 Discussion Leader (Session Chair): Gordon Research Conference on Plasma Processing Science, July 21-26, 2002, Tilton, NH: "Getting Smaller: Applications of Plasmas in Nanotechnology"
- 2001 Technical Program Committee, 2001 IEEE International Conference on Plasma Science, June 17-22, 2001, Las Vegas, NV
- 2000 Session Chair: "Partially Ionized and Low Temperature Plasmas", APS/Division of Plasma Physics, October 23-27, 2000, Quebec City, Canada
- 1998 National Program Committee, 1998 IEEE International Conference on Plasma Science, June 1-3, 1998, Raleigh, NC
- 1996 National Program Committee, 1996 IEEE International Conference on Plasma Science, June 3-5, 1996, Boston, MA
- 1996 Session Chair: "Light Source Performance", 1996 IEEE International Conference on Plasma Science, June 3-5, 1996, Boston, MA
- 1996 Session Chair: "Scanning Probe Microscopy and Advanced Imaging Techniques", International Conference on Imaging and Image Processing, December 9-11, 1996, Santa Barbara, CA

Vc. Executive

- 2003- IEEE Nanotechnology Council TC-1
- 1999-2000 Chair, IEEE Nuclear and Plasma Sciences Society Executive Committee for Plasma Science and Applications (PSAC)
- 1999-2000 IEEE Nuclear and Plasma Sciences Society Advisory Committee (PSAC)
- 1997-1999 IEEE Nuclear and Plasma Sciences Society Executive Committee for Plasma Science and Applications (PSAC)

Vd. Professional Society:

American Physical Society (CMP-Condensed Matter Physics, BMP-Biomedical Physics)
 Biophysical Society
 Materials Research Society
 IEEE Nuclear & Plasma Sciences Society
 American Association of Physics Teachers
 American Society for Engineering Education
 Association for Women In Science

VI. Major Service to Michigan State University:

University:

Judge, University Undergraduate Research and Arts Forum (S2004)
 Co-Coordinator, Science At The Edge Seminar Series (S2001, F2001)
 Instructor, Frontiers in Science: "Nanoscience and Nano Engineering" (S2001)
 Accredited program for Michigan high school teachers
 Instructor, Michigan State University High School Engineering Institute (Summer 1999)
 Judge, University Graduate Research and Arts Forum (S1998)

College of Engineering:

Dean's Search Committee (1998-99)

Department of Electrical and Computer Engineering:

Graduate Admissions, Recruiting and Financial Aid Committee: (F2006, S2007, F2007, S2008, F2008)

Laboratory Committee (F2004, S2005)
Coordinator, ECE Department Distinguished Speaker Seminar Series (F2002, S2003)
Faculty Meeting Secretary (F2002, S2003)
Curriculum Committee (F2001, S2002)
By-Laws Committee (F2000, S2001)
Graduate Studies Committee (F1999, S2001)
Department Advisory Council (F1998, S2000)
Promotion and Tenure Committee (F1998, S2000)
Faculty Recruiting Committee (F1998, S2000)
Qualifying Exam Committee: Electronic Devices and Circuits (S1998, S1999, S2000)

VII. Curricular Activities:

Courses Developed:

At Tokyo Institute of Technology, Japan:

Special Lecture on Mechanical Sciences and Engineering G & H: Mechanical Effects in Nanostructures and Devices (G: Fall Quarter 2005, H: Winter Quarter 2005-06)

Developed new graduate level curriculum on mechanical effects in reduced dimensionality systems including both physical and organic nanostructures. A requirement of the Chair of International Cooperation is that the Special Lecture series be given in English. These lectures were video-taped as well as CD-archived and are now available as reference materials in both nanotechnology and scientific English for students at Tokyo Institute of Technology.

At Michigan State University:

ECE 931B Microstructures and Devices: Molecular Electronics (F2002, S2005, S2008)

New course offering in the 931 series. V. Ayres developed a new graduate level curriculum, including rigorous development of concepts and analytical techniques for evaluation of electronic transport in reduced dimensionality systems including both inorganic and organic nanostructures.

ECE 931C Microstructures and Devices: Properties of Semiconductors (2003)

First team-taught offering of ECE 931C, with Prof. T. Grotjohn. V. Ayres' section included scattering, high field transport, and quantum effects in semiconductors.

ECE 931A Microstructures and Devices: (2000)

Team development of new quantum devices curriculum with Prof. T. Hogan. V. Ayres developed the "Nanocircuits: Carbon Nanotube versus QCA (Quantum Cellular Automata) Devices" section

ECE 476: Electro-Optics (F2000, S2001, F2001, S2002, F2002, F2003, F2004, F2006, F2007)

All instructional materials web-based, beginning 2006

Complete revision of laboratory manual 2006-2008.

ECE 474: (F2000, S2001, S2003, S2005, S2007, S2009)

Addition of section on carbon nanotubes including sp^2 basis, unit cell, chiral vector, translation vector, etc., to standard cubic structures curriculum, beginning S2009

All instructional materials web-based, beginning S2007

Addition of quantum devices section to standard curriculum, beginning S2005

ECE 280 Analytical Methods for Electrical Engineering (2004)

Team development of new course offering in mathematical methods for engineering sciences with Prof. J. Deller. V. Ayres developed the "Applications of Complex Analysis" and the "Vector Calculus" sections.

Courses Taught:

ECE 931A: Microstructures and Devices: Quantum Devices (S2000)

ECE 931B: Microstructures and Devices: Molecular Electronics (S2002, S2005, S2008)

ECE 931C: Microstructures and Devices: Properties of Semiconductors (S2003)

MSM 990: Graduate Independent Study

Directed Studies in Polycrystalline diamond film growth and characterization (1999)

ECE 874: Physical Electronics (F2003)

ECE/PHY 850: Electrodynamics of Plasmas (S1998)
 ECE 801: Graduate Independent Study: (1999, 2000) 3 students
 Directed Studies in Principal Component Analysis in scanning probe microscopy (2000)
 Directed Studies in FTIR emission feedback control for carbon nanomaterials growth (1999)
 ECE 480: Senior Design Capstone Project Facilitator (F2002-2 teams), S2003-1 team, S2004-2 teams, F2004-1 team, S2007-1 team, F2007-1 team, S2008-1 team, F2008-1 team, F2009-1 team, S2009-1-team)
2nd Place, Prism VentureWorks Prize, S2004
1st Place, Prism VentureWorks Prize, S2009
 ECE 476: Electro-Optics (F2000, S2001, F2001, S2002, F2002, F2003, F2004, F2006, F2007, F2008)
 ECE 474: Principles of Electronic Devices (F1997, S1998, F1998, S1999, F2000, S2001, S2003, S2005, S2006, S2007, S2009)
 ECE 302: Electronics for ECE majors (F1999, S2000)
 ECE 345: Electronics for non-ECE majors (F2001)
 ECE 280: Analytical Methods for Electrical Engineering (S2004)

VII. Research Supervision:

Present Graduate Students

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|---------------------------------------------------------------------------------|---------------------------------|
| Volkan Mudjat Tiryaki | Ph.D. Candidate |
| Scanning Probe Recognition Microscopy of the Regenerative Neural Cell System | |
| Raed Alduhailed | M.S. Candidate |
| Thesis: Carbon Nanomaterials in Extreme Environments | |
| Kaylee McElroy | M.S. Candidate |
| Thesis: Nitride Nanowires: Vapor-Solid Growth Mechanisms | |
| Yuan Fan | Ph.D. in Electrical Engineering |
| Ph.D. dissertation defense: 10 November 2007; graduation delayed | |
| Thesis: Image Processing Enhancements for Scanning Probe Recognition Microscopy | |
| Co-advised with Professor Lalita Udpa | |

Past Graduate Students Advised:

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|---------------------------------------------------------------------------------|-------------------------------------------------|
| Benjamin Jacobs | Ph.D. in Electrical Engineering (December 2007) |
| Thesis: Radiation Resiliency in Reduced Dimensionality Systems | |
| Qian Chen | Ph.D. in Electrical Engineering (December 2007) |
| Thesis: Scanning Probe Recognition Microscopy: Recognition Strategies | |
| Susan P. Song | M.S. in Electrical Engineering (2004) |
| Thesis: The Viability of Carbon Nanotubes for Space Technology and Applications | |
| Sarah Hagopian | M.S. in Electrical Engineering (2003) |
| Brandy Goolsby | M.S. in Electrical Engineering (2001) |
| Amy Hoffman | M.S. in Electrical Engineering (2000) |
| Ali Khan (with Prof. D. Rover) | M.S. in Computer Engineering (2000) |
| Munif Farhan | M.S. in Electrical Engineering (2000) |

Graduate Student Awards and Honors:

Benjamin W. Jacobs

- 2007- NASA Graduate Student Researchers Program Fellowship (Competitive Renewal)
- 2006- Participant in National Science Foundation International Research and Education in Engineering Award (IREE). Visiting Research Associate Tokyo Institute of Technology, Japan, 05 March-02June 2007
- 2006- Best Poster Co-Awardee, 6th IEEE Conference on Nanotechnology, Cincinnati, OH, 16-20 July 2006, <http://www.ececs.uc.edu/~mcahay/Nano2006/index2006.html>
- 2006- NASA Graduate Student Researchers Program Fellowship (Competitive Renewal)
- 2005- NASA Graduate Student Researchers Program Fellowship
- 2004- IBM Ph.D. Fellowship Finalist
- 2003- NASA Faculty Fellowship Student Award
2 week internship at NASA Goddard Space Flight Center

Qian Chen

- 2006- Best Poster Co-Awardee, 6th IEEE Conference on Nanotechnology, Cincinnati, OH, 16-20 July 2006 <http://www.ececs.uc.edu/~mcahay/Nano2006/index2006.html>

Kaylee McElroy

- 2005-06- Academic Achievement Graduate Assistant Award

Susan P. Song

- 2001-04- UNCF NASA Harriet G. Jenkins Predoctoral Fellowship
- 2004-UNCF NASA Harriet G. Jenkins Summer Mini Grant Program Awardee 2004
- 2003-UNCF NASA Harriet G. Jenkins Summer Mini Grant Program Awardee 2003
- 2000-01- Academic Achievement Graduate Assistant Award

Brandy G. Goolsby

- 2001- GEM Master of Science Fellowship
- 2000- Sloan Scholar

Amy L. Hoffman

- 1998-Academic Achievement Graduate Assistant Award

Munif Farhan

- 1998- College of Engineering Summer Research Internship Award

Undergraduate Students Advised:

ECE 490/499: Undergraduate Independent Research Advisor: 22 students, 1998-present
Domestic United States: 18/22 students: Women and/or minorities: 10/22 students
Project List at Research-Undergraduate Research Program on <http://egr.msu.edu/ayresv/ebnl>

Honors Option Advisor: ECE 474: 4 students, 1998-present; ECE 302: 1 student (2000)
Project List at Research-Undergraduate Research Program on <http://egr.msu.edu/ayresv/ebnl>

Undergraduate Student Honors and Awards:

Andrew D. Baczewski

- 2007- National Science Foundation Graduate Fellowship Program Honorable Mention
- 2007- Participant in National Science Foundation International Research and Education in Engineering Award (IREE). Visiting Research Associate Tokyo Institute of Technology, Japan, 05 March-02June 2007
- 2006- Best Poster Co-Awardee, 6th IEEE Conference on Nanotechnology, Cincinnati, OH, 16-20 July 2006 <http://www.ececs.uc.edu/~mcahay/Nano2006/index2006.html>

2006- National Science Foundation Research Experience for Undergraduate Award (REU)
 2006- College of Engineering Summer Research Internship Award
 2006- Distinguished Academic Achievement Award (MSU College of Engineering)
 2006- Service Recognition Award (MSU College of Engineering)
 2005- Distinguished Academic Achievement Award (MSU College of Engineering)
 2005- MSU Study Abroad Merit Scholarship
 2005- General Motors Scholarship
 2005- Arthur R. and Pearl Butler Scholarship Fund
 Six semesters on the Dean's List (2003-2006)

ECE 480: Senior Design Capstone Team 01, "Baseball Tracking", V. Ayres, Facilitator
 2004- 2nd Place Prize

Karen Gilgenbach

2000- 11th Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics
 Participant (refereed)

Harun Saglik

2000- Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics
 Participant (refereed)

Brandy D. Goolsby

1999- GE Faculty for the Future Scholarship

Susan P. Song

1999- GE Faculty for the Future Scholarship
 1999- 10th Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics
 Participant (refereed)

Richard L. Venia

1999- 10th Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics
 Participant (refereed)

Undergraduate Research:

NSF REU – National Science Foundation Research Experience For Undergraduates
 MI-LSAMP – Louis Stokes Alliance for Minority Participation
 SURA - Summer Undergraduate Research Academy
 COE SRI – College of Engineering Summer Research Internship
 GE FFF – GE Faculty for the Future
 MSU URF – Michigan State University Undergraduate Research Fellowship
 ECE 490/491/499 – Undergraduate Independent Study/Research

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| 24 | Fall 2008, Spring 2008 | MI-LSAMP | Jonathan C. Callahan | Nanomaterials in Extreme Environments |
| 23 | Summer 2008 | MI-LSAMP/SURA 08 | Dexter A. Flowers | Regenerative Neural Cell System |
| 22 | Fall 2006-Spring 2007 Summer 2006 | NSF-REU COE SRI | Andrew D. Baczewski | Nano-electronic and Nano-biological Investigations |
| 21 | Spring 2005 | ECE-491 | Elissa Carey | Photonic Investigation of Nanomaterials |

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| 20 | Spring 2005 Fall 2004 | MSU URF | Mark Englund | Fundamental Radiation Interactions in Nanoelectronics |
| 19 | Summer 2002 | ECE 490 | Daniel Capps | Micro Raman Spectroscopy Instrumentation Development |
| 18 | Spring 2002 | ECE 499 | Ricky Samona | Controlled Adaptive Learning Augmentation for Scanning Probe Microscope-based Nanomanipulation |
| 17 | Spring 2002 Fall 2001 | GE FFF | Brandy Goolsby | Sensing and Control for SPM Micro/Nano Manipulation |
| 16 | Spring 2001 Fall 2000 | ECE 490 | Harun Saglik | SPM based Nanomanipulation of Biological Objects |
| 15 | Fall 2000 | ECE 490 | Karen Gilgenbach | SPM Investigation of the Molecular Basis of Hypertension |
| 14 | Fall 1999 | ECE 490 | Richard Venia | Impedence Spectroscopy of Nitrogen Methane hydrogen Grown Polycrystalline Diamond Films |
| 13 | Fall 1999 | ECE 490 | Susan Song | SPM Investigations of Nitrogen Methane hydrogen Grown Polycrystalline Diamond Films |
| 12 | Fall 1999 | ECE 490 | David Bordoley | Electronic and Thermal Properties of Diamond Films and Carbon Nanotubes |
| 11 | Summer 1999 | ECE 490 | Jason Spano | Electronic Properties of Diamond and Carbon Nanomaterials |
| 10 | Spring 1999 | ECE 499 | Ali Khan | FTIR Emission Feedback Control for Carbon Nanomaterials Growth |
| 9 | Spring 1999 | ECE 490 | Jill Bobbitt | Image Processing in SPM for Grain Boundaries and Terraces |
| 8 | Fall 1999 | ECE 490 | Carlos Adianata | FTIR Emission from Carbon Nanomaterials |
| 7 | Fall 1998 | EE 499 | Tariq Al-Hindi | FTIR Emission from Diamond and Amorphous Tetrahedral Carbon Films |
| 6 | Fall 1998 | EE 499 | Sarah Hagopian | SPM Investigation of Growth and Materials Structure of Doped Diamond Films |
| 5 | Fall 1998 | EE 490 | Hamad Balhareth | SPM Investigation of Growth and Materials Structure of Doped Diamond Films |
| 4 | Summer 1998 | EE 491 | Brian F. Wright | SPM Analysis of Polycrystalline Diamond Films |
| 3 | Summer 1998 Spring 1998 | EE 490 MSU URI | Jazimah Abdul Majeed | SPM Investigation of Growth and Materials Structure of Diamond Films |
| 2 | Spring 1998 | EE 490 | Daniel Spach | SPM Investigation of Growth and Materials Structure of Diamond Films |
| 1 | Fall 1998 Summer 1998 Spring 1998 | EE 490 COE SRI MSU URF | Munif. Farhan | SPM Investigation of Growth and Materials Structure of Diamond Films |

Honors Options:

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|---|----------------|------------|----------------------|------------------------------------------------------------|
| 5 | Spring 2005 | ECE 474 | Luke Niewiadomski | Quantized Electronic Devices |
| 4 | Spring 2005 | ECE 474 | Hong-Vinh Nguyen | Quantized Electronic Devices |
| 3 | Spring 2003 | ECE 74 | Ankar Patel | Honors Option Challenge |
| 2 | Spring 2000 | ECE 302 | David Bordoley | PSPICE Goal Functions and Schade Curves |
| 1 | Spring 1998 | ECE 474 | Matthew Feusse | Transient and Environmental Effects in CMOS Electronics |

VIII. Publications:

Refereed Articles and Chapters

Refereed Proceedings Papers:

Refereed Extended Abstracts

Invited Colloquia and Seminars

Invited Symposia, Workshops and Special Sessions

Student Presentations

Contributed Conference Proceedings and Presentations

Technical Reports

Dissertation

Articles Written about Ayres' Research

Patents and registrations

[ISI Impact Factor]

Refereed Articles and Chapters

1. Benjamin W. Jacobs, Kaylee McElroy, Raed Al-Duhaileb, Martin A. Crimp, Richard E Stallcup, Adam Hartman, Mary Anne Tupta, **Virginia M. Ayres**, "Cross-Section High Resolution Transmission Electron Microscopy and Nanoprobe Investigation of Gallium Nitride Nanowires", in press, *International Journal of Nanomanufacturing: Special Issue on Nanomanufacturing Systems, Processes and Simulation* [New].
2. **Virginia M. Ayres**, Qian Chen, Yuan Fan, Dexter A. Flowers, Sally A. Meiners, Ijaz Ahmed, Roberto Delgado-Rivera, "Scanning Probe Recognition Microscopy Investigation of Neural Cell Prosthetic Properties", in press, *International Journal of Nanomanufacturing: Special Issue on Nanomanufacturing Systems, Processes and Simulation* [New].

3. R. Delgado-Rivera, S.L. Harris, I. Ahmed, A.N. Babu, R. Patel, **V.M. Ayres**, D.A. Flowers, and S. Meiners "Increased FGF-2 Secretion and Ability to Support Neurite Outgrowth by Astrocytes Cultured on Polyamide Nanofibrillar Matrices", **Matrix Biology**, Vol. 28, pp. 137-147 (2009) [Impact 3.687]
4. Benjamin W. Jacobs, Martin A. Crimp, Kaylee McElroy, and **Virginia M. Ayres**, "Nanopipes in Gallium Nitride Nanowires and Rods", **Nano Lett**, Vol. 8, No. 12, pp. 4354-4358 (2008) [Impact 9.627]
5. B.W. Jacobs, **V.M. Ayres**, M.A. Crimp, and K. McElroy, "Internal Structure of Multiphase Zinc-Blende Wurtzite Gallium Nitride Nanowires", **Nanotechnology**, Vol. 19, No. 40, 405706 (6 pp) (2008) [Impact 3.310]
6. Benjamin W. Jacobs, **Virginia M. Ayres**, Mihail P. Petkov, Joshua B. Halpern, MaoQe He, Andrew D. Baczewski, Kaylee McElroy, Martin A. Crimp, Jiaming Zhang, Harry C. Shaw, "Electronic and Structural Characteristics of Zinc-Blende Wurtzite Biphasic Homostructure GaN Nanowires", **Nano Lett.**, Vol. 7, No. 5, pp. 1435-1438 (2007) [Impact 9.627]
7. B W Jacobs, **V M Ayres**, R E Stallcup, A Hartman, M A Tupta, A D Baczewski, M A Crimp, J B Halpern, M He and H C Shaw, "Electron Transport in Zinc-Blende Wurtzite Biphasic Gallium Nitride Nanowires and GaNFETs", **Nanotechnology**, Vol. 18, No. 47, 475710 (6 pp) (2007) [Impact 3.310]
8. Q. Chen, Y. Fan, S. Kumar, A.D. Baczewski, L. Udpa, **V.M. Ayres**, A. F. Rice, S. Meiners and I. Ahmed, "Cell Response and Tissue Scaffold Triggers Investigated by Scanning Probe Recognition Microscopy", in **Engineered Nanoscale Materials for the Diagnosis and Treatment of Disease**, Editors: V.A. Hackley, A.K. Patri, J. Stein, B.M. Moudgil (Mater. Res. Soc. Symp. Proc. Volume 1019E, Warrendale, PA, 2007), 1019-FF06-04
9. Y. Fan, Q. Chen, S. Kumar, A.D. Baczewski, L. Udpa, **V.M. Ayres** and A. F. Rice, "Scanning Probe Recognition Microscopy Investigation of Nanoscale Mechanical and Surface Roughness Properties Along Nanofibers", in **Surface and Interfacial Nanomechanics**, Editors: R.F. Cook, W. Ducker, I. Szlufarska, R.F. Antrim (Mater. Res. Soc. Symp. Proc. Volume 1021E, Warrendale, PA, 2007), 1021-HH05-26
10. Y. Fan, Q. Chen, **V.M. Ayres**, A.D. Baczewski, L. Udpa and S. Kumar, "Scanning Probe Recognition Microscopy Investigation of Tissue Scaffold Properties", Vol. 2, Issue 4, pp. 651-661, **Int. J. Nanomedicine** (2007) [Impact 0.618]
11. Qian Chen, Yuan Fan, Lalita Udpa, and **Virginia M. Ayres**, "Cell Classification by Moments Based Methods with Continuous Wavelet Transform", **Int. J. Nanomedicine**, Vol. 2, Issue 2, pp. 181-189 (2007) [Impact 0.618]
12. (Invited) Sally Meiners, Ijaz Ahmed, Abdul S. Ponery, Nathan Amor, **Virginia M. Ayres**, Yuan Fan, Qian Chen and Ashwin N. Babu, "Engineering Electrospun Nanofibrillar Surfaces for Spinal Cord Repair: A Discussion", **Polymer Int.**, Vol. 56, pp. 1340-1348 (2007) [Impact Factor 0.807]
13. (Invited) **Virginia Ayres** and Lalita Udpa, "Scanning Tunneling Microscopy", Vol. 4, **Encyclopedia of Medical Devices and Instrumentation (Second Edition)**, Editor J. Webster, published by John Wiley and Sons Inc., Hoboken, NJ, 2006, pp.516-523, Hardbound: ISBN-13 978-0-471-26358-6 and Electronic: ISBN-0-471-73287-7
14. **V.M. Ayres**, B.W. Jacobs, M.E. Englund, E.H. Carey, M.A. Crimp, R.M. Ronningen, A.F. Zeller, J.B. Halpern, M.-Q. He, G.L. Harris, D. Liu, H.C. Shaw and M.P. Petkov, "Investigation of Heavy Ion Irradiation of Gallium Nitride Nanowires and Nanocircuits", **Diamond and Relat. Mater.**, Vol. 15, pp. 1117-1123 (2006) [Impact 1.935]

15. S.L. Rutledge, H.C. Shaw, L.L. Yowell, Q. Chen, B.W. Jacobs, S.P. Song and V.M. Ayres, "Self Assembly and Correlated Properties of Electrospun Carbon Nanofibers", ***Diamond and Relat. Mater.***, Vol. 15, pp. 1070-1074 (2006) [Impact 1.935]
16. (Invited) Lalita Udpa, **Virginia M. Ayres**, Yuan Fan Qian Chen and Shiva. Arun-Kumar, "Deconvolution of Atomic Force Microscopy Data for Cellular and Molecular Imaging", ***IEEE Sig. Proc. Mag., Special Issue on Molecular and Cellular Bioimaging***, Vol. 23, No. 3, pp. 73-83 (2006) [Impact 1.57]
17. **V.M. Ayres**, B.W. Jacobs, S.P. Song, R.M. Ronningen, A.F. Zeller, M.A. Crimp, J.B. Halpern, M-Q He, M.P. Petkov, D. Liu, and H.C. Shaw, "Nanotube, Nanowire and Nanocircuit Behavior in Simulated Space Environments", in ***SPIE Photonics for Space Environments X***, Editor: Edward W. Taylor, Vol. 5897 (SPIE, Bellingham, WA, 2005) Article CID No. 589702, pp. 1-14, Hardbound: ISBN 0-8194-5902-X
18. B.W. Jacobs, **VM Ayres**, M.A. Crimp, R. M. Ronningen, A. F. Zeller, H. C. Shaw, A. J. Kogut, J. B. Benavides, M. P. Petkov and J. B. Halpern, "Investigation of Space Radiation Resiliency of Carbon Nanotube and Gallium Nitride Nanocircuits", in ***Mater. Res. Soc. Symp. Proc.: Materials for Space Applications***, Editors: Mircea Chipara, David L. Edwards, Roberto S. Benson, Shawn Phillips, Vol. 851, The Materials Research Society, Warrendale, PA ,(2005), NN6.8, pp. 287-292, Electronic: ISBN 1-55899-803-9 and Hardbound: ISBN 1-55899-799-7
19. Q. Chen, Y. Fan, **V.M. Ayres**, L. Udpa, M.S. Schindler and A. F. Rice, "Scanning Probe Recognition Microscopy Investigation of the Elastic Properties of Tissue Scaffolding", in ***Scanning-Probe and Other Novel Microscopies of Local Phenomena in Nanostructured Materials***, Editors: S.V. Kalinin, B. Goldberg, L.M. Eng, and B.D. Huey (Mater. Res. Soc. Symp. Proc. Volume 838E, Warrendale, PA, 2005) O15.2
20. Q. Chen, L. Udpa, M. S. Schindler, C. Berger and **V.M. Ayres**, "Scanning Probe Recognition Microscopy Investigation of Cells on Scaffolding", ***Architecture and Applications of Biomaterials and Biomolecular Materials***, Editors: Joyce Y. Wong, Anne L. Plant, Christine E. Schmidt, Lonnie Shea, Arthur J. Coury, Christopher S. Chen (Mater. Res. Soc. Symp. Proc. Vol. EXS-1, Warrendale, PA, 2004) F 8.6 pp. 143-145
21. **V.M. Ayres**, S. Grabski, C. Berger and M. S. Schindler, "Attachment and Immune Responses to Nanostructured Carbon Films", ***Architecture and Applications of Biomaterials and Biomolecular Materials***, Editors: Joyce Y. Wong, Anne L. Plant, Christine E. Schmidt, Lonnie Shea, Arthur J. Coury, Christopher S. Chen (Mater. Res. Soc. Symp. Proc. Vol. EXS-1, Warrendale, PA, 2004) F 7.11 pp. 137-139
22. B. Goolsby, Q. Chen, L. Udpa, Y. Fan, R. Samona, B. Bhooravan, F. M. Salam, D. H. Wang, and **V.M. Ayres**, "Scanning Probe Microscopy with Landmark Referenced Control For Direct Biological Investigations", ***J. Nanosci. Nanotech.***, Vol. 3, No. 4, pp. 347-350 (2003) [Impact 2.194]
23. S. P. Song, M. A. Crimp, **V.M. Ayres**, C. J. Collard, J. P. Holloway, and M. L. Brake "New Hetero Silicon-Carbon Nanostructure Formation Mechanism", ***J. Nanosci. Nanotech.***, Vol. 4, No. 7, pp. 817-823 (2004) [Impact 2.194]
24. **V.M. Ayres**, M. Farhan, D. Spach, J. Abdul Majeed, B. F. Wright, B. L. Wright, J. Asmussen, M. Kanatzidis and T. R. Bieler, "Transitions in Morphology Observed in Nitrogen/Methane-Hydrogen Depositions of Polycrystalline Diamond Films", ***J. Appl. Phys.***, Vol. 89, pp. 6062-6068 (2001) [Impact 2.316]
25. **V.M. Ayres**, T. R. Bieler, M. G. Kanatzidis, J. Spano, S. Hagopian, H. Balhareth, B. F. Wright, M. Farhan, J. AbdulMajeed, D. Spach, B. L. Wright and J. Asmussen, "The Effect of Nitrogen on

- Competitive Growth Mechanisms of Diamond Thin Films”, *Diamond and Relat. Mater.* Vol. 9, pp. 236-240 (2000) [Impact 1.935]
26. J.K. Park, **V.M. Ayres**, J. Asmussen and K. Mukherjee, “Precision Micromachining of CVD Diamond Films”, *Diamond and Relat. Mater.*, Vol. 9, pp. 1154-1158 (2000) [Impact 1.935]
 27. J. Asmussen, J. Mossbrucker, S. Khatami, W. S. Huang, B. Wright, and **V.M. Ayres**, “The Effect of Nitrogen on the Growth Morphology and Crystalline Quality of MPACVD Diamond Films”, *Diamond and Relat. Mater.* Vol. 8, pp. 220-225 (1999) [Impact 1.935]
 28. **V. Ayres**, B. Wright, J. Asmussen, S. Song, S. Khatami, D. Reinhard, D. Tomanek, and D. Roach “Characterization of the Growth and Emission Properties of Hybrid Carbon Films Containing Carbon Nanotubes”, *Chemistry and Physics of Fullerenes and Carbon Nanomaterials*, Editors: P. V. Kamat, D. M. Guldi, K.M. Kadish (Fullerenes Vol. 10, The Electrochemical Society, Inc., Pennington, NJ 2000) pp. 236-245
 29. J. K. Park, **V.M. Ayres**, J. Asmussen and K. Mukherjee, “Maskless Patterning and Structuring on Ultra-hard Film Materials”, *Materials Science of Microelectromechanical Systems (MEMS) Devices II*, Editors: M.P. deBoer, A.H. Heuer, S.J. Jacobs, E. Peeters (Mater. Res. Soc. Symp. Proc. Vol. 605, Warrendale, PA, 1999) pp. 79-84
 30. **V.M. Ayres**, T. McCormick, D. J. Vestyck, Jr., W. B. Alexander, J. E. Butler, and P. Spiberg, “Infrared Emission Characterization of Polycrystalline Diamond Films”, *Diamond and Relat. Mater.*, Vol. 7, pp. 789-793 (1998) [Impact 1.935]
 31. R. Ramesham, D. Hill, S. Best, M. F. Rose, R. F. Askew, and **V. Ayres**, “Hypervelocity Impact Tests on Polycrystalline Diamond Deposited over Silicon Substrates”, *Thin Solid Films*, Vol. 257, pp. 68-71 (1995) [Impact 1.666]
 32. R. Ramesham, M. Rose, R. Askew, T. Bekker, J. Dayton, I. Krainsky, G. Mearini, D. File, A. Gilmour, and **V. Ayres**, “Effect of Hydrogen on the Properties of Polycrystalline Diamond Thin Films”, *Surf. and Coating Tech.* Vol. 64, pp. 81-86 (1994) [Impact 1.559]
 33. **V.M. Ayres**, H. C. Chen, FL A. Stark, H. S. Uhm and H. E. Brandt, “Diocotron Instability for Relativistic Non-Neutral Electron Flow in Planar Magnetron Geometry”, *Phys. Fluids B*, Vol. 4, pp. 3396-3406 (1992) [Impact 1.697]
 34. H. Uhm, W. Namkung, J. Choe, and **V. Ayres**, “Cyclotron Maser Instability for a High Power Gyrotron,” *Phys. Rev. A*, Vol. 37, pp. 178-188 (1988) [Impact 2.280]
 35. J. Choe, **V. Ayres**, W. Namkung, and H. Uhm, “Dispersion Characteristics of Cusp-tron Vacuum Waveguide Modes”, *Int. J. Electronics*, Vol. 65, pp. 389-395 (1988) [Impact 0.459]
 36. W. Namkung, J. Choe, H. Uhm, and **V. Ayres**, “Microwave Generation from a Cusp-tron Oscillator with a Six-vane Circuit”, *Int. J. Electronics*, Vol. 65, pp. 381-388 (1988) [Impact 0.459]
 37. W. Namkung, J. Choe, and H. Uhm, and **V.M. Ayres**, “Operation of Cusp-tron at Fundamental Harmonic Cyclotron Frequencies”, *IEEE Trans. Plasma Sci.*, Vol. 16, pp. 149-154 (1988) [Impact 1.143]
 38. **V. Ayres**, and G. Gaunard, “Inverse Acoustic Scattering from an Elastic Sphere,” *J. Acoust. Soc. Am.*, Vol. 82, pp. 1291-1302 (1987) [Impact 1.433]
 39. **V. Ayres**, G. Gaunard, C. Tsui, and M. Werby, “The Effects of Lamb Waves on the Sonar Cross-Sections of Elastic Spherical Shells,” *Int. J. Solids & Structures*, Vol. 23, pp. 937-945 (1987) [Impact 1.529]

40. D. Brill, **V. Ayres**, and G. Gaunaurd, "The Influence of Natural Resonances on Scattering and Radiation Processes", *Jour. Wash. Acad. Sci.*, Vol. 77, pp. 55-65 (1987)
41. **V. Ayres** and G. Gaunaurd, "Acoustic Resonance Scattering by Viscoelastic Objects", *J. Acoust. Soc. Am.*, Vol. 81, pp. 301-311 (1987) [Impact 1.433]

Refereed Proceedings Papers:

1. Benjamin W. Jacobs, Kaylee McElroy, Raed Al-Duhaileb, Martin A Crimp, **Virginia M. Ayres**, "Cross-Section High Resolution Transmission Electron Microscopy Investigation of Internal Structures of Gallium Nitride Nanowires", *6th International Symposium on Nanomanufacturing*, 12-14 November 2008, Athens, Greece, CD-ROM Proceedings paper 1.A.1
2. **Virginia M. Ayres**, Qian Chen, Yuan Fan, Dexter A. Flowers, Sally A. Meiners, Ijaz Ahmed, Roberto Delgado-Rivera, "Neural Cell Prosthetic Investigation by Scanning Probe Recognition Microscopy", *6th International Symposium on Nanomanufacturing*, 12-14 November 2008, Athens, Greece, CD-ROM Proceedings paper 5.B.2
3. Y. Fan, Q. Chen, S. A. Kumar A.D. Baczewski, N.V. Tram, **V.M. Ayres**, A.F. Rice, L. Udpa, "Registration of Tapping and Contact Mode Atomic Force Microscopy Images", *2006 6th IEEE Conference on Nanotechnology Proceedings*, Vol. 01, pp.193-196 (2006)
4. B.W. Jacobs, **V.M. Ayres**, M.A. Tupta, R.E. Stallcup, A. Hartman, J.B. Halpern, M-Q. He, M.A. Crimp, A.D. Baczewski, N.V. Tram, Q. Chen, Y. Fan, S. Kumar, L. Udpa , "Electronic Transport Characteristics of Gallium Nitride Nanowire-based Nanocircuits", *2006 6th IEEE Conference on Nanotechnology Proceedings*, Vol. 02, pp. 496-499 (2006)
5. H.C. Shaw, D. Liu, B.W. Jacobs, **V.M. Ayres**, R.M. Ronningen, A.F. Zeller, M.A. Crimp, J. Halpern, M-Q He, G.L. Harris and M.P. Petkov, "Performance of Nanomaterials and Actively Running Nanocircuits During Heavy Ion Irradiation", *Proceedings of the 12th NASA Symposium on VLSI Design*, Editor: G. Donohoe, Cour d'Alene, ID, October 2005
6. Qian Chen, **Virginia Ayres**, and Lalita Udpa, "Biological Investigation Using Scanning Probe Recognition Microscopy", *2003 3rd IEEE Conference on Nanotechnology Proceedings (IEEE-Nano2003)*, Vol. 02, pp. 863-865 (2003)
7. **V.M. Ayres**, H. Hummert, B. Goolsby, N. Xi, and F. Salam, "Micro/Nano Motion Control for Biological Specimen Handling", *Proceedings of the IEEE International Symposium on Smart Structures and Microsystems (IS³M 2000)*, Hong Kong, October 2000
8. R. Ramesham, M. F. Rose, R. F. Askew, S. R. Best, M. F. Crumpler and **V. Ayres**, "Hypervelocity Impact Tests on Polycrystalline Diamond Deposited over Silicon Substrates", Vol. 95-4: *Proceedings of the Fourth International Symposium on Diamond Materials*,. Editors: K. V. Ravi and J. P. Dismukes, The Electrochemical Society, Inc. Pennington, NJ, (1997), pp. 409-414
9. **V. Ayres**, G. Gaunaurd, and K. Davey, "Inverse Scattering from Penetrable Objects", *Proceedings of the Fourth International Symposium on Innovative Numerical Methods in Engineering*, Editors: R. P. Shaw, J. Periaux, A. Chaudouet, J. Wu, C. Marino and C. A. Brebbia, Springer-Verlag, Berlin, (1986), pp. 635-641

Refereed 1-2 Page Extended Abstracts

1. **V.M. Ayres**, Q. Chen, Y. Fan and L. Udpa, "Properties Investigation by Scanning Probe Recognition Microscopy", **Program Booklet SCANNING 2008**, 14-17 April 2008 NIST Gaithersburg, MD
2. B.W. Jacobs, S.P. Song, R.M. Ronningen, A.F. Zeller, M.A. Crimp, **V.M. Ayres**, H.C. Shaw, J.B. Benavides, J. Plante and A. Kogut, "Potential of Resilient Nanomaterials for Space Applications", **Proceedings of the 5th Trends In Nanotechnology** (TNT04) CMP Cientifica (2004)
3. Q. Chen, Y. Fan, L. Udpa, M.S. Schindler and **V.M. Ayres**, "Scanning Probe Recognition Microscopy for Nano Biomedical Applications", **Proceedings of the 5th Trends In Nanotechnology** (TNT04) CMP Cientifica (2004)
4. **V.M. Ayres**, F. Salam, N. Xi and D. Wang, "Scanning Probe Microscopy with Landmark Referenced Control", **Conference Record of the 3rd Trends In Nanotechnology** (TNT02) published by CMP Cientifica, pp. 157-158 (2002)

Invited Colloquia and Seminars:

1. "Undergraduate Research in the EBNL Group"
V.M. Ayres
 EGR 160: Diversity and Engineering Seminar and Panel
 Michigan State University
 East Lansing, MI 48824
 09 April 2009
2. "Scanning Probe Recognition Microscopy Investigations of Tissue Scaffolds for Spinal Cord Repair"
V.M. Ayres
 Department of Physics Colloquium
 North Carolina State University
 Raleigh NC
 18 February 2008
3. "Multiphase Gallium Nitride Nanowires and Nanocircuits"
V.M. Ayres
 nanoHub 501 Graduate Tutorial Seminar Series
 Purdue University
 West Lafayette, IN
 16 January 2008
4. "Electronic Transport Characteristics of Gallium Nitride Nanowire-based Nanocircuits"
V.M. Ayres
 Electrical & Computer Engineering and Computer Science Department Colloquium
 University of Cincinnati
 Cincinnati, Ohio
 05 January 2007
5. "Scanning Probe Recognition Microscopy"
V.M. Ayres
 National Institute of Standards and Technology
 Gaithersburg, MD
 March 22, 2006
6. "Scanning Probe Recognition Microscopy Investigation of Tissue Scaffold Properties"
V.M. Ayres
 Ethicon/Johnson & Johnson

Somerville, NJ
March 21, 2006

7. "Two-Phase Coaxial Homostructure Gallium Nitride Nanowires"
V.M. Ayres
Center for Condensed Matter Sciences
National Taiwan University
Taipei, Taiwan
February 15, 2006
8. "Radiation Resilience of Nanostructures"
V.M. Ayres
Department of Chemistry Colloquium
Howard University
Washington, DC
July 14, 2004
9. "The Potential of Nanoelectronics for Space Applications"
V.M. Ayres
NASA Goddard Space Flight Center
Greenbelt, MD
June 18, 2004
10. "CNT-Based Nanoelectronics for Polarimeter-on-a-Chip"
V.M. Ayres
NASA Goddard Space Flight Center
Greenbelt, MD
June 16, 2004
11. "Fundamental Space Radiation Interactions in New Nanoscale Components"
V.M. Ayres
NASA Goddard Space Flight Center
Greenbelt, MD
July 18, 2003
12. "Site-specific Scanning Probe Microscopy of Biological Specimens"
V. M. Ayres
Department of Physics Colloquium
Purdue University, West Lafayette, IN
April 25, 2002
13. "Optimal Microstructure Design Engineering of Diamond Films"
V. M. Ayres, T. R. Bieler, B. Adams
Electronics Science and Technology Division (Code 6800)
Naval Research Laboratory, Washington, DC
July 30, 2001
14. "The Effect of Nitrogen on Competitive Growth in Polycrystalline Diamond Films"
V. M. Ayres
Condensed Matter Physics Colloquium Series
Department of Physics & Astronomy
Michigan State University, East Lansing, MI
April 24, 2000
15. "The Best of Both Worlds: Diamond and Carbon Nanotube Hybrid Films"
V. M. Ayres

Nuclear Engineering & Radiological Sciences Department Colloquium
University of Michigan, Ann Arbor, MI
February 4, 2000

16. "Diamond and Carbon Nanotube Hybrid Films"
V. M. Ayres and D. Tomanek
Micro and Nano Engineering Center
Michigan State University, East Lansing, MI
December 15, 1999
17. "The Effect of Nitrogen on Competitive Growth Mechanisms of Diamond Films"
V. M. Ayres
Chemistry Division Colloquium
Argonne National Laboratory, Argonne IL
December 14, 1999
18. "Carbon Nanotubes: From Modeling to Synthesis and Applications"
D. Tomanek, V. M. Ayres and D. Luzzi (joint presentation)
NASA Goddard Space Flight Center
Radiation Effects Branch
Greenbelt, MD
December 7, 1999
19. "Carbon Nanotubes: From Modeling to Synthesis and Applications"
D. Tomanek and V. M. Ayres (joint presentation)
Dupont Experimental Research Station
Chaad's Ford, DE
December 6, 1999
20. "A Discussion With SWE About the Possibility of Becoming An Engineering Professor and How To Get There"
V. M. Ayres
Society for Women Engineers
Michigan State University, East Lansing, MI
October 20, 1999
21. "Plasma Processing and Nanoscale Characterization of Novel Electronic Materials"
V. M. Ayres
Electrical & Computer Engineering Department Graduate Student Seminar Series
Michigan State University, East Lansing, MI
April 8, 1999
22. "Macro- and Micro-Electronic Investigations of Polycrystalline Diamond Thin Films for Electronic Applications"
V. M. Ayres, M. Bataineh, M. Farhan, and B. F. Wright
IEEE Fall Regional Meeting - Electronic Devices Section
Detroit, MI
October 28, 1998
23. "Scanning Probe Microscope Investigations of Polycrystalline Diamond Thin Films"
V. M. Ayres, M. Farhan, D. Spach, J. Abdul Majeed, B. F. Wright, H. Balhareth, S. Hagopian, B. L. Wright, and J. Asmussen
Michigan Microscopy and Microanalysis Society
Kalamazoo, MI
October 16, 1998

24. "FTIR-Emission Characterization of Diamond Films"
V. M. Ayres
 Department of Electrical and Computer Engineering
 Michigan State University, East Lansing, MI
 May 1, 1997
25. "Recent Characterization Studies of Hetero and Homo-Epitaxially Grown Diamond Films"
V. M. Ayres
 Department of Mechanical & Aerospace Engineering and Applied Physics
 Princeton University, Princeton, NJ
 April 15, 1997
26. "FTIR-Emission Characterization of Diamond Films"
V. M. Ayres
 Department of Physics Colloquium
 Purdue University, West Lafayette, IN
 February 14, 1997
27. "FTIR-Emission Spectroscopy of Polycrystalline Diamond Films"
V. M. Ayres
 Technion, Inc./Norton Diamond Films
 Technion, Inc, Irvine CA
 December 12, 1996

Invited Symposia, Workshops and Special Sessions

1. (Invited Speaker) **V.M. Ayres**, "Multiphase Gallium Nitride Nanowires and Nanocircuits"
Howard University Nanotechnology Symposium, 05-06 November 2007, Howard University,
 Washington DC
2. (Invited Workshop and Presentation) **V.M. Ayres**, "The New Physics of Heavy Ion Interactions with
 Nanostructures", **National Superconducting Cyclotron Laboratory User Workshop**, 16-17 August
 2007, East Lansing, MI
3. (Invited Webcast) **Keithley Nano Days** 23-26 April 2007
 Two 30 minutes presentations plus 30 minute live Q&A session in USA and in Europe
V.M. Ayres and B.W. Jacobs, Session #3-Realise: Seminar #5 "Electronic Properties of Zinc-Blende
 Wurtzite Biphasic Gallium Nitride Nanowires and NanoFETs", 26 April 2007
4. (Invited Presentation) **V.M. Ayres**, A.F. Rice and L. Udpa, "The Strategic Role of the NSF GOALI
 Program in Scanning Probe Recognition Microscopy Development", National Science Foundation
 DMI Grantees Conference, 24-28 July, 2006, St. Louis, MO
5. (Invited Workshop) **V.M. Ayres**, "Resilient Nanoelectronics for Space Applications" **International
 Workshop on Nanoscience and Nanotechnology**, Center for Micro-Nano Sciences and
 Technology, National Cheng Kung University, Tainan, Taiwan, 14 February 2006
6. (Invited Presentation) H.C. Shaw, D. Liu, B.W. Jacobs, **V.M. Ayres**, R.M. Ronningen, A.F. Zeller,
 M.A. Crimp, J. Halpern, M-Q He, G.L. Harris and M.P. Petkov, "Performance of Nanomaterials and
 Actively Running Nanocircuits During Heavy Ion Irradiation", **12th NASA VLSI Design Symposium**,
 4-5 October 2005, Coeur d'Alene, ID
7. (Invited Presentation) **V.M. Ayres**, M.A. Crimp, B.W. Jacobs, M. Englund, E. Carey, R. M.
 Ronningen, A. F. Zeller, H. C. Shaw, M. P. Petkov and J. B. Halpern, "Nanotube, Nanowire and
 Nanocircuit Behavior in Simulated Space Environments", SPIE, 1-5 August, 2005, San Diego, CA

8. (Invited Workshop) T.R. Bieler, **V.M. Ayres** and B.L. Adams, "Designing Processing Strategies for Elastic Property Optimization for Polycrystalline Diamond Films", **Microstructure Sensitive Design: A Workshop**, Drexel University, 2-7 December, 2002, Philadelphia, PA
9. (Invited Workshop) T.R. Bieler, **V.M. Ayres** and B.L. Adams, "Nanoscopic Stress Evaluation and Mesoscopic Grain Boundary Conditions in Polycrystalline Ceramics", **Air Force Office of Scientific Research Contractors Meeting in Metallic Materials and Ceramic Materials**, August 12-14, 2002, Bar Harbor, ME
10. (Invited Workshop) Fathi M. Salam and **Virginia Ayres**, "Landmark-based control for precision handling of biological specimens", **2002 IEEE International Conference on Robotics and Automation, Workshop W2: "Manipulation in the Micro and Nano Domains: New Materials and Technologies"**, May 12-14, 2002, Crystal City, VA
11. (Invited Workshop) **V.M. Ayres**, "Bioelectronics", **UMAC: Emerging Directions in Materials Workshop**, April 13, 2002, Michigan State University, East Lansing, MI
12. (Invited Special Session) **V.M. Ayres**, N. Xi, F. Salam, D. Wang, D. Arnosti, K. Gilgenbach, B. Goolsby, W. K. Fung and M. M. Yu, "SPM-Based Nano-Robotic operation for Site specific Biological Investigations" **IEEE Int'l Conf. on Nanotechnology and Nanomanipulation Special Session**, Maui, HI, October 28-30, 2001
13. (Invited Special Session) **V.M. Ayres** (Michigan St Univ.), E. Choueri (Princeton Univ.), C. Keane (U.S. DOE), C. Surko (U. C.-San Diego), and J. Willis (U.S. DOE), **American Physical Society: The Field of Plasma Physics - the Next Generation**, Bull. Am. Phys. Soc., Vol. 45, No. 7, p. 88 (2000).
14. (Invited Workshop) **V.M. Ayres**, N. Xi, F. Salam, B. Goolsby, and A. Hoffman, "Sensing, Planning and Control for Nano-Manipulation" **Nanoscience and Nanotechnology Workshop**, April 15, 2000, Michigan State University, East Lansing, MI
15. (Refereed Workshop) J.K. Park, **V.M. Ayres**, J. Asmussen and K. Mukherjee, "High Resolution Micro-Machining/Patterning of CVD Diamond Films for MEMS", **Solid State Studies in Ceramics, Gordon Conference 1999**, August 1-6, 1999, Kimball Union Academy, NH.
16. (Invited Workshop) ONR Workshop, "Future Directions in Electromagnetics Research", **Progress in Electromagnetics Research Symposium**, July 7-11, 1997 Boston, MA

Selected Student Presentations:

1. "Nano Mechanical and Electronic Investigations with Tokyo Institute of Technology"
Benjamin W. Jacobs, Andrew D. Baczewski, Virginia M. Ayres and Atsushi Hirata
2007 NSF Grantees Conference on International Research and Education in Engineering
Purdue University, West Lafayette, IN
October 30-November 01, 2007
2. "Current and Future Work With Carbon Nanotubes and Carbon Nanostructures"
S. P. Song
1st Annual NASA/Harriet G. Jenkins Technical Symposium
NASA Johnson Space Center, Houston, TX
June 10-13, 2002
3. "Scanning Probe Microscope Based Micro/Nanomanipulation Investigation of

Molecular Events Sparked by Angiotensin II”

K. Gilgenbach, H. Saglik, B. Goolsby, H. Hummert, V. Ayres, N Xi, F. Salam and D. Wang

11th Annual Argonne National Laboratory Symposium for Undergraduate Research in Science, Engineering & Mathematics

Argonne National Laboratory, Argonne, IL

November 3-4, 2000

4. “Analysis of Laser Ablation Processes on CVD Diamond Films”
J.K Park, V. M. Ayres, J. Asmussen, and K. Mukherjee
Michigan Microscopy and Microanalysis Society Soaring Eagle, MI
October 22, 1999
5. “Impedance Spectroscopy Investigation of Nitrogen-Methane-Hydrogen Grown Polycrystalline Diamond Films”
Susan P. Song, Richard A. Venia, Mohannad Bataineh and Virginia M. Ayres
10th Annual Argonne National Laboratory Symposium for Undergraduate Research in Science, Engineering & Mathematics
Argonne National Laboratory, Argonne, IL
November 5, 1999

Contributed Conference Proceedings and Presentations

1. DA Flowers, VM Ayres, R Delgado-Rivera, I Ahmed, SA Meiners, “Nanoscale Properties of Neural Cell Prosthetic and Astrocyte Response”, Bull. Am. Phys. Soc., Vol. 54, No. 1, e-ref: V 27.10 (2009).
2. RA Al-Duhaileb, BW Jacobs, MA Crimp, VM Ayres, A Hirata, M Horikoshi, MGI Galinato, N Lehnert, “Friction and Stability of Carbon Onions Films in Vacuum”, Bull. Am. Phys. Soc., Vol. 54, No. 1, e-ref: V 24.5 (2009).
3. JM Callahan, BW Jacobs, K McElroy, MA Crimp, VM Ayres, RM Ronningen, AF Zeller, HC Shaw, “Carbon Nanomaterials Under Highly Energetic Heavy Ion Irradiation”, Bull. Am. Phys. Soc., Vol. 54, No. 1, e-ref: D 24.12 (2009). Note: name left off, contacted APS.
4. K McElroy, BW Jacobs, TR Bieler, MA Crimp, VM Ayres, “Temperature Evolution of Gallium Nitride Nanowire Vapor-solid Growth Matrix”, Bull. Am. Phys. Soc., Vol. 54, No. 1, e-ref: X 26.2 (2009).
5. VM Ayres, SA Meiners, I Ahmed, R Rivera-Delgado, DA Flowers, “Quantitative Investigation of FGF-2-Modified Nanofibrillar Prosthetic for Neural Cell System Re-establishment”, Abstracts Issue, 53rd Annual Meeting of the Biophysical Society, 28 February-04 March 2009, Boston, MA, e-ref: 2469-Pos (2009)
6. J.B. Halpern, A. Bello, J. Gilcrease, G.L. Harris, M. He, B.W. Jacobs, K. McElroy, V.M. Ayres, M.A. Crimp, R.A. Stallcup, and M.A. Tupta, “Biphasic GaN Nanowires: Growth mechanism and properties”, European Materials Research Society (E-MRS) Annual Meeting, Strasbourg, France, 26-28 May 2008.
7. Joshua B. Halpern, Benjamin W. Jacobs, Virginia M. Ayres, Martin A. Crimp, Maoqi He and Kaylee McElroy, “Growth and properties of multi-phase gallium nitride nanowires”, PHYS 712, 235th Spring National American Chemical Society Meeting, 6-10 April 2008 New Orleans, LA
8. B.W. Jacobs, K. McElroy, V.M. Ayres, M.A. Crimp, M. He, J.B. Halpern, "Electronic, Mechanical and Cross-Section TEM Analysis of Zinc-Blende/Wurtzite Multiphase Gallium Nitride Nanowires", Materials Research Society Abstracts Spring Meeting, 24-28 March 2008, San Francisco CA, Abstract O6.5, page 332

9. K. McElroy, B.W. Jacobs, V.M. Ayres, M.A. Crimp, J.B. Halpern, M.Q. He, Q. Chen and Y. Fan, "AFM, STM and SPRM Investigations of Multiphase GaN Nanowires and Nanocircuits", Materials Research Society Abstracts Spring Meeting, 24-28 March 2008, San Francisco CA, Abstract O7.9, page 334
10. Y. Fan, Q. Chen, L. Udpa, V.M. Ayres and A.F. Rice, "Scanning Probe Recognition Microscopy", Materials Research Society 2007 Fall Meeting November 26-30, 2007, Boston, MA Abstract B2.3 p. 22 (2007)
11. Q. Chen, Y. Fan, L. Udpa, V.M. Ayres, I. Ahmed, S. Meiners, R. Delgado-Rivera, S. Harris and A. F. Rice, "Investigation of Astrocytes Growing on Tissue Scaffolds by Scanning Probe Recognition Microscopy", Materials Research Society 2007 Fall Meeting November 26-30, 2007, Boston, MA Abstract OO6.13 p. 955 (2007)
12. B.W. Jacobs, K. McElroy, V.M. Ayres, M.A. Crimp, M. He and J.B. Halpern, "Structural and Mechanical Properties of Novel Multi-Phase Gallium Nitride Nanowires" Materials Research Society 2007 Fall Meeting November 26-30, 2007, Boston, MA Abstract HH11.28 p. 746 (2007)
13. Qian Chen, Yuan Fan, Virginia Ayres, Lalita Udpa, Roberto Delgado-Rivera, Sally Meiners, Ijaz Ahmed, Suzan L. Harris, "Nanoscale 3D Cues for Neural Cell Growth and Alignment", Biomaterials and Tissue Engineering Oral Presentation BTE1 Emerging Nanoscience Applications in Technology and Biomedicine (ENATBio07), 15-16 October 2007 Detroit, MI
14. Roberto Delgado-Rivera, Ijaz Ahmed, Abdul S. Ponery, Suzan L. Harris, Ashwin N. Babu, Qian Chen, Y. Fan, L. Udpa, Virginia Ayres, Sally Meiners, "Engineering Electrospun Nanofibrillar Surfaces for Spinal Cord Repair", Biomaterials and Tissue Engineering Oral Presentation BTE4, Emerging Nanoscience Applications in Technology and Biomedicine (ENATBio07), 15-16 October 2007 Detroit, MI
15. A.D. Baczewski, B.W. Jacobs, V.M. Ayres, A. Hirata, and R. Yamada, "Analysis of the tribological properties and radiation resilience of carbon onions", Abstract Book New Diamond and Nano Carbons 28-31 May 2007, Osaka, Japan, p. 71 (2007)
16. Q. Chen, Y. Fan, S. Kumar, A.D. Baczewski, L. Udpa, V.M. Ayres and A. F. Rice, "Cell Response and Tissue Scaffold Triggers Investigated by Scanning Probe Recognition Microscopy", Materials Research Society Abstracts 2007 Spring Meeting, April 9-13, 2007, San Francisco, CA
17. Y. Fan, Q. Chen, S. Kumar, A.D. Baczewski, L. Udpa, V.M. Ayres and A. F. Rice, "Scanning Probe Recognition Microscopy Investigation of Nanoscale Mechanical and Surface Roughness Properties Along Nanofibers", Materials Research Society Abstracts 2007 Spring Meeting, April 9-13, 2007, San Francisco, CA
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Technical Reports

1. Space Power Institute, Auburn University Report, "Investigation of Applications of Diamond and DLC Films in Microwave Tubes", R. Ramesham, M. Rose, R. Askew, T. Bekker, J. Dayton, I. Krainsky, G. Mearini, D. File, A. Gilmour, and V. Ayres, August, 1993. V. M. Ayres, Chapter V: "Surface and Sub-Surface Physics of Diamond and DLC Films".

2. NSWC Technical Report 87-340 , “Nonlinear Analysis of Non-Neutral Plasmas”, V. M. Ayres.
3. NSWC Technical Report TR 87-268 , “Fundamental Cyclotron Frequency Generation from a Cusptron Oscillator”, W. Namkung, J. Y. Choe, H. S. Uhm, and V. Ayres.
4. NSWC Technical Report TR 87-266 , “Microwave Generation from a Cusptron Oscillator with a Six-Vane Circuit”, W. Namkung, J. Choe, H. S. Uhm, and V. Ayres.
5. Purdue University Report PURD-TH-84-13 , “S, X Baryons as Relativistic Bound States of Three Baryons”, M. Sugawara, and V. M. Ayres.,
6. Purdue University Report PURD-TH-84-3 , “The Evaluation of B and T Meson Masses”, M. Sugawara and V. M. Ayres.
7. Purdue University Report PURD-TH-83-16 , “The Meson Mass Spectrum”, M. Sugawara and V. M. Ayres.
8. Purdue University Report PURD-TH-83-1, “Radiative Decays of 2- and 3- Body Bound States”, M. Sugawara and V. M. Ayres.
9. Purdue University Report PURD-TH-82-2 , “Radiative and Weak Decays of Relativistic Bound States”, M. Sugawara and V. M. Ayres.

Dissertation:

“Relativistic Bound States of Fermions and Antifermions”
Advisor: M. Sugawara, Dept. of Physics, Purdue University

Articles Written about Ayres’ Research:

1. Physics Interactions Newsletter (Purdue University), Vol. 2005-2006, “Physics Outstanding Alumni Award 2006”
2. Up to Date at the Cyclotron (Michigan State University) “NSCL Cyclotron and A100 News: Experiment No. 02501 Fundamental Radiation Interactions in Reduced Dimensionalities”, No. 1036, June 10, 2005
3. Currents Magazine (Michigan State University), “Engineers Are Good for Your Health”, Volume 2, No. 1 pp. 12-17, Summer 2002
4. Currents Magazine (Michigan State University), “The Science of Small”, Volume 85, pp. 1-4, Spring 2000

IX. Current and Pending Support:

CURRENT AWARDS:

National Superconducting Cyclotron Laboratory No. 05044
Fundamental Radiation Interactions in Reduced Dimensionalities
PI: Ayres
Institution: Michigan State University
State: Michigan
Total Award: 92 Hours Beam Time
Total Award Equivalent Amount (NASA rate): \$223,000.00
Start Date: July 1, 2005 Projected Duration: 48 Months
% Effort: V. Ayres - 0% (beam time grant)

PENDING AWARDS:

National Science Foundation
Acquisition of an environmental scanning electron microscope with a 3D dual beam focused ion beam (FIB)
Proposal#: 0922999
PI: Drazl
Institution: Michigan State University
State: Michigan
Total Award Amount: \$1,453,598 + 30% match
Start Date: 01 July 2009 Projected Duration: 24 Months
% Effort: V. Ayres - 0% (equipment grant)

National Institutes of Health
Proposal#: 1R43 GM087815-01
SBIR Phase I
Lipid Associated Nanofibrillar Surfaces for Cell Culture
PI: Schindler
Institution(s): Nanoculture, LLC, UMDNJ Robert Woods Medical School, Michigan State University
State(s): New Jersey and Michigan
Total Award Amount: \$275,447.
MSU Award Amount: \$28,775.
Start Date: 01 January 2009 Projected Duration: 36 Months
% Effort: V. Ayres - 8.33%

PAST AWARDS listed by Agency

National Science Foundation:

National Science Foundation
Scanning Probe Recognition Microscopy
Award#: DMI-0400298
PI: Ayres
Institution: Michigan State University
State: Michigan
Total Award Amount: \$350,000.00
Start Date: August 15, 2004 Projected Duration: 48 Months
% Effort: V. Ayres - 8% (0.8 summer month)

International Research in Engineering and Education (IREE)
IREE: Nano Mechanical and Electronic Investigations with Tokyo Institute of Technology

Award#: DMI-0637134
PI: Ayres
Institution: Michigan State University
State: Michigan
Total Award Amount: \$35,000.00
Start Date: 15 August, 2006 Projected Duration: 18 Months
% Effort: V. Ayres – 0%
Supplement to DMI-0400298 Scanning Probe Recognition Microscopy

Research Experience for Undergraduates (REU)
Award#: DMI-0631978
PI: Ayres
Institution: Michigan State University
State: Michigan
Total Award Amount: \$6,000.00
Start Date: 23 May, 2006 Projected Duration: 18 Months
% Effort: V. Ayres – 0%
Supplement to DMI-0400298 Scanning Probe Recognition Microscopy

National Science Foundation
The Acquisition of Laboratory Equipment to Facilitate Micro and Nano Engineering at Michigan State University
Award#: ECS-0116252
PI: J. Asmussen
Co-PI: F. Salem, D. Aslam, T. Grotjohn, and V. Ayres
Institution: Michigan State University
State: Michigan
Total Award Amount: \$272,000.00
Start Date: 01 September 2001 Projected Duration: 60 Months
% Effort: V. Ayres - 0% (equipment grant)

National Science Foundation
Bioengineering a SPM Based Nanomanipulator With Landmark Referenced Control
Award#: BES-0225805
PI: Ayres
Institution: Michigan State University
State: Michigan
Total Award Amount: \$46,628
Start Date: Sep 01, 2002 Projected Duration: 24 Months
% Effort: V. Ayres - 0% (graduate student support; materials & supplies)

NASA:

National Aeronautics and Space Administration
Graduate Student Researchers Program (GSRP)
Radiation Resiliency in Reduced Dimensionality Systems
Award #: NNG05GO15H
PI: V. Ayres
Institution: Michigan State University
State: Michigan
Total Award Amount: \$78,000.00
Start Date: August 15, 2005 Projected Duration: 36 Months
% Effort: V. Ayres—0% (graduate student fellowship)

National Aeronautics and Space Administration

Resilient Nanoscale Electronics for Space Applications
Award #: NASA Award Task No.14: Subcontract Award, Muniz Engineering, Inc
PI: Ayres
Institution: Michigan State University
State: Michigan
Total Award Amount: \$118,185.00
Start Date: Jan 01, 2003 Projected Duration 32 months:
% Effort: V. Ayres - 0% (graduate student support; materials & supplies)

| Award # | Amount | Dates |
|---------------------------------------------------------------------|---------|------------------------------|
| NASA Award Task No.14 Subcontract Award, Muniz Engineering, Inc | \$12000 | 16 May – 15 August 2005 |
| NASA Award Task No.14: Subcontract Award, Muniz Engineering, Inc | \$25000 | 1 January-15 May 2005 |
| H. G Jenkins | \$9121 | 1 January-31 December 2005 |
| QSS PO M10992 | \$25000 | 1 September-31 December 2004 |
| QSS PO M10818 | \$12000 | 1 June -31 August 2004 |
| NNG04GF14G | \$15000 | 1 January-31 May 2004 |
| QSS PO M10408 | \$10064 | 1 September-31 December 2003 |
| NAG-12735 | \$10000 | 1 January-31 May 2003 |

ASEE 2004 NASA Faculty Fellowship Program
PI: V. Ayres
Institution: NASA Goddard Space Flight Center
State: Maryland
Total Award Amount: \$15,900.00
Start Date: June 01, 2004 Projected Duration: 03 months
% Effort: V. Ayres - 100%
All NASA Centers: 764 applied/235 accepted
NASA Goddard Space Flight Center: 149 applied/26 accepted

ASEE 2003 NASA Faculty Fellowship Program
PI: V. Ayres
Institution: NASA Goddard Space Flight Center
State: Maryland
Total Award Amount: \$12,000.00
Start Date: May 28, 2003 Projected Duration: 10 Weeks
% Effort: V. Ayres - 100%
All NASA Centers: 740 applied/244 accepted
NASA Goddard Space Flight Center: 201 applied/30 accepted

UNCF Harriet G. Jenkins Predoctoral Fellowship
National Aeronautics and Space Administration
PI: Susan Song (graduate student V. Ayres)
Institution: Michigan State University
State: Michigan
Total Award Amount: \$73,500
Start Date: August 15, 2001 Projected Duration: 36 Months
% Effort: V. Ayres -0%
% Effort: Susan Song, M.S. Thesis Candidate – 100%

UNCF Harriet G. Jenkins Predoctoral Fellowship
National Aeronautics and Space Administration
PI: Susan Song (graduate student V. Ayres)
Mini Grant Program Summer 2003
"Radiation Effects on the Electronic and Mechanical Properties of Carbon Nanotubes and Carbon Nanotube Interfaces"
Total Award Amount: \$6,700.00

UNCF Harriet G. Jenkins Predoctoral Fellowship
National Aeronautics and Space Administration
PI: Susan Song (graduate student V. Ayres)
Mini Grant Program Summer 2002
"Radiation Effects on the Electronic and Mechanical Properties of Carbon Nanotubes and Carbon Nanotube Interfaces"
Total Award Amount: \$6,700.00

National Aeronautics and Space Administration
Synthesis of Hybrid Carbon Nanotube/Diamond Films
Award #: NAG-61-2743
PI: D. Tomanek
Co-PI: V. Ayres and D. Aslam
Institution: Michigan State University
State: Michigan
Total Award Amount: \$20,000.00
Start Date: Mar 20, 2000 Projected Duration: 12 Months
% Effort: V. Ayres—0%
% Effort: Ali Kahn, M.S. Candidate – 100%

National Aeronautics and Space Administration
Atomic Force Microscope Lithography and BEEM Investigation of Carbon Nanotube Interfaces
Award #: NAG5-8893
PI: V. Ayres
Institution: Michigan State University
Internal MSU#: 61-2742
State: Michigan
Total Award Amount: \$5,000.00
Start Date: Jan 15, 2000 Projected Duration: 12 Months
% Effort: V. Ayres—0% (equipment and travel grant)

National Superconducting Cyclotron Laboratory:

National Superconducting Cyclotron Laboratory Director's Discretionary Beam Time Award No. 020501
Fundamental Radiation Interactions in Reduced Dimensionalities
PI: Ayres
Institution: Michigan State University
State: Michigan
Total Award: 16 Hours Beam Time
Total Award Equivalent Amount (NASA rate): \$38,832.00
Start Date: April 1, 2003 Projected Duration: 36 Months
% Effort: V. Ayres - 0% (beam time grant)

International:

Chair of International Cooperation
Tokyo Institute of Technology
PI: Ayres
Institution: Tokyo Institute of Technology
Country: Japan
Total Award Amount: ¥3073144
Start Date: Sep 20, 2005 Projected Duration: 5 Months
% Effort: V. Ayres - 100%