ALEXANDER N. CARTWRIGHT

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Education

PhD, University of Iowa**,** 1995
Major: Electrical and Computer Engineering
Thesis Title: "Nonlinear optical properties of hetero *n-i-p-i* device structures"
BS, University of Iowa, 1989 (with Highest Distinction)
Major: Electrical and Computer Engineering

Employment History

University at Buffalo, The State University of New York

Faculty Appointments:

Aug. 2005 – present:	Professor of Electrical Engineering, University at Buffalo (UB)
July 2009 – present:	Professor of Biomedical Engineering, UB
Aug. 2005 – present:	Adjunct Professor of Physics, UB
Aug. 2000 – July 2005:	Associate Professor of Electrical Engineering, UB
Aug. 1995 – July 2000:	Assistant Professor of Electrical Engineering, UB

University at Buffalo Administrative Positions

Jan. 2012 – present:	Vice President for Research and Economic Development
Jan. 2011 – Jan. 2012:	Vice President for Research
April 2011 – present:	Operations Manager, Research Foundation for the State University of New York
July 2010 – Jan. 2011:	Interim Vice President for Research
Oct. 2010 – present:	Acting Executive Director of the New York State Center of Excellence in Bioinformatics and Life Sciences
July 2009 – June 2010:	Chair, Electrical Engineering Department
July 2009 – June 2010:	Inaugural Chair, Biomedical Engineering Department
Aug. 2007 – July 2009:	Vice Provost for Strategic Initiatives
Aug. 2006 – July 2007:	Director of UB2020 Integrated Nanostructured Systems Initiative
Aug. 2002 – present:	Director, Institute for Lasers, Photonics and Biophotonics
Sept. 1999 – present:	Co-Director, Electronics Packaging Laboratory (EPL)
Sept. 2001 – Aug. 2008:	Director, National Science Foundation Integrative Graduate Education and Research Traineeship in "Biophotonics: Materials and Applications"

Dec. 1999 – Aug. 2002: Deputy Director, Institute for Lasers, Photonics and Biophotonics

University at Buffalo Research Center / Institute Membership

Aug. 2004 – present: Member, Center for Unified Biometrics and Sensors (CUBS)
Dec. 1999 – present: Member, Institute for Lasers, Photonics and Biophotonics
Sept. 1999 – present: Member, Electronics Packaging Laboratory

University of Iowa

Mar. 1995 – Aug. 1995: Postdoctoral Scientist, Laboratory for Photonics and Quantum Electronics, U. of Iowa
Aug. 1989 – Feb. 1995: Research Assistant, Laboratory for Photonics and Quantum Electronics, U. of Iowa

Professional and academic Honors/Awards

2014 Fellow, SPIE – The International Society for Optics and Photonics
2013 Society of Manufacturing Engineers Awardee for "Innovations that Could Change the Way you Manufacture" (1 of 5 awardees internationally)
2010 Exceptional Scholar Award for Sustained Achievement, University at Buffalo
2009 Elevated to Senior Member status, IEEE
2009 School of Engineering and Applied Sciences Faculty Excellence Award, University at Buffalo
2006 Faculty in Leadership Participant (1 of 4 participants), University at Buffalo
2003 Most Valuable Workshop Contribution, First International Workshop on Indium Nitride
2002 State University of New York Chancellor's Award for Excellence in Teaching
2000 University at Buffalo Top 100 Federal Grantee
2000 Department of Defense, Office of Naval Research Young Investigator Award
1998 National Science Foundation CAREER Award
1996, 1997, 1998 University at Buffalo Reifler Award
1993 NATO Advanced Studies Institute Travel Award
1989 NCR Most Promising Student Scholarship
1987-1989 Exxon Honors Scholarship, Caterpillar Honors Scholarship, State of Iowa Scholarship

Administrative Experience

Jan 2012 – Present: ***Vice President for Research and Economic Development***
Jan 2011 – Jan. 2012: ***Vice President for Research***
July 2010 – Jan. 2011: ***Interim Vice President for Research***

- The Office of the Vice President for Research and Economic Development (OVPRED) works with other senior leaders in supporting the university's vision as an AAU public research institution. The Vice President develops effective and innovative strategies to best achieve UB's research goals, ensuring resources that are aligned with the university's education and service missions. The Vice President manages UB's research enterprise, including research funding, policy and compliance, research communications, research support, technology transfer and industry/university relations.
- Managing an administrative portfolio that includes:
    - Office of Research Advancement (ORA).
    - Office of Sponsored Projects Services (SPS) – providing complete pre- and post-award services for UB Principal Investigators and the UB research community.
    - Division of Comparative Medicine/Laboratory Animal Facility (DCM/LAF).
    - Office of Economic Development (OED).
    - UB Office of Science, Technology Transfer and Economic Outreach (STOR).
    - Office of Research Compliance.
    - VPR Information Systems.
- Leading the University's research and economic development operations with
    - Eight campus research centers and institutes.
- More than 100 staff members reporting through the OVPRED.
- The OVPRED has partnered with university leaders, faculty and industry in launching several successful major initiatives, including:
    - 2014: New York State Buffalo Genomic Medicine Center - $47.5M over 5 years recommended by Governor Cuomo in the 2014 State of the State Address. A consortium of the University at Buffalo, New York Genome Center and associated industrial partners.
    - 2013: National Science Foundation Science and Technology Center (NSF STC) on Biology with X-Ray Free Electron Lasers (BioXFEL) awarded October 2013, $25M award for 5 years.
    - 2013: Led the establishment of the University at Buffalo's Institute for Research and Education in eNergy, Environment and Water (RENEW) – a $15M, 5 year investment in upwards of 20 new faculty positions to build on existing strengths within the university and to establish UB as a world leader in energy, water and environment. Engaged a faculty advisory group and facilitated the leading deans to develop a strategic vision for the institute.

- 2012: Secured a second New York State Center of Excellence designation, in Materials Informatics.
- 2013: Established the Office of Research Advancement in conjunction with the Vice Provost for Strategic Initiatives.
- 2012-2014: Active participant in the planning team for the "Realizing UB2020" strategic planning process led by the Provost and President.
- 2013-2014: Led the "Research and Innovation" Task Force to implement strategic initiatives in "Realizing UB2020."
- 2011-2014: Member of the Regional Economic Development Council Advanced Manufacturing Implementation Team that focuses on the establishment of Buffalo Manufacturing Works.
- 2012-2014: Active participant in AAU Research Officers and APLU Council on Research Policy and Graduate Education (Executive Committee).
- Active participant in Congressional visits to Senators and Representatives.
- 2013: Partnered with local business leaders to recruit Sentient Sciences, LLC to Western New York.

Oct. 2010 – Present: Acting Executive Director of the New York State Center of Excellence in Bioinformatics and Life Sciences, UB

- As Acting Executive Director, provide strategic leadership for UB's New York State Center of Excellence in Bioinformatics and Life Sciences, which houses faculty from the Schools of Medicine and Biological Sciences, Engineering and Applied Sciences, Public Health and Health Professions, Pharmacy and Pharmecuetical Sciences, and the College of Arts and Sciences. In addition, the Center of Excellence is home to the New York State Center of Advanced Technology in Biomedical Sciences and the Center for Computational Research. This unique Center also houses business partners (9).

  The Executive Director oversees all research, education and outreach activities of the Center, in addition to managing the Center's space and core facilities.

- Major Accomplishments include:
  - Establishment of a management team to oversee facilities, space and personnel needs.
  - Established an Internal Advisory Committee of Deans that provides guidance on the program for the Center of Excellence.

April 2011 – present: Operations Officer, The Research Foundation for SUNY

- The VPRED brings innovative thinking to his role as a Research Foundation Operations Officer. Reporting to the President of The Research Foundation for SUNY (RF), the RF Operations Officer serves as the top level RF executive on campus, responsible for supporting SUNY's research mission and successfully implementing the RF's strategic plan. The Operations Officer supervises all Research Foundation operations on campus, including:
    - Sponsored program administration services to the SUNY community (faculty, students, and staff) and stewardship to our sponsors;
    - Creating an environment that supports and increases funding for sponsored programs;
    - Supporting increased technology transfer and commercialization activities on behalf of SUNY efforts to revitalize New York's economy;
    - Supports business offices that process RF transactions.

July 2009 – June 2010: Chair, Department of Electrical Engineering

- Assumed administrative leadership and was responsible for:
    - Teaching assignments.
    - Space assignments.
    - Discretionary salary increases.
    - Hiring of new faculty:
        - Hired two new Assistant Professors.
        - Hired a new Associate Professor in collaboration with Physics department.
    - Designed and established department conference room.
    - Reviewed and redistributed workload for all staff in department (one technician, one administrative assistant, and three secretaries).
    - Supervised five staff members.

July 2009 – June 2010: Inaugural Chair, Department of Biomedical Engineering

- Collaborated in designing a new interdisciplinary department and implemented the plan
    - Hired three new department faculty members.
    - Worked with Dean of the School of Medicine and Biomedical Sciences and Dean of School of Engineering and Applied Sciences to identify initial list of twelve faculty from across the University.
    - Hired the Assistant to the Chair of the department.
    - Identified affiliated faculty who would help with the proper delivery of the BME undergraduate curriculum.

July 2007 – June 2009: Vice Provost for Strategic Initiatives

- Implemented administrative structure for eight strategic strengths at UB. Strength administrative structure included i) a Dean's advisory committee, and ii) a faculty advisory committee.
  Identified UB2020 strategic strengths included:
  - Artistic Expression and Performing Arts
  - Civic Engagement and Public Policy
  - Cultures and Texts
  - Extreme Events: Mitigation and Response
  - Health and Wellness Across the Lifespan
  - Information and Computing Technology
  - Integrated Nanostructured Systems
  - Molecular Recognition in Biological Systems and Bioinformatics
- Coordinated management of strategic strengths through a committee that included eight strategic strength faculty advisory committee chairs (one per strategic strength).
- Developed review process for assessing progress of the eight diverse strategic strengths. This included procedures to track investments in UB2020 Strategic Strengths.
- Chaired committee responsible for providing a strategic plan for a newly purchased UB Downtown Gateway building located at the developing downtown campus.
- Established the UB2020 strategic strengths resource center in 9 Norton Hall.
- Organized the planning process for the strategic strength in Civic Engagement and Public Policy.
- Developed a model university process for inter-disciplinary hiring. This included processes for multi-department and multi-school hires.
- Facilitated implementation of Strategic Strengths in collaboration with upper administration (Deans, VPs, Provost and President) and faculty leaders (including negotiations of strategic plan, hiring plans and infrastructure investments).

August 2006 – June 2007: Faculty Leadership Program

- Faculty Leadership Fellow reporting to Provost.
- Developed a plan for organization of strategic strengths (as part of UB2020 strategic planning process).
- Proposed administrative structure for strategic strengths.

July 2006 – June 2007 Faculty Advisory Committee Chair, Integrated Nanostructured Systems (A UB2020 Strategic Strength)

- Responsible for organizing effort of the University at Buffalo's Strategic Strength in Integrated Nanostructured Systems.
- Developed the budget model for the strength.
- Organized the planning of research themes and associated faculty hires. The hiring plan included 29 distinct hires across five academic units at the University at Buffalo (the schools of Engineering and Applied Sciences, Pharmacy and Pharmaceutical Sciences, Medicine and Biological Sciences, Dental Medicine and the College of Arts and Sciences).
- Worked with the five Academic Deans and the Vice President for Research to implement the research initiatives and faculty hires.

Board Memberships

January 2012 – present: Member of the Buffalo Niagara Enterprise Board of Directors.

October 2011 – present: Member of the CUBRC Board of Directors.

October 2011 – present: Member of the Buffalo 2020 Corporation Board of Directors.
Chair: December 2011 - present

Spring 2008 – present: Member of the New York Sea Grant Institute Board of Governors.
Executive Committee: 2014 - present
Chair: April 2012 - 2014
Vice Chair: Jan. 2012 – April 2012

January 2012 – present: Member of the Hauptman-Woodward Institute Board of Directors.

Professional Memberships and Activities

Society Memberships:

Fellow, SPIE – The International Society for Optics and Photonics
Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
American Society for Engineering Education (ASEE)
Eta Kappa Nu
Materials Research Society (MRS)
American Association for the Advancement of Science (AAAS)

Journal Reviewer:

Advanced Materials
Applied Physics Letters
IEEE Electron Devices
IEEE Journal of Quantum Electronics

IEEE Photonics Technology Letters
IEEE Transactions on Advanced Packaging
IEEE Transactions on Components and Advanced Packaging
IEEE Transactions on Education
Journal of Applied Physics
Journal of Crystal Growth
Associate Editor, Journal of Nanophotonics
Associate Editor, Light: Science & Applications
Optics Communications
Optics Letters
Optics Express
Physica E-Low-Dimensional Systems & Nanostructures
Solid State Communications

Conference Organization:

February 2014: Co-Chair of "Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications X," SPIE Photonics West, BiOS Annual Conference, San Francisco, CA, February 1-6, 2014.

February 2013: Co-Chair of "Nanoscale Imaging, Sensing and Actuation for Biomedical Applications IX," SPIE Photonics West, BiOS Annual Conference, San Francisco, CA, February 2-7, 2013.

January 2012: Co-Chair of "Nanoscale Imaging, Sensing and Actuation for Biomedical Applications VIII," SPIE Photonics West, BiOS Annual Conference, San Francisco, CA, January 21-26, 2012.

January 2011: Co-Chair of "Nanoscale Imaging, Sensing and Actuation for Biomedical Applications VII," SPIE Photonics West, BiOS Annual Conference, San Francisco, CA, January 22-27, 2011.

January 2010: Co-Chair of "Nanoscale Imaging, Sensing and Actuation for Biomedical Applications VI," SPIE Photonics West, BiOS Annual Conference, San Francisco, CA, January 23-28, 2010.

January 2009: Co-Chair of "Nanoscale Imaging, Sensing and Actuation for Biomedical Applications V," SPIE Photonics West, BiOS Annual Conference, San Jose, CA, January 24-29, 2009.

March 2008: Co-Chair of "Magnetic Excitations in Semiconductors – A Bridge to the Next Decade," MagEx 2008, Buffalo, NY, March 6-8, 2008.

January 2008: Co-Chair of "Nanoscale Imaging, Sensing and Actuation for Biomedical Applications IV," SPIE Photonics West, BiOS Annual Conference, San Jose, CA, January 19-24, 2008.

April 2007: Co-Chair of "Symposium XX: Hybrid Functional Materials for Optical Applications," MRS Annual Meeting, San Francisco, CA, April 9-13, 2007.

January 2007: Co-Chair of "Nanoscale Imaging, Spectroscopy, Sensing and Actuation for Biomedical Applications IV," SPIE Photonics West, BiOS Annual Conference, San Jose, CA, January 20-25, 2007.

January 2006: Co-Chair of "Nano/Biophotonics and Biomedical Applications," SPIE Photonics West, BiOS Annual Conference, San Jose, CA, January 21-26, 2006.

January 2005: Co-Chair of "Nano/Biophotonics and Biomedical Applications," SPIE Photonics West, BiOS Annual Conference, San Jose, CA, January 22-27, 2005.

December 2004: Chair of Symposium "Novel Materials for Nanophotonics," MRS Annual Meeting, Boston, MA, November 29-December 3, 2004.

August 2004: Co-Chair of "Nanophotonic Materials," SPIE – The International Society for Optical Engineering, Annual Meeting, Denver, CO, August 2-6, 2004.

January 2004: Chair of "Nano/Biophotonics and Biomedical Applications," SPIE Photonics West, BiOS Annual Conference, San Jose, CA, January 24-29, 2004.

August 2003: Program Committee, IEEE Nanotechnology Conference, IEEE-Nano 2003, San Diego, CA, August 12-14, 2003.

August 2003: Chair of "Organic and Hybrid Materials for Nanophotonics," SPIE The Annual Meeting, San Diego, CA, August 3-8, 2003.

April 2001: SPIE Opto-NorthEast and Imaging 2001, Conference Chair for Optoelectronic and Photonic Devices, Rochester, NY, April 10-11, 2001.

Fall 1999 – Spring 2000: Member of the American Society for Engineering Education (ASEE) technical committee for the St. Lawrence Sectional Meeting, Alfred, NY, March 30-April 1, 2000.

Spring 1999 – January 2000: Member of the international program committee (IPC) for the International Conference on Simulation and Multimedia in Engineering Education 2000, San Diego California, January 23-27, 2000.

Service

Scientific Service:

January – February, 2014: Reviewer for Department of Energy, Basic Energy Sciences, Early Career Research Program 2014.

April 2013 and May 2014: Member of the American Association for the Advancement of Science's Review Panel for the EPSCoR program of South Dakota. Interviews held in Sioux Falls, SD.

January – March, 2013: Reviewer for Department of Energy, Basic Energy Sciences, Early Career Research Program 2013.

September24-25, 2012: Member of the NSF IGERT review panel, Arlington, VA.

January – March, 2012: Reviewer for Department of Energy, Basic Energy Sciences, Early Career Research Program 2012.

February 1-3, 2012: Member of the NSF Division of Materials Research, Electronic and Photonic Materials Panel 4, Arlington, VA.

January 17, 2010: Member of the NSF STTR Review panel on "Photovoltaics," Arlington, VA.

November 4-6 2009: Member NIH review panel for P41 program reverse site visit for Duke University Photonics Center, Washington, DC.

September 17, 2009: Member of the NSF SBIR Review panel on "Magnetic and Sensor Materials," Arlington, VA.

November 2008: Member of the Natural Sciences and Engineering Research Council of Canada (NSERC) site review team for the Major Resource Support (MRS) Program. One of 5 team members to review The Laboratory of Micro and Nanofabrication (LMN), Institut National de la Recherche Scientifique (INRS).

March 2008: Member of the site review committee for the National Institutes of Health, National Institute of Biomedical Imaging and Bioengineering (NIBIB) Technology Resource Center in Biophotonics and Nanosensing at Duke University.

February 2007: Member of National Science Foundation's Review Panel for the Directorate for Engineering's Division of Electrical, Communications and Cyber Systems (ECCS) focused on Nanoscale Exploratory Research Teams for Active Nanostructures and Nanosystems, NSF, Arlington, VA.

April 2004: Member of National Science Foundation's CREST program Review Panel, NSF, Arlington, VA.

April 2004: Member of National Science Foundation's Spintronics Panel for Electrical and Communications Systems (ECS), unsolicited proposal, NSF, Arlington, VA.

November 2003: Member of National Science Foundation's Review Panel for Directorate for Engineering's Division of Electrical and Communications Systems, CAREER Panel, *Electronics, Photonics, and Device Technologies,* NSF, Arlington, VA.

October 2003: Member of National Science Foundation's Review Panel for Directorate for Engineering's Division of Electrical and Communications Systems, CAREER Panel, *Electronics, Photonics, and Device Technologies,* NSF, Arlington, VA.

November 2002: Member of National Science Foundation's Review Panel for Directorate for Engineering's Division of Electrical and Communications Systems, CAREER Panel, *Electronics, Photonics, and Device Technologies,* NSF, Arlington, VA.

November 2001: Member of National Science Foundation's Review Panel for Directorate for Engineering's Division of Electrical and Communications Systems, CAREER Panel, *Electronics, Photonics, and Device Technologies,* NSF, Arlington, VA.

July 2001: Member of National Science Foundation's Review Panel for Directorate for Undergraduate Education, *Course, Curriculum and Laboratory Innovation,* (NSF-CCLI #2), NSF, Arlington, VA.

April 2000 – April 2001: Secretary, St. Lawrence Section of the American Society for Engineering Education.

December 2000: National Science Foundation Workshop on "The Future Revolution in Optical Communications and Networking," Washington, D. C., (one of approximately 70 invited nationwide).

November 2000: Reviewer of the National Science Foundation's Award #9752693, "Hands-on Laboratory Projects for Non-Engineers: Learning Scientific Principles in the Context of Everyday Technology," John Krupczak, Hope College, Holland, MI.

May 2000: Member of National Science Foundation's Review Panel for Directorate for Engineering's Division of Electrical and Communications Systems, *Electronics, Photonics, and Device Technologies*, (NSF-EPDT #4), NSF, Arlington, VA.

August 1999: Member of National Science Foundation's Review Panel for the Directorate for Education and Human Resources' Division of Undergraduate Education *Course Curriculum and Laboratory Improvement* Program, (ILI-27), Washington, DC.

May 1999: Member of National Science Foundation's Review Panel for Directorate for Engineering's Division of Electrical and Communications Systems, *Electronics, Photonics, and Device Technologies*, (NSF-EPDT #1), Washington, DC.

March 1998: Member of National Science Foundation's Review Panel for Directorate for Engineering's Division of Electrical and Communications Systems *Physical Foundations of Enabling Technologies* Program, (NSF-PFET #2), Washington, DC.

January 1998: Member of National Science Foundation's Review Panel for the Directorate for Education and Human Resources' Division of Undergraduate Education *Instrumentation and Laboratory Improvement* Program, (ILI-27), Washington, DC.

Community Service

Summer 2010 – Offer Summer Camp, "Innovation Station" for 8-11 year olds, July 26-30, 2010; Camp focused on Basic Physics and Engineering of Optical Sciences.

Spring 2010 – 7th & 8th Grade Science Presentation, "Nanostructured Optical Devices," 2010.

Spring 2007 – UB Engineer's Week Presentation, "Nanoengineering: Past and Future," 2007.

Spring 2007 – Integrated Nanostructured Systems East Aurora High School campus visit.

Fall 1995-Present: Fall Campus Visit Program, UB Open House, UB Preview Day, Take your Daughters to Work Day.

Spring 2006: Third grade "Light Lab" Explore Lab, Country Parkway Elementary School, Williamsville, NY.

Spring 2006: Mentor for the State University of New York Louis Stokes Alliance for Minority Participation Program.

Fall/Spring 2005-2006: Mentor for three students in the State University of New York Collegiate Science & Technology Entry Program.

Fall 2005: Third Grade Science Laboratory, Country Parkway Elementary School, Williamsville, NY.

Summer 2005: Mentor for State University of New York Louis Stokes Alliance for Minority Participation Program.

Spring 2000: Guest Lecturer, Orchard Park School Eighth Grade Science Assembly, "Lasers and Photonics."

Summer 1999: Mentor for State University of New York Louis Stokes Alliance Louis Stokes for Minority Participation

Summer 1997: Mentor for State University of New York Louis Stokes Alliance for Minority Participation.

Summer 1996: Supervised SEAS Buffalo-Area Engineering Awareness for Minorities (BEAM) Honors Research Summer Program Student.

University Service

November 2012 – Present: Member, Council on Research Policy and Graduate Education (CRPGE) Executive Committee.

Fall 2011 – Spring 2012: Member, University at Buffalo Provost and Executive Vice President for Academic Affairs Search Committee.

Fall 2011 – Spring 2012: Member, President of the Research Foundation / SUNY Vice Chancellor for Research Search Committee.

Spring 2012 – Fall 2012: Member, Dean of the School of Engineering and Applied Sciences Search Committee.

March 2011: Participant in the 25th Annual Science Exploration Day.

Fall 2007 – Spring 2009: Member, Provost's Vast Potential Working Group

A coterie of deans and faculty, at the behest of the provost, engaged in a discussion regarding the vast potential of the Buffalo Niagara Region. The conversation focused, in large measure, on the unique attributes of our region.

Fall 2007 – June 2010: Member, Committee on Environmental Stewardship.

Created in November 2007 to lead UB's work toward fulfilling UB's President's endorsement of the American College and University Presidents Climate Commitment (ACUPCC) and in pursuit of a broader agenda for sustainable development and design on our three campus centers.

Fall 2006 – Spring 2009: Member, Development Program Advisory Council.

Fall 2002 – Spring 2007: Chair of ILPB Executive Committee.

Spring 2002 – present: Director: Institute for Lasers, Photonics and Biophotonics.

Spring 2001 – Spring 2007: Member of the University at Buffalo Faculty Senate's Budget Priorities Committee.

This committee advised the President in the development of the university budget, recommended criteria for the allocation of the university budget funds related to the development and implementation of programs related to the academic mission and recommended and reported regularly to the faculty senate.

Fall 1999 – present: Serving as member of the Graduate School Fellowship Committee.

Spring 1999 – present: Director: CAPEM/MRIF Ultrafast Laser Facility.

Fall 2007 – July 2009: Vice Provost for Strategic Initiatives.

Fall 2006 – July 2009: Member, University at Buffalo's Strategic Strengths Advisory Committee, Advisory to the University at Buffalo Provost (Satish Tripathi).

Fall 2007 – May 2009: Chair, UB Downtown Gateway Committee.

Fall 2006 – Spring 2008: Member, University at Buffalo's Research Advisory Council (RAC), Advisory to the Vice President for Research (Jorge Jose).

Fall 2006 – Fall 2007: Director, UB2020 Integrated Nanostructured Systems Initiative.

Integrated Nanostructured Systems at UB aims to transform nanoscience discoveries into integrated technologies that advance information processing and storage, biomedical diagnostics and therapy, and renewable energy sources for the benefit of industry, human health, the environment, and society.

Fall 2006 – Spring 2007: Faculty in Leadership Program, Mentor: Provost Satish Tripathi.

Spring 2005: Chair: White Paper Committee for UB2020 Foci of Excellence on Nanomaterials (Integrated Nanostructured Systems).

Fall 2004 – Spring 2005: Member; University at Buffalo Task Force on Centers and Institutes.

Fall 2004 – Spring 2005: Member; University at Buffalo Task Force on Research Incentives and Support.

May 1997 – January 2005: Center for Advanced Photonics and Electronic Materials. Actively participated in center activities for the University at Buffalo center focusing on photonic and opto-electronic materials.

April 1997, 1998, 1999, 2000, 2001, 2002, 2003: Judge for Sigma Xi Annual Student Research Competition. Sponsored by the Vice Provost for Graduate Education and Research.

Fall 2002: Member; SUNY Sensor Planning Committee.

Fall 2001 – Fall 2002: Member; SUNY Faculty Senate Graduate Research and Education Committee.

Fall 1999 – Spring 2002: Member; Advisory Board of the Institute for Research and Education on Women and Gender.

Spring 1997 – Fall 2001: Served as a SEAS representative to the Provost's Junior Faculty Advisory Council.

Fall 1999 – May 2000: Serving as alternate for the School of Engineering and Applied Sciences representatives to the University Faculty Senate.

Fall 1999: Served as faculty representative in the University at Buffalo Mission Review Process (one of only two faculty members invited to participate).

September 1995 – May 1997: Center for Electronic and Electro-optic Materials, University at Buffalo; Actively participated in center activities.

Faculty Service

Fall 1998 – present: Serving as the Freshmen Mentor for declared Engineering Freshmen for the School of Engineering and Applied Science (SEAS) Computing Committee.

Fall 2007 – June 2009: Member: EE Executive Committee

Fall 2006 – Spring 2007: Vice Chair, SEAS Faculty Personnel Committee

Fall 2005 – Fall 2006: Member: SEAS Faculty Personnel Committee

Fall 2005 – Spring 2006: Chair, SEAS Dean Search Committee.

Spring 1999 – Fall 2003: Associate Director: Center for Active-learning of Microelectronics in Administration and Photonics.

Fall 1998 – Fall 2003: Serving as the Faculty Advisor for the University at Buffalo American Society for Engineering Education Student Club (UB-ASEE).

Fall 2002 – Spring 2003: Member: SEAS Research Advisory Committee.

Summer 1998 – Spring 2000: Serving as the Electrical Engineering Representative to the School of Engineering and Applied Science (SEAS) Computing Committee.

Departmental Service

Spring 1996 – present: Director: Laboratory for Advanced Spectroscopic Evaluation.

Spring 2008 – June 2009: Member: Electrical Engineering Research Space Group.

Fall 2007 – June 2009: Member: New SEAS Building and Space Committee.

Fall 2005 – Spring 2007: EE Course Scheduling.

Fall 2005 – Spring 2007: Member: New SEAS Building, Department Committee.

Fall 2003 – Spring 2007: Member: Awards Committee.

Spring 2006 – Summer 2006: Chair: Electrical Engineering Faculty Search.

Fall 2005 – Spring 2006: Member: Faculty Recruitment Bio Committee.

Fall 2004 – Spring 2006: Chair: Electrical Engineering Graduate Curriculum Committee.

Fall 2004 – Spring 2006: Member: Graduate Admissions Committee.

Fall 2003 – Spring 2006: Member: Staff Duties & Evaluation Committee.

Spring 2003 – Spring 2006: Member: Undergraduate Curriculum Committee.

Summer 1999 – Spring 2006: Electrical Engineering Graduate Committee.

Fall 2001 – Spring 2005: Member: Electrical Engineering Space Committee.

Fall 2004 – 2005: Electrical Engineering Graduate Seminar Coordinator.

Fall 2002 - Spring 2003: Member: Accreditation Board for Engineering and Technology Committee.

Fall 2000 – Fall 2002: Director: Financial Aid and Teaching Assistants.

Fall 2001 – Spring 2002: Member: Electrical Engineering Search Committee.

Fall 2001 – Spring 2002: Member: Electrical Engineering Chair Search Committee.

Summer 1998 – Spring 2000: Electrical Engineering Webmaster.

Fall 1999: Electrical Engineering Course Revitalization Committee.

Summer 1998 – Fall 1999: Electrical Engineering Year 2000 Coordinator.

Spring 1998: Electrical Engineering Planning Committee.

Spring 1998: Electrical and Computer Engineering Curriculum Reform Committee.

Spring 1995 - Spring 1997: Graduate Seminar Coordinator.

Fall 1996: Head of ECE Strategic Planning Sponsored Research Subcommittee.

Education

Courses Taught

Spring 2014: EE 699 – Dissertation (PhD): *Borui Chen, Tania Moein, Joseph Murphy, Xi Wang, Tianmu Zhang*

Fall 2013: EE 699 – Dissertation (PhD): *Borui Chen, Tania Moein, Joseph Murphy, Xi Wang, Tianmu Zhang*

Spring 2013: EE 699 – Dissertation (PhD): *Tania Moein, Joseph Murphy, Xi Wang, Tianmu Zhang, Bin Zhou*

Fall 2012: EE 699 – Dissertation (PhD): *Tania Moein, Joseph Murphy, Xi Wang, Tianmu Zhang, Bin Zhou*

Spring 2012: EE 699 – Dissertation (PhD): *Ke Liu, Tania Moein, Joseph Murphy, Prateek Sharma, Xi Wang, Huina Xu, Tianmu Zhang, Bin Zhou*

Fall 2011: EE 699 – Dissertation (PhD): *Ke Liu, Tania Moein, Joseph Murphy, Prateek Sharma, Xi Wang, Huina Xu, Tianmu Zhang, Bin Zhou*

Spring 2011: EE 598 – Individual Problems (MS): *Tianmu Zhang,* (PhD)
EE 699 – Dissertation (PhD): *Dong Ho Lee, Ke Liu, Tania Moein, Bin Qu, Prateek Sharma, Xi Wang, Huina Xu, Bin Zhou*

Fall 2010: EE 598 – Individual Problems
EE 599 – Masters Research

Spring 2010: EE 598 – Individual Problems (MS): *Jeffrey Cox, Thomas Heidinger, Nathan Majchrzak, Jonathan Roberts, (PhD) Prateek Sharma*
EE 599 – Masters Research: *Mark Eiden, Manohar Raju, Andrea Schmitz*
EE 701 – Special Topics: *Jeffrey Cox*

Fall 2009: EE 202 – Circuit Analysis I
EE 494 – Senior Capstone Project: *Matthew Bischof, James Whitefield*
EE 598 – Individual Problems (MS): *Thomas Heidinger, (PhD) Ke Liu, Nathan Majchrzak, Manohar Raju, Jonathan Roberts*
EE599 – Masters Research: *Andrea Schmitz*

Spring 2009: EE 598 – Individual Problems (PhD): *Bin Qu, Huina Xu*

Fall 2008: EE 202 – Circuit Analysis I
EE 498 – Undergraduate Research: *Claire Lochner*
EE 598 – Individual Problems (MS): *Duo Mao, (PhD) Bin Qu, (PhD) Prateek Sharma*

Spring 2008: EE 598 – Individual Problems (MS): *Duo Mao, (PhD) Bin Qu, Prateek Sharma*
EE 599 – Masters Research: *Prateek Sharma*

Fall 2007: EE 202 – Circuit Analysis I
EE 598 – Individual Problems (MS): *Duo Mao, (PhD) Huina Xu*

Spring 2007: EE 492 – Lasers and Photonics
EE 598 – Individual Problems (MS): *Duo Mao, Elizabeth Nio, (PhD) Huina Xu, Xiaoyu Zhou*
EE 599 – Masters Research: *Dae Yu Kim*
UE 141 – Integrated Nanostructured Systems Freshman Seminar Series

Fall 2006: EE 489/589 – Lasers & Photonics
EE 598 – Individual Problems (MS): *Elizabeth Nio*
EE 599 – Masters Research: *Dae Yu Kim, Elizabeth Nio*
UE 141 – Integrated Nanostructured Systems Freshman Seminar Series

Spring 2006: EE 494/594 – Consumer Optoelectronics
EE 499 – Independent Study: *Erin Hopkins*
EE 598 – Individual Problems (PhD): *Kevin Edward Enser, Firdous Kamal*
EE 599 – Masters Research: *Jason Bowker, Nihal Shastry*

Fall 2005: EE 492 – Lasers and Photonics
EE 730 – Individual Problems (MS): *Sung Jin Kim*

Spring 2005: EE 494/594 – Consumer Optoelectronics
EE 499 – Independent Study: *Evan Haas, Matthew Watkins*

Fall 2004: EE 492 – Lasers and Photonics
EE 499 – Independent Study: *Evan Haas, Matthew Watkins*
EE 730 – Individual Problems (MS): *Sarojini Ramakrishnan*

Spring 2004: EE 494/594 – Consumer Optoelectronics
EE 499 – Independent Study: *Evan Haas, Chun Ling Lau*
EE 511 – Applied Biophotonics
EE 730 – Individual Problems (MS): *Sharat Chikkerur, Pavan Rudravaram, (PhD) Vamsy Chodavarapu, Gurinder Singh*

Fall 2003: EE 202 – Circuit Analysis I
EE 492 – Lasers and Photonics
EE 730 – Individual Problems (MS): *Swati Agrawal, Preeti Gupta, Pavan Rudravaram, (PhD) William Kirkey*

Spring 2003: EE 511 – Problems in Biomedical Engineering
EE 730 – Individual Problems (MS): *Paul Sweeney*

Fall 2002: Sabbatical

Spring 2002: EE 494/594 – Consumer Optoelectronics
EE 499 – Independent Study: *Ryan LoIacono, Derek Hoiem*
EE 730 – Individual Problems (MS): *Vamsy Chodavarapu, Christian Korner, Priyadarsini, Sreeja Raghunath, (PhD) Xin Li, Zhou Lu*

Fall 2001: EE 492/592 – Lasers and Photonics
EE 499 – Independent Study: *Anthony Guetta*
EE 730 – Individual Problems (MS): *Sreeja Raghanuth, Bill Kirkey*

Spring 2001: EE 494/594 – Consumer Optoelectronics
EE 499 – Independent Study: *Xin Hu*

Fall 2000: EE 492/592 – Lasers and Photonics
EE 499 – Independent Study: *Mark Andrews*
EE 730 – Individual Problems (MS): *Maurice Cheung, Tatsuya Saito, Michael Pan, (PhD) Fei Chen*
UE 151 – Consumer Electronics

Spring 2000: EE 494/594 – Consumer Optoelectronics
EE 499 – Independent Study: *Xin Hu, Daniel Grasso, Carrie Harder*
EE 502 – Individual Problems (MS): *Heng Liu*

Fall 1999: EE 492/592 – Lasers and Photonics
EE 499 – Independent Study: *Xin Hu*
EE 501 – Individual Problems (MS): *Maurice Cheung, Tatsuya Sait, Dai Vu*

Spring 1999: EE 494/594 – Consumer Optoelectronics
EE 499 – Independent Study: *John Choi, Thomas Prunty*
EAS 230 – Higher Level Language (C++)

Fall 1998: ECE 492/592 – Laser Electronics I
ECE 499 – Independent Study: *John Choi, Carrie Harder*
ECE 501 – Individual Problems (MS): *Bovorn Vichiansin, Menq Pan*

Spring 1998: ECE 494/594 – Laser Electronics II
ECE 499 – Independent Study: *Nathan Merkel*
ECE 502 – Individual Problems (MS): *Matthew Blasczak*
EAS 230 – Higher Level Language (C++)
Senior Scholar Research Program: *Dai Vu*

Fall 1997: ECE 492/592 – Laser Electronics I
ECE 499 – Independent Study: *Nathan Merkel*
ECE 502 – Individual Problems (MS): *Matthew Blasczak*

Spring 1997: ECE 499 – Independent Study: *Michael S. Albright, Matthew D. Blasczak, Jonathan Drury, Keith P. Nowicki, Menq J. Pan, Christopher C. Striemer*
ECE 502 – Individual Problems (MS): *Christian H. Wengerter*
ECE 586 – ECE Graduate Seminar
EAS 230 – Higher Level Language (C++)

Fall 1996: ECE 494/594 – Laser Electronics II
ECE 499 – Independent Study: *Michael S. Albright, Harold M. Gill, Keith P. Nowicki, Ross S. Padak, Menq J. Pan, Christopher C. Striemer*
ECE 502 – Individual Problems (MS): *Christian H. Wengerter*
ECE 585 – ECE Graduate Seminar

Spring 1996: ECE 492/592 – Laser Electronics I
ECE 586 – ECE Graduate Seminar
ECE 499 – Independent Study: *Ross S. Padak, Matteo Anello*
ECE 502 – Individual Problems (MS): *Sundari Nagarathnam*
ECE 602 – Individual Problems (PhD): *Hyesook Hong*

Fall 1995: ECE 202 – Circuit Analysis I

ECE 499/EE499: Undergraduate independent Study: These projects range from programming applications for the laboratory to the design and implementation of experimental apparatus.

Research Supervision:

Postdoctoral Researchers

None at this time.

Previous Postdoctoral Researchers

Sung Jin Kim: Responsible for Ultrafast Spectroscopy, and Solar Cell Fabrication and Characterization.

Maurice Cheung: Optical Properties of Wide Bandgap III-nitrides, Zinc Oxide and III-N/Zinc Oxide Heterostructures.

Fei Chen, Primary Responsibility: Ultrafast Spectroscopy of III-N Materials and Devices.

Hans Andreas Nickel, Primary Responsibility: CAPEM/MRIF Ultrafast Laser Facility.

Current PhD Students (expected graduation date listed)

February 2015 – Tania Moein, *"Metamaterials: Enhancing Efficiency of Photovoltaics"*

May 2015 – Joseph Murphy, *"Ultrafast dynamics in Semiconductor Laser Nanostructures"*

May 2015 – Tianmu Zhang, *"Ultrafast dynamics in Semiconductor Quantum Dots"*

Graduated PhD Students

May 2014 – Xi Wang, *"Metamaterials on Fibers: Nanofabrication for Optical Applications"*

September 2013 – Bin Zhou, *"Optical Properties of DNA Biomaterial and Application to UV-Photoconductors"*

September 2012 – Huina Xu, *"Optically Selevtive Nanostructures and the Optical Sensing Applications"*

September 2012 – Ke Liu, *"Graded Photonic Bandgap Structures and Applications"*

September 2012 – Prateek Sharma, *"EMCCD Based X-Ray Imaging System"*

September 2011 – Bin Qu, *"EMCCD Based X-Ray Imaging System"*

May 2011 – DongHo Lee, *"Low Cost Solution Based Solar Cells"*

September 2008 – Sung Jin Kim, "*Nanostructured Devices for Next Generation Photovoltaics"*

December 2007 – Ram Thapa, *"Hybrid Inorganic: Organic Light-emitting Diodes: Fabrication and Characterization"*

September 2007 – Zhou Lu, *"E-Beam Lithography of Nanoscale Structures for Sensors"*

September 2007 – Daniel Kaputa, *"Optical Trapping, Delivery, and Imaging of Nanoparticles in Cells"*

February 2007 – Maurice Cheung, "*Development of Visible and UV Devices Using Alternative Substrates*"

September 2006 – Vamsy Chodavarapu, *"Integrated CMOS Photonic Sensor Systems for In-Vivo Monitoring of Biomarkers"*

September 2005 – Paul Sweeney "*Piezoelectricity and Indium Segregation in III-Nitride Heterostructure Devices*"

September 2005 – Vincent Hsiao, "*Composite Nanostructured Liquid Crystals for Optical Switching*"

September 2004 – Fei Chen, "*Ultrafast spectroscopy of InN epilayers and InGaN/GaN Heterostructures*"

February 2004 – Madalina Furis, *"Time-Resolved Photoluminescence Spectroscopy of Nitride Emitters"*

September 2003 – Heng Liu, *"Phase Reconstruction of Phase Shifted Moiré Interferograms Using Continuous Wavelet Transforms"*

February 2001 – Ying Zhao, *"Thermomechanical Behavior of Ball Grid Array Solder Joints Under Thermal and Vibration Loading: Testing and Modeling"*

Current Masters Students

None at this time.

Graduated Masters Students

February 2008 – Elizabeth Nio, non-thesis option, researched on holographic polymeric photonic bandgap structures.

June 2007 – Dae Yu Kim, "*Design of CCD and EMCCD Sensors Readout Circuitry for Digital X-ray Imaging.*"

September 2006 – Jason Bowker, "*The Fabrication of a Linear Polarizer and an Angle Dependant Reflection Grating by means of Holographic Lithography*."

September 2006 – Nihal Shastry, "*Sigma Delta A/D Modulator Design for Soc Implementation of a Glucose Biosensor*."

September 2005 – Rana Bhowmick, *"An Integrated CMOS Optical Detector for Chemical and Biological Sensors."*

August 2005 – Sarojini Ramakrishnan, *"Reflectance Spectroscopy of Skin and application in Skin Biometry."*

August 2005 – Preeti Gupta, *"Photonic Crystal Based Optical Circuitry."*

June 2005 – Gurinder Singh, *"Ultrafast Spectroscopy Core-shell and Hybrid Quantum Well-quantum Dot Heterostructures."*

June 2005 – Sharat Chikkerur, *"Online Fingerprint Verification System."*

February 2005 – Preeti Joshi, *"A Wireless Sensor Network using Multiple Protocols."*

September 2004 – Bhanu S. Nandamuri, *"Data Acquisition and Processing using MPLAB."*

April 2004 – Emmanuel T. Nishanth, *"Detection of Proteins Using an Evanescent Wave Fiber Optic Sensor: Application to signal Transducers and Activators of Transcription 3 (STAT3)."*

September 2003 – Sreeja Raghanuth, *"Real-Time Adaptive Alignment of Free-Space Optical Interconnects for Integrated Circuits."*

February 2003 – Vamsy Chodavarapu, "*Photonics Simulations using Java."*

February 2003 – Christian Körner, "*Intraband Lasers for Communications."*

September 2002 – Michael Pan, *"Organic Light Emitting Diodes."*

February 2002 – Menq Pan, Project, "*Reflection and Differential Reflection Measurements of III-N Heterostructures*."

September 2001 – Pratibha Gopalam, "*Frameworks for Java™ Simulation Tools and E-Laboratories.*"

June 2001 – Heng Liu, Project, "*PhaseShifting Moiré Interferometry for Electronic Packaging.*"

June 2001 – Matthew Blasczak, Masters Thesis, "*An Experimental Whole Field Ultrafast Interferometric Technique for Nondestructive Evaluation and Material Characterization.*"

June 2001 – Tatsuya Saito, Project, *"CW Photoluminescence of III-N Materials."*

December 2000 – Maurice Cheung, "*Numerical Monte Carlo Simulations of III-N Heterostructures*."

June 2000 – David Vu, "*Image Processing to Enhance and Automate Determination of Strain in Electronic Packaging.*"

December 1999 – Paul Sweeney, Non-thesis option to continue for PhD

August 1997 – Christian H. Wengerter, "*Differential Reflection Measurements of Quantum Well Structures for Optical Modulators*."

Current Supported Research Assistants

Tania Moein (PhD), Joseph Murphy (PhD), Tianmu Zhang (PhD).

Graduate Committees

February 2016 – Dengxin Ji (Electrical Engineering, PhD)
August 2014 – Jinwei Zeng (Electrical Engineering, PhD)
December 2013 – Swetadri Vasan Setlur Nagesh, (Electrical Engineering, PhD)
May 2013 – Apra Pandey, (Electrical Engineering, PhD)
May 2013 – Fatema Alali, (Electrical Engineering, PhD)
May 2012 – Ethan Gibson, (Electrical Engineering, PhD)
August 2011 – Vincent Whiteside, (Physics, PhD)
August 2011 – Kangsun Lee, (Electrical Engineering, PhD)
August 2011 – Ying Huang, (Electrical Engineering, PhD)
May 2011 – Bicheng Chen, (Civil, Structural and Environmental Engineering, PhD)
September 2010 – Wing Cheung Law, (Electrical Engineering, MS)
September 2008 – Chinmay Joshi, (Electrical Engineering, MS)
September 2008 – Yili Quan, (Electrical Engineering, PhD)
June 2007 – Jong-Uk Bae, (Electrical Engineering, MS)
September 2006 – Bhanu Jaiswal, (Electrical Engineering PhD)

September 2006 – Sirisha Karri, (Electrical Engineering PhD)
September 2005 – Cibu Jose, (Electrical Engineering, MS)
September 2005 – Gaurav Puri, (Electrical Engineering, MS)
September 2005 – Harishankar Jayakumar, (Electrical Engineering, MS)
June 2005 – Kiriti Bhagavathula, (Electrical Engineering, MS)
February 2005 – Arunkumar Vedavyasan, (Electrical Engineering, MS)
February 2005 – Michael Davenoport, (Electrical Engineering, PhD)
February 2005 – Massoud Momeni, (Electrical Engineering, MS)
February 2005 – Shwetha Shekar, (Electrical Engineering, MS)
September 2004 – Pavan Kumar Rudravaram, (Computer Science & Engineering, MS)
September 2004 – Shubhrangshu Sengupta, (Electrical Engineering, MS)
June 2004 – Hua Ye, (Civil, Structural and Environmental Engineering, PhD)
September 2003 – Supriya P. Khanolkar, (Electrical Engineering, MS)
September 2003 – Lihong Teng (Electrical Engineering, PhD)
February 2003 – Hong Tang, (Civil, Structural and Environmental Engineering, PhD)
February 2003 – Ye Pu (Mechanical Engineering, PhD)
September 2002 – Jin-Hyuk Jeung (Electrical Engineering, MS)
August 2001 – Shu-Zee Lo (Electrical Engineering, MS)
February 2001 – Tao Tang (Electrical Engineering, MS)
December 2000 – Zhiyong Yuan, (Electrical Engineering, MS)
December 2000 – Bryan Mihalick (Chemical Engineering, MS)
August 2000 – MiRan Park (Electrical Engineering, PhD)
June 2000 – Elena Guliants (Electrical Engineering, PhD)
August 1997 – Boguslaw Swedek (Chemistry PhD)
July 1997 – Gary Edgar Ruland (Chemistry PhD)
February 1997 – Jens Christoph Egerer (Electrical and Computer Engineering, MS)
May 1996 – Seong-Ryong Ryu (Physics PhD)

Undergraduate Students

Supervised undergraduate students that included eight NASA scholarships winners, one NSF Graduate Research Fellowship winner, two Department of Defense Graduate Fellowship winners, and three Presidential Fellowship winners, and ten Senior Scholars. Topics have included and will include (listed as: **student name**, title of work, funding source, and research period, associated fellowship either for the work or due to the work):

1) **Tara Feuerstein**, "*Development of Nanophotonic Demonstration Modules*," NSF, Summer Research Program, Summer 2010.
2) **Cecilia Simon**, "*Development of Nanophotonic Demonstration Modules*," NSF, Summer Research Program, Summer 2010.
3) **Erin Jacklin**, *"Flexible Photonic Bandgap Structures for Sensing Applications,"* NIH Summer Research Program, Summer 2009.
4) **Claire Lochner**, *"Flexible Solar Cells,"* Honors Program, Fall 2008.
5) **Rene Van Ee**, SUNY Louis Stokes Alliance for Minority Participation, Summer 2007.
6) **Jamar Drue**, SUNY Louis Stokes Alliance for Minority Participation, Summer 2007.
7) **Aggery Jacobs**, "*Development and Testing of Data Acquisition and Analysis Software*," SUNY Louis Stokes Alliance for Minority Participation, Fall 2006, Spring 2007.
8) **Akinbode Oluwaseyi**, "*Photoluminescence of Zinc Oxide*," SUNY Louis Stokes Alliance for Minority Participation, Summer 2006.

9) **Hanan Basat**, *"Quantum Efficiency and Quantum Yield Measurements of Nanoparticles,"* SUNY Collegiate Science and Technology Entry Program, Spring 2006.
10) **Lai Cheung**, *"Quantum Efficiency and Quantum Yield Measurements of Nanoparticle,"* SUNY Collegiate Science and Technology Entry Program, Spring 2006.
11) **Ebow Cobbina**, *"Readout Interfaces for Integrated Sensors Systems,"* SUNY Collegiate Science and Technology Entry Program, Spring 2006.
12) **Jose Caraballo**, "*Readout Interfaces for Integrated Sensors Systems*," SUNY Louis Stokes Alliance for Minority Participation, Fall 2005.
13) **Erin Hopkins**, *"Tailoring Polymeric Photonic Bandgap Devices for Biosensing Applications,"* NASA Undergraduate Research Scholarship, Fall 2005.
14) **Mark Cianchetti**, *"E-Beam Lithography,"* NSF Sponsored Summer Research Experience for Undergraduates, Summer 2005.
15) **Zachary Lochner,** *"Electron Beam Nanolithography,"* NSF Sponsored Summer Research Experience for Undergraduates, Summer 2005.
16) **Nicholas Robinson**, *"Readout Interfaces for Integrated Sensor Systems,"* NSF Sponsored Summer Research Experience for Undergraduates, Summer 2005.
17) **Bizzy Abis ola Abdullai,** *"Optical Sensor for Oxygen Detection,"* SUNY Louis Stokes Alliance for Minority Participation, Summer 2005.
18) **Evan Haas**, *"Biologically Inspired Smart Sensor System (BIS^3) for Health Monitoring*," NASA Undergraduate Fellowship, Fall 2003 - Summer 2004.
19) **Aaron Vallet**, *"Nanoparticle-polymer light emitting diodes,"* NSF Sponsored Summer Research Experience for Undergraduates, Summer 2004.
20) **Matthew Watkins**, *"Creating hybrid organic-inorganic InP quantum dot LED devices*," NSF Sponsored Summer Research Experience for Undergraduates and NASA Undergraduate Scholarship, Summer 2003.
21) **Paul Couchman**, *"Hybrid Materials and Devices,"* NASA Undergraduate Scholarship, Fall 2002 – Spring 2003.
22) **Helen Shibru**, *"Measuring the bandgap energy of III-N Heterostructures using Reflectance Spectroscopy,"* NSF Sponsored Summer Research Experience for Undergraduates, Summer 2003
23) **Anthony Guetta,** *"Simulation of Carrier Dynamics in III-N Materials,"* NASA Undergraduate Scholarship, Fall 2001 – Spring 2002 (NSF Graduate Fellowship).
24) **Kerry Courtright**, *"Java Applet Development,"* NSF Research Experience for Undergraduates, Spring 2002.
25) **Xin Hu**, *"Molecular Dynamics Simulation of Growth of III-N Materials,"* NASA Undergraduate Scholarship, Spring 2001 (NSF Graduate Fellowship).
26) **Mark Andrews**, *"Development of Laser System for Photoluminescence of III-N Heterostructures*," NASA Undergraduate Scholarship and NSF Research Experience for Undergraduates, Fall 2000 – Spring 2001 (NSF Graduate Fellowship).
27) **Xin Hu**, *"Control and Data Acquisition using Labview,"* NSF Research Experience for Undergraduates, Fall 2000.
28) **Stanley Bileschi**, *"Microphotoluminescence of III-N Heterostructures*," School of Engineering and Applied Sciences Senior Scholarship, Fall 1999 – Spring 2000.
29) **Daniel Grasso**, *"Monte Carlo Simulations of III-N Heterostructure Devices,"* School of Engineering and Applied Sciences Senior Scholarship, Fall 1999 – Spring 2000.

30) **Carrie Harder**, *"Reflection and Transmission of III-N Materials,"* NASA Undergraduate Scholarship and School of Engineering and Applied Sciences Senior Scholarship, 2000 (NSF Graduate Fellowship).
31) **Filipe Mora**, *"Optical Properties of GaN Based Materials,"* State University of New York Louis Stokes Alliance for Minority Participation, Summer 1999.
32) **John Choi**, *"GaN based Spatial Light Modulators,"* NASA Undergraduate Scholarship and School of Engineering and Applied Sciences Senior Scholarship, Fall 1998 – Spring 1999 (National Defense Science and Engineering Graduate Fellowship).
33) **Carrie Harder**, *"Microcontrolled Beam Profiler,"* NSF Research Experience for Undergraduates, Carrie Harder, Fall 1999 – Summer 2000.
34) **Nathan Merkel**, *"Ultrafast Imaging of Bonding Interfaces,"* NASA Undergraduate Scholarship and School of Engineering and Applied Sciences Senior Scholarship, Fall 1997 – Spring 1998.
35) **Dai Vu**, *"Laser Applications in Microelectronic Fabrication,"* School of Engineering and Applied Sciences Senior Scholarship, Spring 1998.
36) **Christopher Striemer,** *"Time-resolved Frequency Upconversion,"* NASA Undergraduate Scholarship and NSF Research Experience for Undergraduates, Fall 1996 – Spring 1997 (National Defense Science and Engineering Graduate Fellowship).
37) **Matthew Blasczak**, *"Fourier Optics and Imaging,"* School of Engineering and Applied Sciences Senior Scholarship, Fall 1996 – Spring 1997 (University at Buffalo Presidential Fellowship).
38) **Michael Albright**, *"Data Acquisition and System Control Software*, NASA Undergraduate Scholarship and School of Engineering and Applied Sciences Senior Scholarship, Fall 1996 – Spring 1997 (University at Buffalo Presidential Fellowship).
39) **Menq Pan**, *"Java Educational Applet Programming,"* NASA Undergraduate Scholarship, Fall 1996 – Spring 1997.
40) **Ross Padak,** *"C++ and Java Programming,"* Fall 1997.
41) **Jon Drury,** *"C++ and Java Programming,"* Fall 1997.
42) **Keith Nowicki,** *"C++ and Java Programming,"* Fall 1997.
43) **Matthew Matteo,** *"C++ and Java Programming,"* Fall 1996.

Current Undergraduate Students

None at this time.

Placement of Students

Graduate Students

Xi Wang, Postdoctoral Fellow, University of California Berkeley, Berkeley, CA
Prateek Sharma, Design Engineer, Itron Incorporated, West Union, SC
Huina Xu, Application Development Engineer, KLA-Tencor, Milpitas, CA
Ke Liu, RF System Application Engineer, Litepoint, Sunnyvale, CA
Dong Ho Lee, Samsung Electronics, Seoul, South Korea
Bin Qu, Animage LLC, Pleasanton, CA
Sung Jin Kim, Assistant Professor, University of Miami, Miami, FL
Maurice Cheung – Post-doc, McGill University, Montreal, Canada
Ram Thapa, Post-doc, The University of Texas – Pan American, Edinburg, TX

Elizabeth Nio, Solar Cell Test Engineer, Stion Corporation, San Jose, CA
Zhou Lu, Engineer, Panasonic, Boston, MA
Daniel Kaputa, Signal Analyst, Moog, Buffalo, NY
Nihal Shastry, PDK Development Engineer, Simucad, Santa Clara, California
Vamsy Chodavarapu, Assistant Professor, McGill University, Montreal, Canada
Vincent Hsiao, Associate Professor, Department of Applied Materials and Optoelectronic Engineering, National Chi Nan University, Taiwan
Sarojini Ramakrishnan, Qualcomm Incorporated, San Diego, California.
Fei Chen, Optical Engineer, Lexmark, Lexington, KY
Michael Pan, Army Research Laboratory, Space and Missile Defense Command, Huntsville, Alabama.
Madalina Furis, Assistant Professor, Dept. of Physics, University of Vermont
Sreeja Raghanuth, Southern California Institute of Technology at Anaheim, California
Heng Liu, KLA-Tencor, San Jose, California
Priyadarsini Krishnan, MBA Candidate - Class of 2008, Kellogg School of Management Northwestern University
Sundari Nagarathnam, Cypress Systems, Minneapolis, Minnesota
Christian Wengerter, Panasonic R&D Center, Germany
Matthew Blasczak, Symbol Technologies, Long Island, NY
Pratibha Gopalam, Philips Research India, India
Dai Vu, Anderson Consulting
Menq Pan, self-employed
Ying Zhao, Sr. Reliability Engineer, Analog Devices, Norwood, MA

Undergraduate researchers currently pursuing PhDs at other Institutions:

Claire Lochner, 2011 Graduate, UC Berkely, NSF Fellowship
Erin Jacklin, 2011 Graduate, Columbia, SMART Fellowship
Both PhD Candidates

Undergraduate researchers who were awarded PhDs at other Institutions:

Amy Turner, 2009, NSF Graduate Research Fellowship Award, Senior Scholar Award, and Presidential Fellowship, PhD Candidate, Cornell University, Advisor: Michal Lipson.
Stanley Bileshi, 2000 National Science Foundation Graduate Fellow, PhD 2006, Massachusetts Institute of Technology.
John Choi, 1999 DOD Graduate Research Fellow, PhD 2007, CalTech University, Advisor: Amnon Yariv.
Carrie Harder, 2001 National Science Foundation Graduate Fellow, PhD 2007, University of Dayton.
Daniel Grasso, PhD 2005, University of Illinois, Advisor: Kent Choquette.
Xin Hu, 2001 NSF Graduate Fellowship, PhD 2006, Massachusetts Institute of Technology.
Thomas Prunty, PhD 2006, Cornell University, Advisor: Prof. J. R. Shealy.
Christopher Striemer, 1998 DOD Graduate Research Fellow, PhD, University of Rochester, Advisor: Philippe Fauchet.

Intellectual Property

Patents

1. "Photonic Bandgap Structures for Multispectral Imaging Devices," Q. Gan, A. Cartwright, K. Liu and H. Xu, ed: WO Patent 2,013,066,606, 2013.
2. "Temporally Addressable Detection Array," Albert H. Titus, Frank V. Bright, Alexander N. Cartwright, Patent No.: US 8,501,098, August 6, 2013.
3. "Sensor and method of sensing having an energy source and detector on the same side of the sensor substance," Albert H. Titus, Frank V. Bright and Alexander N. Cartwright, Patent No.: US 7,897,108 B1, Mar. 1, 2011.
4. "PH-Change Sensor and Method," Vamsy P. Chodavarapu, Alexander N. Cartwright, Albert H. Titus, Rachel M. Bukowski, Frank V. Bright, Patent No.: US 7.794,584 B2, Sep. 14, 2010.
5. "Method for Diagnosis of Physiological States by Detecting Patterns of Volatile Analytes," F. Bright, A. Cartwright, V. Govindaraju, W. Hicks and A. Titus, ed: WO Patent 2,008,121,183, 2008.
6. "Resorbable Laminated Repair Film and Method of Using Same," W. L. Hicks, Jr., Rena Bizios, Frank V. Bright, Joseph A. Gardella, Jr., Robert Hard, Jamson S. Lwebuga-Mukasa, Alexander N. Cartwright, Bahattin Koc, US Patent No.: US 7,417,174 B2, Aug. 26, 2008.

Companies Licensing / Developed Technology

1. Solexant, 2385 Bering Dr., San Jose, CA 95131, USA
2. Senz-IT Technology, 4340 Von Karman, Suite 200, Newport Beach, CA
3. TheraSyn-DM, Buffalo, NY

Publications and Presentations

Invited Presentations

1. A.N. Cartwright, B.L. Fredette, A.M. Podolefsky, D.L. Trump, Member of Panel on "Innovation in Education: The Cornerstone of Tomorrow's Leaders," Buffalo, NY, 30 May, 2012
2. A.N. Cartwright, E. Krentsel, M. Dwyer, K. Parysek, Member of Panel on "Best Practices in Corporate Sponsored Research," Partners in Open Innovation – Best Practices in University-Startup-Corporate Relations, 2012 Venture Forum, University at Buffalo, Buffalo, NY, 16 May, 2012
3. A.N. Cartwright, S.J. Kim, Carrie Bartsch, Emily Heckman, "Photoresponse of DNA biopolymers," paper 7765-13, Nanobiosystems: Processing, Characterization, and Applications III, SPIE Annual Meeting, San Diego, CA, 01-05 August, 2010.
4. A.N. Cartwright, "Nanoimaging," The International Workshop on "Bioimaging Technologies for Enhanced Healthcare", Vancouver, BC, 24-25 April, 2010.

5. A.N. Cartwright, "Nanostructured Materials for Enhanced Optical Sensing," paper 7553-29, Frontiers in Pathogen Detection: From Nanosensors to Systems, SPIE Photonics West 2010 Conference, San Jose, CA, 23-28 January, 2010.
6. A.N. Cartwright, "Biochemical Sensing: From Nanomaterials to Signal Processing," Centre for Applied Mathematics in Bioscience and Medicine, McGill University, Montreal, Canada, December 3, 2009.
7. A.N. Cartwright, "Development of Novel Flexible Nanostructured Solar Cells," American Solar Energy Society National Solar Conference, Buffalo, NY, 11-16 May, 2009.
8. A.N. Cartwright, S-J. Kim, W-J. Kim, J.W. Seo, F. Erogbogbo, M.T. Swihart, and P.N. Prasad, "Photopatterned Semiconductor Nanocrystal Films for Photovoltaics," paper O1.3, Materials Research Society Spring Meeting 2009, San Francisco, CA, 10-16 April, 2009.
9. A.N. Cartwright, "Hybrid Inorganic:Organic Photovoltaics," Crossborder Workshop on Laser Science, Cornell University, Ithaca, NY, 16-18 June, 2008.
10. A.N. Cartwright, "Optical Chemical and Biological Sensor Systems," IT Collaboratory Annual Workshop, Rochester Institute of Technology, Rochester, NY, 14 April, 2008.
11. A.N. Cartwright, "Hybrid Inorganic:Organic Photovoltaics," Department of Physics, Rochester Institute of Technology, Rochester, NY, 14 April, 2008.
12. S.J. Kim, V.P. Chodavarapu, A.H. Titus, F.V. Bright, V. Govindaraju, A.N. Cartwright, "CMOS Chemical and Biochemical Sensors using Nanostructured Materials," IEEE LEOS Summer Topical Meetings, Portland, 23-25 July 2007.
13. A.N. Cartwright, "Organic and Hybrid Materials and Devices for Energy Harvesting," University of Vermont, Burlington, VT, 18 April 2007.
14. A.N. Cartwright, "Optical Chemical and Biological Sensor Systems," Rensselaer Polytechnic Institute, 3 March 2007.
15. A.N. Cartwright, "Nanostructured Porous Polymeric Photonic Bandgap Structures for Sensing," paper 6447-24, SPIE Photonics West 2007 Conference, San Jose, CA, 20-25 January 2007.
16. A.N. Cartwright, M.C. Cheung, O.W. Akinbode, Univ. at Buffalo; T. Murphy, K. Moazzam, J.D. Phillips, W.C.T. Lee, P. Miller, C. Swartz, S.M. Durbin, R.J. Reeves, T. H. Myers, J.W. Dong, A.V. Osinsky, "Ultrafast spectroscopy in ZnO," paper 6474-28, SPIE Photonics West 2007 Conference, San Jose, CA, 20-25 January 2007.
17. A.N. Cartwright, "Tunable Porous Photonic Bandgap Structures For Chemical and Biological Sensing," SPIE Optics and Photonics 2006 Annual Conference, San Diego, CA, 13-17 August 2006.
18. A.N. Cartwright, "Hybrid Nanostructured Materials for Solar Cells," 3rd US-Korea Workshop on Nanoelectronics, Los Angeles, CA, 8-9 August 2006.
19. A.N. Cartwright, "Ultrafast Carrier Dynamics in III-N Materials," 2006 Materials Research Society Spring Meeting, Solid State Lighting Symposium, San Francisco, CA, 17-21 April 2006.
20. A.N. Cartwright, "Hybrid Nanostructured Materials for Solar Cells," 3rd Annual US-Korea Workshop on Nanoelectronics, Los Angeles, CA, 8-9 April 2006.

21. A.N. Cartwright, "CMOS-based Biosensor System Using Integrated Nanostructured Recognition Elements,**"** SPIE Photonics West 2006 Conference, San Jose, CA, 21-26 January 2006.
22. A.N. Cartwright, "Optical Nanofabrication of Photopolymer Based Photonic Bandgap Structures: Materials and Applications," NATO-ASI, Orford, Quebec, Canada, 19-29 September 2005.
23. A.N. Cartwright, "Organic Solvent Vapor Sensing using Porous Photopolymer Photonic Bandgap Structures," paper 5926-20, Tuning the Optical Response of Photonic Bandgap Structures II, SPIE Annual Conference, San Diego, CA, 31 July-4 August 2005.
24. A.N. Cartwright, "Ultrafast Carrier Recombination and Transport in III-N Materials," 2nd US-Korea Workshop on Nanoelectronics, Seoul, Korea, 25-26 April 2005.
25. A.N. Cartwright, "Ultrafast Carrier and Transport Dynamics in III-N Materials," University at Albany, State University of New York, Albany, NY, 25 March 2005.
26. A.N. Cartwright, "Carrier Recombination and Transport in III-N Materials," University of Notre Dame, South Bend, IN, 15 March 2005.
27. A.N. Cartwright, "Time-resolved Spectroscopy in GaN Based Devices," Second International Conference on Advanced Materials and Nanotechnology, Queenstown, New Zealand, 6-11 February 2005.
28. A.N. Cartwright, F. Chen, H. Lu, W.J. Schaff, "Time-resolved Spectroscopy of Recombination and Relaxation Dynamics in InN," paper 5725-60, SPIE Photonics West '05 International Symposium on Ultrafast Phenomena in Semiconductors and Nanostructure Materials IX, Optoelectronics, SPIE Photonics West Conference, San Jose, CA, 22-27 January 2005.
29. A.N. Cartwright, "Ultrafast Processes in III-N Nanostructures," University of Michigan, WIMS, Ann Arbor, Michigan, 2 November 2004.
30. A.N. Cartwright, "Integrated Biosensors," NATO Advanced Institute in Biophotonics, Biophotonics – from Fundamental Principles to Health, Environment, Security and Defense Applications, Ottawa, Canada, 29 September – 9 October 2004.
31. A.N. Cartwright, "Temporal Resolution of Carrier Dynamics and Transport in III-N Epilayers and Heterostructures," Workshop on Nanoscale Issues Nitride Semiconductors, Anchorage, AK, 22-25 August 2004.
22. A.N. Cartwright, "Nitride Luminescence," ONR Electronic Materials Division, Monterey, CA, 1-4 August 2004.
23. A.N. Cartwright, "Holographic Writing of Gratings for Nanophotonics," Liquid Crystal Technology and Applications Conference, Great Lakes Photonics Symposium, Cleveland, OH, 7-11 June 2004.
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Journal Articles

(NOTE: IN THIS FIELD, AUTHORS ARE LISTED BY INSTITUTION WITH PROFESSORS LISTED LAST FOR THEIR INSTITUTION. THE INSTITUTION THAT CONTRIBUTES THE MOST IS LISTED FIRST.)

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4. A.N. Cartwright, T. M. Cooper, S. P. Karna, H. Nakanishi, and Editors, *Organic and Nanocomposite Optical Materials. (Symposium held 28 November-3 December 2004 in Boston, Massachusetts.) [In: Mater. Res. Soc. Symp. Proc.; 2005, 846]*, (2005).
5. A.N. Cartwright, M. Osinski, and Editors, Nanobiophotonics and Biomedical Applications II. (Proceedings of the SPIE International Conference held 24-27 January 2005 in San Jose, California.) *[In: Proc. SPIE-Int. Soc. Opt. Eng.; 2005, 5705],* (2005).
6. A.N. Cartwright, T. Cooper, S. Karna, H. Nakanishi, "Organic and Nanocomposite Optical Materials," (Proceedings of the Materials Research Society 2004 Annual Meeting held 28 November – 3 December 2004 in Boston, MA) *[In: Mater. Res. Soc. Symp. Proc.; 2005, 846]* (2005).
7. A.N. Cartwright, "Proceedings of SPIE - Nanobiophotonics and Biomedical Applications," Proceedings of SPIE - The International Society for Optical Engineering Progress in

Biomedical Optics and Imaging - Nanobiophotonics and Biomedical Applications, **5331** 148p (2004).

8. D.L. Andrews, Z. Gaburro, A.N. Cartwright, and C.Y.C. Lee, "Proceedings of SPIE: Nanocrystals, and Organic and Hybrid Nanomaterials," Proceedings of SPIE - The International Society for Optical Engineering, **5222** 183 (2003).

Workshop Participation

1. National Science Foundation Case Studies in Science Workshop, Buffalo, NY, Summer, 1998.
2. American Society Engineering Education/National Science Foundation Visiting Scholars Teaching Workshop focusing on Collaborative Learning, Buffalo, NY, February 1998.
3. National Science Foundation Sponsored: *Applied Optics for College Teachers* workshop focusing on optical methods including Moiré, Speckle, Holographic interferometry and Photoelasticity, Oakland University, Rochester, MI, August 1997.
4. National Science Foundation Sponsored *Women in Science Curriculum Reform Institute*, University of Wisconsin at Oshkosh, June 1997.

Short Courses

1. A.N. Cartwright, P.N. Prasad, "Organic Nanophotonics – Materials and Applications," Materials Research Society Fall Meeting, Boston, MA, November 29, 2004.

Internal University at Buffalo Presentations

1. A.N. Cartwright, Department of Chemistry, University at Buffalo, State University of New York, "Ultrafast Carrier Dynamics in III-N Based Heterostructures & Devices," February 15, 2006.
2. A.N. Cartwright, Department of Surgery, University at Buffalo, Faculty Development Retreat, "Engineering Applications (Devices, Sensors, and Haptics): Research Opportunities for UB Surgeons, March 2004.
3. A.N. Cartwright, Center for Unified Biometrics and Sensors, Guest Lecturer for General Dynamics Corp. presentation, Vice President for Special Projects and Programs, State University of New York at Buffalo, Buffalo, NY, November 2003.
4. W.D. Kirkey, M. Pan, A.N. Cartwright, and X. Li, Y. He, M.T. Swihart, and Y. Sahoo, P.N. Prasad, "Photoluminescence Characterization of Silicon Nanoparticles," Defense University Research Initiative on Nanotechnology Annual Meeting, 2002.
5. A. Patra, P.N. Prasad, C.S. Friend, T.C. Lin, R. Burzynski, M. Pan, A.N. Cartwright, "Electroluminescence Properties of Systematically Derivatized Organic Chromophores Containing Electron Donor and Acceptor Groups," Defense University Research Initiative on Nanotechnology Annual Meeting, 2002.
6. D.J. MacRae, Y. Sahoo, P.N. Prasad, M. Furis, A.N. Cartwright, F.S. Manciu and B.D. McCombe, "An Alternate Approach to the Synthesis of Gallium Phosphide (GaP) Nanocrystals," Defense University Research Initiative on Nanotechnology Annual Meeting, 2002.

7. M. Furis, A.N. Cartwright, F.S. Manciu, B.D. McCombe, Y. Sahoo, D.J. MacRae, P.N. Prasad, "Challenges in Nanochemistry Route to GaP Nanoparticles," Defense University Research Initiative on Nanotechnology Annual Meeting, 2002.
8. F.S. Manciu, B.D. McCombe, Y. Sahoo, D.J. MacRae, P.N. Prasad, M. Furis, A.N. Cartwright, "Chemical Preparation and Infrared Spectroscopy of GaP Nanoparticles," Defense University Research Initiative on Nanotechnology Annual Meeting, 2002.
9. A.N. Cartwright, "From EE Education to Gallium Nitride Heterostructures," Electrical Engineering Departmental Graduate Seminar, April 2000.
10. A.N. Cartwright, "Piezoelectricity in III-N Materials," Center for Advanced Photonics and Electronic Materials Seminar, March 2000.
11. A.N. Cartwright, "Blue/Green Optoelectronics," Center for Advanced Photonics and Electronic Materials Seminar, May 1999.
12. A.N. Cartwright, "Blue/Green Optoelectronics," Electrical Engineering Departmental Graduate Seminar, March 1999.
13. A.N. Cartwright, Sundari Nagarathnam, "Comparison of Photodegradation in Single and Asymmetric Coupled ZnSe/ZnCdSe Quantum Wells," CAPEM Semiconductor Group Seminar, 1997.
14. A.N. Cartwright, "Electrical and Computer Engineering," EAS140 Presentation on Electrical and Computer Engineering, School of Engineering and Applied Sciences, State University of New York at Buffalo, Buffalo, NY, September 1997.
15. A.N. Cartwright, "Ultrafast Photonics," ECE Senior Seminar, Department of Electrical and Computer Engineering, State University of New York at Buffalo, Buffalo, NY, September 1997.
16. A.N. Cartwright, "Time Resolved Laser Spectroscopy," Guest Lecturer for ECE 509, "Characterization, Phenomena and Packaging of Compound Semiconductors," Electrical and Computer Engineering, State University of New York at Buffalo, Buffalo, NY, February and March 1997.
17. A.N. Cartwright, "Ultrafast Photonics," Chemistry Graduate Seminar, Department of Chemistry, State University of New York at Buffalo, Buffalo, NY, February 1997.
18. A.N. Cartwright, "Ultrafast Lasers," ECE Senior Seminar, Electrical and Computer Engineering, State University of New York at Buffalo, Buffalo, NY, October 1996.
19. A.N. Cartwright, "Ultrafast Lasers," ECE Graduate Seminar, Electrical and Computer Engineering, State University of New York at Buffalo, Buffalo, NY, October 1995.