

# Curriculum Vitae

**Gregory P. Nordin**

Professor  
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Electrical & Computer Engineering Department  
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## Research Activities and Interests

Biological and chemical sensors, microfluidics, 3D printing for microfluidics, micro- and nanofabrication, nanophotonics and integrated optics, MEMS, rigorous electro-magnetic analysis and design of photonic structures, electro-optics, diffractive and holographic optical elements, and polymer materials and devices.

## Academic History

### Summary

|                |                                   |                        |      |
|----------------|-----------------------------------|------------------------|------|
| BS (cum laude) | Brigham Young University          | Physics                | 1984 |
| MS             | UCLA                              | Physics                | 1986 |
| PhD            | University of Southern California | Electrical Engineering | 1992 |

### Scholarships and Fellowships

Presidential Scholarship (BYU)  
John Einar Anderson Scholarship (BYU)  
Elvira S. Barrett Scholarship (BYU)  
Hughes Aircraft Company Masters Degree Fellowship, 2 years (UCLA)  
Hughes Aircraft Company Doctoral Fellowship, 6 years (USC)  
Center for Photonic Technology Prize Fellowship (USC)

## Honors and Awards

- NSF CAREER Development Award, 1996-2001
- UAH Outstanding Researcher Award, 1998-1999
- UAH Outstanding Researcher Award, 1999-2000
- UAH Foundation Award for Research and Creative Achievement, 2000
- Founding Director, Nano and Micro Devices Center (UAH), 2003

## Professional Experience

**Brigham Young University**, Provo, Utah (2005 - present)

Engineering and Technology Endowed Chair (2006 – 2009)

Professor (2005 – present)

Department of Electrical and Computer Engineering

**University of Alabama in Huntsville**, Huntsville, Alabama (1992 - 2005)

Director, Nano and Micro Devices Center (NMDC) (2003-2005) and Technical Associate Director, LICOS (precursor to NMDC) (1999-2003)

- Report directly to the Vice President for Research as of January 1, 2003. Calendar year appointment.
- NMDC approved by the University of Alabama System Board of Trustees as an official campus research center on April 16, 2004. Prior to this it operated as a campus-designated research center.
- Responsible for hiring and directing center staff (5-7) as well as working with associated faculty (5) and students (15-20).
- Set up nano/microfabrication facility in 1,300 sq. ft. cleanroom space, 1995-1999.
- Enlarged facility to 7,600 sq. ft. (5,500 sq. ft. cleanroom) with greatly expanded tool set (<http://nmdc.uah.edu/facilities/equipment.html>) based on grants and \$2M gifts from community benefactor, 2000-2002.
- Developed computing facility using linux clusters created by my group for rigorous electromagnetic design and analysis of nanophotonic structures with parallelized custom software tools developed in my group, 2001-2004.

Adjunct Professor (2005–present)

Professor (2001–2005)

Associate Professor (1996–2001) (promoted 2 years early in 1996 and granted tenure one year early in 1997)

Assistant Professor (1992–1996)

Department of Electrical and Computer Engineering; Optical Science and Engineering Ph.D. Program; Materials Science Ph.D. Program (2002-2005).

Research Activities at UAH

Microcantilever-based chemical and biological detectors, photonic crystals and planar lightwave circuits, polymer integrated optics, subwavelength polarization filters and arrays for imaging polarimetry, diffractive optical elements, micro- and nanofabrication, microfluidic device fabrication, interferometric lithography, liquid crystal lenses, real-time 3-D holographic-like displays, volume holographic optical memories, stratified volume holographic optical elements, high resolution liquid crystal gratings, liquid crystal gratings on silicon VLSI electronics.

**Hughes Aircraft Company**, El Segundo and Malibu, California (1984-1992)

Hughes Research Laboratories (1990-1992)

Multiplexed volume holographic interconnections for optical neural network applications.

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### Electrooptical and Data Systems Group (1985-1990)

High energy laser phased array beam transmission systems, conceptual design of satellite-borne high energy laser beam profile testing apparatus, part of system design team for space station/shuttle laser docking system.

### Radar Systems Group (1984-1985)

Supported development of a synthetic aperture radar pseudo-image generator for testing of advanced SAR concepts, B-2 radar SAR module software specification.

## Fellowships

### NASA/ASEE Summer Faculty Fellowship, NASA

June 3, 1996 – August 9, 1996. Summer salary for myself and one graduate student to work at the NASA Marshall Space Flight Center developing new beam scanning techniques based on diffractive optical elements for space-borne laser radar systems.

## Teaching - BYU

EngT 231 Moral Leadership in a Technological World

Fall 2009, Fall 2010

ECEn 191 New Student Seminar

Fall 2016, Win 2017

ECEn 301 Elements of Electrical Engineering

Spr 2012, Spr 2016, Fall 2016

ECEn 360/361 Electromagnetics

Win 2006, Fall 2006, Fall 2007, Win 2009, Win 2011, Win 2013, Win 2014, Win 2015, Win 2016, Win 2017 (Lab)

ECEn 362 Transmission Lines

Win 2011, Win 2013, Spr 2013

ECEn 462 Electromagnetic Radiation and Propagation

Fall 2008

ECEn 466 Introduction to Optical Engineering

Fall 2008, Fall 2014

ECEn 490 Senior Project – 3D Printing of PEG Microfluidics

Winter 2013, Fall 2013

ECEn 490 Senior Project – Miniaturization of Microfluidics Analysis System

Fall 2013, Win 2014, Spr/Su 2014, Fall 2014, Win 2015, Spr/Su 2015, Fall 2015

ECEn 490 Senior Project – Patent experimental implementation for local company

Spr/Su 2016

ECEn 490 Senior Project – Superresolution imaging for 3D printer development

Fall 2016

## Curriculum Vitae—Gregory P. Nordin

ECEn 662R Physical Optics

Win 2007, Win 2008, Win 2010, Win 2012, Win 2014, Win 2016

ECEn 690 Professional Writing for ECEn

Fall, 2011, Fall 2012, Fall 2013, Fall 2015

RelA 121 Book of Mormon

Fall 2011, Fall 2012, Fall 2013, Fall 2014, Fall 2015

### Teaching - UAH

EE/OSE/PH 632 Coherent Optical Systems & Holography, Graduate Fourier optics  
Sp 94

EE/OSE/PH 542 Physical Optics, First year graduate physical optics  
Fa 94, Sp 95, Fa 95, Sp 96, Fa 96, Sp 97, Fa 97, Sp 98, Sp 99, Fa 99, Sp 00, Fa  
00, Sp 01, Fa 01, Sp 02, Fa 02, Fa 03, Fa 04

EE/OSE/PH 541 Geometrical Optics, First year graduate geometrical optics  
Fa 95

OPE 451 Optoelectronics, Senior optical engineering course  
Fa 92, Fa 93

EE 197 Computer Methods in Engineering, Freshman computer programming  
W 93, Sp 93, Su 93, Sp 94, Su 94

Average course evaluation score for all classes taught: 93.8/100  
ECE Department average: 85.9/100

### Students

#### Ph.D. Dissertations Supervised

1. Michael W. Jones, "Partial Pixels: A Real-Time 3-D Display Architecture," 1996
2. Panfilo C. Deguzman, "Stacked Subwavelength Gratings for Imaging Polarimetry," 2000.
3. Diana M. Chambers, "Stratified Volume Diffractive Optical Elements," 2000.
4. Jiang Jianhua, "Rigorous Analysis and Design of Diffractive Optical Elements," 2000.
5. Steve Mellin, "Design and Analysis of Finite Aperture Diffractive Optical Elements," 2001.
6. Arthur Ellis, "Design and Grayscale Fabrication of Beamfanners in a Silicon Substrate," 2001.
7. Yi Sun, "Liquid Crystal Adaptive Lens With Circular Electrodes," 2002.
8. Lixia Li, "Compact Waveguide Bends and Application in a Waveguide Depolarizer," 2004.
9. Seunghyun Kim, "Hybrid Photonic Crystal and Conventional Waveguide Structures," 2004.
10. Jingbo Cai, "Rigorous Analysis and Design of Compact Photonic Components," 2004.

11. Jaime Cardenas, “Microphotonic Devices for Compact Planar Lightwave Circuits and Sensor Systems,” 2005.
12. Bin Wang, “Waveguide Grating Couplers Operating in the Strong Coupling Regime,” 2005.
13. Ashwini Kadam, “Study of Thermally Induced Higher Order Microcantilever Modes,” 2006.
14. Yongbin Lin, “Compact Perfluorocyclobutyl (PFCB) Waveguide Devices For WDM Applications,” 2007.
15. Nazli Rahmanian, “High Efficiency Perfluorocyclobutyl Air-Trench Splitters For Use in Compact Ring Resonators,” 2007.
16. Yusheng Qian, “Compact Trench-Based Bend and Splitter Devices for Silicon-on-Insulator Rib Waveguides,” 2009.
17. Jong Wook Noh, “In-Plane All-Photonic Transduction Method for Silicon Photonic Microcantilever Array Sensors,” 2009.
18. Weisheng Hu, “Development of Single-Chip Silicon Photonic Microcantilever Array for Sensing Applications,” 2011
19. Ryan R. Anderson, “Characterization and Preliminary Demonstration of Microcantilever Array Integrated Sensors,” 2012
20. Stanley J. Ness, “Functionalization of In-Plane Photonic Microcantilever Arrays for Biosensing Applications,” 2012
21. Long-Fang Tsai, “Microfluidic Devices and Biosensors,” 2016

**One Ph.D. and one M.S. students are currently under supervision.**

#### **M.S. Theses**

1. Patrick Nasiatka, “Creating and Controlling Dynamic Diffractive Optical Elements for Use in the Partial Pixel 3-D Display Architecture,” 1996.
2. Bettina Wendling, “Preparation and Optical Properties of Mixed-Dimensional Gold Nanostructures,” 2001.
3. Aimee Dorman, “Effect of a Conformal Anti-Reflection Coating on a Diffraction Grating,” 2001.
4. David Sparks, “Implementation and Testing of a Compact Corneal Microscope Design,” 2001.
5. Bryan Lafayette Redd III, “Development of Acceptance Testing Methods for a 473 nanometer Frequency-Doubled Nd:YAG Laser Module,” 2001.
6. Koon-Kim Jeremy Wong, “Optical Metrology and Applications of a PLZT Lens,” Committee chair: Greg Nordin, Thesis Adviser: Bruce Peters, 2001.
7. Earlie O. Oliver, “The Photo-Chemistry and Photo-Polymerization of Matrix-Isolated Diacetylenes,” Committee chair: Greg Nordin, Thesis Adviser: David D. Smith, 2003.
8. Jiguo (Peter) Song, “Compact Trench-Based Silicon-on-Insulator Rib Waveguide 90 degree and 105 degree Bend and Splitter,” 2008.
9. Joseph B. Oxborrow, “Dynamic Nanochannels for Biosensing Applications,” 2013.
10. David M. W. Landry, “Proteins in High Electric Fields,” 2013.

11. Kamran Qaderi, “Polyethylene Glycol Diacrylate (PEGDA) Resin Development for 3D-Printed Microfluidic Devices,” 2015.

**Professional Society Affiliations**

Optical Society of America, Senior Member

IEEE, Member

SPIE, Member

**Professional Service**

- Proposal Reviewer *National Science Foundation*  
*NASA*
- Journal Reviewer *Advances in Optical Technologies*  
*Analytical and Bioanalytical Chemistry*  
*Analytical Chemistry*  
*Applied Optics*  
*Applied Physics Letters*  
*Biomicrofluidics*  
*IEEE Journal of Selected Topics in Quantum Electronics*  
*IEEE Transactions on Multimedia*  
*JEOS—Pure and Applied Optics*  
*Journal of Materials Research*  
*Journal of Microlithography, Microfabrication, and*  
*Microsystems*  
*Journal of Micromechanics and Microengineering*  
*Journal of the Optical Society of America A*  
*Journal of Quantum Electronics*  
*Journal of Selected Topics in Quantum Electronics*  
*Journal of Vacuum Science and Technology B*  
*Journal of X-Ray Science & Technology*  
*Lab on a Chip*  
*Materials Today*  
*Optica*  
*Optics Communications*  
*Optical Engineering*  
*Optics Express*  
*Optics & Laser Technology*  
*Optics Letters*  
*Sensors & Actuators: B. Chemical*
- General Co-Chair: Nanophotonics, 2006 (new Optical Society of America topical meeting).
- Conference Co-Organizer: *Micromachining Technology for Microoptics and Nanooptics I through V*, SPIE Photonics West, 2002-2007.  
  
*Optics in the Southeast*, Huntsville, Alabama, Oct. 25-26, 2002.
- Program Committee Chair *Nanophotonics, Integrated Photonics Research Topical Meeting*, Optical Society of America, 2005.
- Technical Review Comm *Nano Science and Technology Review Institute*, Nanotech 2008.

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- Program Committee      *Annual Meeting of the European Optical Society*, Paris, Sept. 29 – Oct. 2, 2008.
- Micro (MEMS) and Nanotechnologies for Defense and Security*, SPIE Defense & Security Symposium, 2008.
- Integrated Photonics and Nanophotonics Research and Applications*, 2008.
- Optics in the Southeast*, Atlanta, Georgia, Oct. 6-7, 2005.
- Diffraction Optics and Microoptics Topical Meeting*, Optical Society of America, 2002 and 2004.
- Photonics Materials Topical Conference*, AVS 49<sup>th</sup> International Symposium, November 4-8, 2002.
- Application and Theory of Periodic Structures Conference*, SPIE International Symposium on Optical Science and Technology, July 29 – August 3, 2001.
- Wavelength Scale Optical Devices Conference*, SPIE International Symposium on Optical Science and Technology, July 29 – August 3, 2001.
- Micromachining Technology for Microoptics Conference*, SPIE *Micromachining and Micrfabrication Symposium*, October 22-25, 2001.
- Committee Member:      New Focus/Bookham Student Award Committee, Optical Society of America, 2005-2006.
- Modeling, Numerical Simulation and Theory Subcommittee, *Integrated Photonics Research Topical Meeting*, Optical Society of America, 2004.
- Dielectric Waveguide Subcommittee, *Integrated Photonics Research and Applications Topical Meeting*, Optical Society of America, 2007.
- Steering Committee for SPIE’s Polarization Technical Group.

**Workshops and Seminars**

- Invited panelist      “Nanotechnology: Funding the Next Growth Revolution,” at TopTech 2004: Revolution, sponsored by the North Carolina Electronics and Information Technology



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- Association (NCEITA), Charlotte, North Carolina, May 25, 2004.
- Invited exhibitor      5<sup>th</sup> annual Coalition for National Science Funding (CNSF) on May 19, 1999. This exhibit is held to educate members of Congress and their staff on research supported by the National Science Foundation
- Participant              “Diffractive Optics Workshop” Sept. 14-17, 1993, Georgia Institute of Technology.

### **Educational Outreach Activities**

- 5<sup>th</sup> Grade Science Demonstration and Discussion. One hour program focused on understanding basic concepts about heat, temperature, states of matter, and phase changes. Includes demonstrations with liquid nitrogen and dry ice. Approximately 325 students have participated in sessions conducted in 1994, 1997, 1998, and 1999.
- High School Holography Day. On May 16, 1997, advance placement physics students from Huntsville's Grissom High School came to my laboratories at The University of Alabama in Huntsville to learn principles of holography and holographic displays. As part of their activities they made their own white-light holograms to take home and experienced an example of a real-time holographic-like display developed by myself and several other UAH faculty members.
- Laboratory tours and discussions conducted for Boy Scout troops.

### **Personal**

Citizenship: USA

Married, three children

Eagle scout

Hobbies: Off-road motorcycle riding and racing (2007 KTM 300 xc), trail running and racing, mountain biking, hiking, skiing, backcountry skiing, snowshoeing

**Publications—Refereed Journal Articles**

1. G. P. Nordin, R. V. Johnson, and A. R. Tanguay, Jr., "Diffraction Properties of Stratified Volume Holographic Optical Elements," *J. Opt. Soc. Am. A*, **9**(12), pp. 2206-2217 (1992).
2. G. P. Nordin and A. R. Tanguay, Jr., "Photopolymer-Based Stratified Volume Holographic Optical Elements," *Opt. Lett.* **17**(23), pp. 1709-1711 (1992).
3. P. Asthana, G. P. Nordin, A. R. Tanguay, Jr., and B. Keith Jenkins, "Analysis of Weighted Fan-out/Fan-in Volume Holographic Interconnections," *Applied Optics Special Issue on Neural Networks* **32**(8), pp. 1441-1469 (1993).
4. G. P. Nordin and P. Asthana, "Effects of Crosstalk on Fidelity in Page-Oriented Volume Holographic Optical Data Storage", *Opt. Lett.* **18**(18), pp. 1553-1555 (1993).
5. R. G. Lindquist, J. H. Kulick, G. P. Nordin, J. M. Jarem, S. T. Kowel, M. Friends and T. Leslie, "High Resolution Liquid Crystal Phase Grating Formed by Fringing Fields From Interdigitated Electrodes", *Opt. Lett.* **19**(9), pp. 670-72 (1994).
6. G. P. Nordin, J. H. Kulick, M. Jones, P. Nasiatka, R. G. Lindquist, and S. T. Kowel, "Demonstration of a Novel 3-D Autostereoscopic Display", *Opt. Lett.* **19**(12), pp. 901-903 (1994).
7. J. H. Kulick, G. P. Nordin, A. Parker, S. T. Kowel, R. G. Lindquist, M. Jones, and P. Nasiatka, "Partial Pixels: A Three-Dimensional Diffractive Display Architecture", *J. Opt. Soc. Am. A*, **12**(1), pp. 73-83 (1995).
8. R. G. Lindquist, G. P. Nordin, A. Thomsen, P. J. Nasiatka, J. H. Kulick, and S. T. Kowel, "Pulse Width Modulation Drive Technique for High Resolution Liquid Crystal Gratings", *Opt. Lett.* **20**(5), pp. 510-512 (1995).
9. A. Thomsen, R. G. Lindquist, J. H. Kulick, P. J. Nasiatka, G. P. Nordin, and S. T. Kowel, "A Pixel Scale Digital-to-Analog Converter Array for Liquid Crystal on VLSI Displays", *IEEE Trans. On Circuits & Systems I*, **42**(9), pp. 545-548 (1995).
10. M. W. Jones, G. P. Nordin, J. H. Kulick, R. G. Lindquist, and S. T. Kowel, "Real-Time Three-Dimensional Display Based on the Partial Pixel Architecture", *Opt. Lett.* **20**(12), pp. 1418-1420 (1995).
11. G. P. Nordin, J. H. Kulick, R. G. Lindquist, P. J. Nasiatka, M. W. Jones, M. Friends, S. T. Kowel, "Liquid Crystal-on-Silicon Implementation of the Partial Pixel Three-Dimensional Display Architecture", *Appl. Opt.* **34**(19), pp. 3756-3763 (1995).

12. G. P. Nordin, M. W. Jones, J. H. Kulick, R. G. Lindquist, and S. T. Kowel, "A 3-D Display Utilizing a Diffractive Optical Element and an Active Matrix Liquid Crystal Display", *Opt. Eng.* **35**(12), pp. 3404-3412 (1996).
13. G. P. Nordin, J. T. Meier, P. C. Deguzman, and M. W. Jones, "Micropolarizer Array for Infrared Imaging Polarimetry", *J. Opt. Soc. Am. A* **16**(5), pp. 1184-1193 (1999).
14. D. M. Chambers and G. P. Nordin, "Stratified Volume Diffractive Optical Elements as High Efficiency Gratings", *J. Opt. Soc. Am. A* **16**(5), pp. 1168-1174 (1999).
15. G. P. Nordin and P. C. Deguzman, "Broadband Form Birefringent Quarter-Wave Plate for the Mid-Infrared Wavelength Region", *Opt. Express* **5**(8), pp. 163-168 (1999), <http://www.opticsexpress.org/abstract.cfm?URI=OPEX-5-8-163>.
16. J. Jiang and G. P. Nordin, "A Rigorous Unidirectional Method for Designing Finite Aperture Diffractive Optical Elements", *Opt. Express* **7**(6), pp. 237-242 (2000), <http://www.opticsexpress.org/abstract.cfm?URI=OPEX-7-6-237>.
17. M. A. Jensen and G. P. Nordin, "Finite-Aperture Wire Grid Polarizers", *J. Opt. Soc. Am. A* **17**(12), pp. 2191-2198 (2000).
18. H. Shah, D. Smith, Jr., J. Ballato, S. Foulger, P. Deguzman, and G. Nordin, "Direct Generation of Optical Diffractive Elements in Perfluorocyclobutane (PFCB) Polymers by Soft Lithography," *IEEE Photonics Tech. Let.* **12**(12), 1650 (2000).
19. S. D. Mellin and G. P. Nordin, "Limits of Scalar Diffraction Theory and an Iterative Angular Spectrum Algorithm for Finite Aperture Diffractive Optical Element Design", *Optics Express* **8**(13), pp. 705-722 (2001), <http://www.opticsexpress.org/abstract.cfm?URI=OPEX-8-13-705>.
20. M. A. Jensen and G. P. Nordin, "Characterization of Two-Dimensional Finite-Aperture Wire Grid Polarizers by a Spectral-Domain Technique," *Appl. Opt.* **40**(26) pp. 4738-4745 (2001).
21. P. C. Deguzman and G. P. Nordin, "Stacked Subwavelength Gratings as Circular Polarization Filters," *Appl. Opt.* **40**(31), pp. 5731-5737 (2001).
22. G. P. Nordin, S. Kim, J. Cai, and J. Jiang, "Hybrid integration of conventional waveguide and photonic crystal structures," *Opt. Express* **10**(23), 1334-1341 (2002), <http://www.opticsexpress.org/abstract.cfm?URI=OPEX-10-23-1334>.
23. D. M. Chambers, G. P. Nordin, and Seunghyun Kim, "Fabrication and analysis of a three-layer stratified volume diffractive optical element high-efficiency grating,"

- Opt. Express **11**(1), 27-38 (2003).  
<http://www.opticsexpress.org/abstract.cfm?URI=OPEX-11-1-27>.
24. L. Li, G. P. Nordin, J. M. English, and J. Jiang, “Small-area bends and beamsplitters for low-index-contrast waveguides”, Opt. Express **11**(3), 282-290 (2003). <http://www.opticsexpress.org/abstract.cfm?URI=OPEX-11-3-282>
  25. J. Jiang, J. Cai, G. P. Nordin, and L. Li, “Parallel microgenetic algorithm design for photonic crystal and waveguide structures,” Opt. Lett. **28**(23), pp. 2381-2383 (2003).
  26. S. Kim, G. P. Nordin, J. Cai, and J. Jiang, “Ultracompact high-efficiency polarizing beam splitter with a hybrid photonic crystal and conventional waveguide structure,” Opt. Lett. **28**(23), pp. 2384-2386 (2003).
  27. S. Kim, J. Cai, J. Jiang, and G. P. Nordin, “New ring resonator configuration using hybrid photonic crystal and conventional waveguide structures,” Opt. Express **12**(11), pp. 2356-2364 (2004).  
<http://www.opticsexpress.org/abstract.cfm?URI=OPEX-12-11-2356>
  28. J. Yan, S. T. Kowel, H. J. Cho, C. H. Ahn, G. P. Nordin, and J. H. Kulick, “Autostereoscopic 3D display based on micromirror array,” Appl. Opt. **43**(18) pp. 3686-3696 (2004).
  29. J. Cai, G. P. Nordin, S. Kim, and J. Jiang, “3D analysis of hybrid photonic crystal/conventional waveguide 90° bend,” Appl. Opt. **43**(21), pp. 4244-4249 (2004).
  30. B. Wang, J. Jiang, and G. P. Nordin, “Compact slanted grating couplers,” Opt. Express **12**(15), pp. 3313-3326 (2004).  
<http://www.opticsexpress.org/abstract.cfm?URI=OPEX-12-15-3313>
  31. S. Kim, G. P. Nordin, J. Jiang, and J. Cai, “High efficiency 90 degree silica waveguide bend using an air hole photonic crystal region,” IEEE Photonics Tech. Lett. **16**(8), pp. 1846-1848 (2004).
  32. S. Kim, G. P. Nordin, J. Jiang, and J. Cai, “Micro-genetic algorithm design of hybrid conventional waveguide and photonic crystal structures,” Opt. Eng., **43**(9), pp. 2143-2149 (2004).
  33. J. Cardenas, L. Li, S. Kim, and G. P. Nordin, “Compact low loss single air interface bends in polymer waveguides,” Opt. Express **12**(22), pp. 5314-5324 (2004).  
<http://www.opticsexpress.org/abstract.cfm?URI=OPEX-12-22-5314>
  34. B. Wang, J. Jiang, D. M. Chambers, and G. P. Nordin, “Stratified waveguide grating coupler for normal fiber incidence,” Opt. Lett, **30**(8), pp. 845-847 (2005).

35. B. Wang, J. Jiang, and G. P. Nordin, “Embedded slanted grating coupler for vertical coupling between fibers and silicon-on-insulator planar waveguides,” *Phot. Techn. Lett.* 17(9), pp. 1884-1886 (2005).
36. Seunghyun Kim, Jianhua Jiang, and Gregory P. Nordin, “Design of compact polymer Mach-Zender interferometer and ring resonator with air trench structures,” *Opt. Eng.* 45, 054602 (2006).
37. Lixia Li, Jaime Cardenas, Jianhua Jiang and G. P. Nordin, “Compact integrated depolarizer for interferometric fiber optic gyroscopes,” *Opt. Eng.* 45, 055602 (2006).
38. Ashwini R. Kadam, G. P. Nordin, and Michael A. George, “Use of thermally induced higher order modes of a microcantilever for mercury vapor detection,” *J. Appl. Phys.*, 99, 094905 (2006).
39. Yusheng Qian, Seunghyun Kim, Jiquo Song, Gregory P. Nordin, and Jianhua Jiang, “Compact and low loss silicon-on-insulator rib waveguide 90° bend,” *Opt. Express* 14, pp. 6020-6028 (2006).  
<http://www.opticsinfobase.org/abstract.cfm?URI=oe-14-13-6020>
40. Bin Wang, Jianhua Jiang, and Gregory P. Nordin, “Systematic design process for slanted grating couplers,” *Appl. Optics* 45(24) pp. 6223-6226 (2006).
41. Ashwini R. Kadam, G. P. Nordin, and Michael A. George, “Comparison of microcantilever Hg sensing behavior with thermal higher order modes for as-deposited sputtered and thermally evaporated Au films,” *J. Vac. Soc. Techn. B* 24(5) pp. 2271-2275 (2006). Also: *Virtual Journal of Nanoscale Science & Technology* 14(14) (2006).  
<http://scitation.aip.org/dbt/dbt.jsp?KEY=VIRT01&Volume=14&Issue=14>
42. Nazli Rahmanian, Seunghyun Kim, and G. P. Nordin, “Anisotropic high aspect ratio etch for fluorinated polymers with stress relief technique,” *J. Vac. Soc. Techn. B* 24(6) pp. 2572-2577 (2006).
43. Y. Lin, J. Cardenas, S. Kim, and G. P. Nordin, “Reduced loss through improved fabrication for single air interface bends in polymer waveguides,” *Optics Express* 14(26), pp. 12803-12813 (2006).  
<http://www.opticsexpress.org/abstract.cfm?id=121395>
44. J. Jiang, P. C. Deguzman, and G. P. Nordin, “Analysis of stacked rotated gratings,” *Applied Optics* 46(8) pp. 1177-1183 (2007).

45. Y. Qian, J. Song, S. Kim, G. P. Nordin, “Compact 90° trench-based splitter for silicon-on-insulator rib waveguides,” *Optics Express* 15(25), pp. 16712-16718 (2007).  
<http://www.opticsexpress.org/abstract.cfm?id=148289>
46. N. Rahmanian, S. Kim, Y. Lin, G. P. Nordin, “Air-trench splitters for ultra-compact ring resonators in low refractive index contrast waveguides,” *Optics Express* 16(1), pp. 456-465 (2008).  
<http://www.opticsexpress.org/abstract.cfm?id=148708>
47. Y. Qian, J. Song, S. Kim, W. Hu, G. P. Nordin, “Compact waveguide splitter networks,” *Optics Express* 16(7), pp. 4981-4990 (2008).  
<http://www.opticsexpress.org/abstract.cfm?id=156939>
48. J. W. Noh, R. Anderson, S. Kim, J. Cardenas, G. P. Nordin, “In-plane photonic transduction of silicon-on-insulator microcantilevers,” *Optics Express* 16(16), pp. 12114-12123 (2008).  
<http://www.opticsexpress.org/abstract.cfm?uri=oe-16-16-12114>
49. Y. Lin, S. Kim, N. Rahmanian, G. P. Nordin, C. Topping, D. W. Smith, Jr., and J. Ballato, “Ultracompact AWG using air-trench bends with perfluorocyclobutyl polymer waveguides,” *IEEE J. Lightwave Techn.* 26(17), pp. 3062-3070 (2008).
50. W. Hu, R. Anderson, Y. Qian, J. Song, J.W. Noh, S. Kim, G.P. Nordin, “Demonstration of microcantilever array with simultaneous readout using in-plane photonic transduction method,” *Rev. Sci. Instr.* 80, 085101, pp. 1-7 (2009).
51. J.W. Noh, R. Anderson, S. Kim, W. Hu, G.P. Nordin, “In-plane all-photonic transduction with differential splitter using double-step rib waveguide for photonic microcantilever arrays,” *Opt. Express* 17(22), pp. 20012-20020 (2009).  
<http://www.opticsinfobase.org/oe/abstract.cfm?uri=oe-17-22-20012>
52. Y. Qian, S. Kim, J. Song, W. Hu, G. Wojcik, G.P. Nordin, “Compact trench-based SOI rib waveguide ring resonator with large free spectral range,” *Opt. Eng.* 48(12), 124602, pp. 1-4 (2009).
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45. G. P. Nordin, “The UAH Nano/Microfabrication Facility”, Optics in the Southeast, Huntsville, Alabama, October 24-25, 2002.
46. Jamshid Nayyer, Samah Nazzal and Gregory P. Nordin, “Polarization Sensitivity of Intersecting Waveguide Type Optical Modulators/Switches at Presence of Absorption Loss,” Optics in the Southeast, Huntsville, Alabama, October 24-25, 2002.

47. Lixia Li, Gregory P. Nordin, Jennifer M. English, Jianhua Jiang, “Novel Corner Mirror for Right-angle Bend in Low-index-contrast Waveguide,” Optics in the Southeast, Huntsville, Alabama, October 24-25, 2002.
48. Jamie Cardenas, Gregory P. Nordin, Shengrong Chen, Dennis W. Smith, “Micromolding for polymer waveguides,” Optics in the Southeast, Huntsville, Alabama, October 24-25, 2002. (post-deadline paper)
49. Seunghyun Kim, Gregory P. Nordin, Jianhua Jiang, and Jingbo Cai, “Hybrid photonic crystal and low refractive index contrast waveguide structures,” in *Integrated Photonics Research*, OSA Technical Digest, (Optical Society of America, Washington DC, 2003), pp. 46-48.
50. Diana Chambers, Bin Wang, Gregory P. Nordin, and Jianhua Jiang, “Stratified grating couplers for waveguide applications,” in *Integrated Photonics Research*, OSA Technical Digest, (Optical Society of America, Washington DC, 2003), pp. 98-100.
51. Lixia Li, Gregory P. Nordin, Jianhua Jiang, and Jennifer M. English “High efficiency, small-area bends in low index contrast waveguides,” in *Integrated Photonics Research*, OSA Technical Digest, (Optical Society of America, Washington DC, 2003), pp. 219-221.
52. Gregory P. Nordin, Lixia Li, Jaime Cardenas , and Jianhua Jiang, “Small-area bends and polarizing beamsplitters for compact planar lightwave circuits,” in *Symposium on Organic Thin Films for Photonic Applications*, OSA Technical Digest, (Optical Society of America, Washington DC, 2003). **(Invited)**
53. Gregory P. Nordin, “Approaches for small-area bends and splitters in low index contrast waveguides,” Paper SE 05-C1, Optics in the Southeast, Orlando, Florida, November 12-13, 2003. **(Invited)**
54. Seunghyun Kim, Jingbo Cai, Jianhua Jiang, and Gregory P. Nordin, “Low refractive index contrast waveguide 90 degree bend and a ring resonator design using hybrid photonic crystal and conventional waveguide structures,” in *Integrated Photonics Research Topical Meetings on CD-ROM* (The Optical Society of America, Washington, DC, 2004), Presentation IthG3.
55. Jingbo Cai, Jianhua Jiang, and Gregory P. Nordin, “Ultra-short waveguide polarization converter using a sub-wavelength grating,” in *Integrated Photonics Research Topical Meetings on CD-ROM* (The Optical Society of America, Washington, DC, 2004), Presentation IFG2.
56. Dennis W. Smith, John Ballato, and Gregory P. Nordin, “Perfluorocyclobutyl (PFCB) polymers for photonics applications,” *Polymeric Materials: Science & Engineering* 91, 807 (2004).

57. Gregory P. Nordin, Seunghyun Kim, Lixia Li, Jingbo Cai, and Jianhua Jiang, “Air Trench and Photonic Crystal Structures for Compact Waveguide Devices in Low Index Contrast Waveguides,” Paper N1 1433, 206<sup>th</sup> Meeting of the Electrochemical Society, October 3-8, 2004. **(Invited)**
58. Gregory P. Nordin, “Compact Microphotonic Devices and Applications to Chemical and Biological Sensors,” Workshop on Nano and Microsystems Technology and Metrology, November 17-18, 2004, Redstone Arsenal.
59. Gregory P. Nordin, Jaime Cardenas, and Seunghyun Kim, “Compact High Efficiency Bends in Perfluorocyclobutyl Polymer Waveguides,” Optical Fiber Communications (OFC), Paper OFD2, 2005.
60. Jianhua Jiang and Gregory P. Nordin, “Optimal Design of Sub-Wavelength Dielectric Gratings as Broadband Mirrors,” Optical Fiber Communications (OFC), Paper OME28, 2005.
61. Gregory P. Nordin, “In-Plane Photonic Transduction as an Enabler for Microcantilever Arrays,” ASME Workshop—Nanomechanics: Sensors and Actuators, Knoxville, TN, May 16-18, 2005, **(Invited)**.
62. Gregory P. Nordin, Seunghyun Kim, Nazli Rahmanian, and Yongbin Lin, “Compact Photonic Devices in Low Index Contrast Waveguides,” in *Symposium on Organic Thin Films for Photonic Applications*, OSA Technical Digest, (Optical Society of America, Washington DC, 2005), Paper SWB3, **(Invited)**.
63. Gregory P. Nordin, Seunghyun Kim, Jong Wok Noh, and Yusheng Qian, “In-Plane Photonic Transduction for Microcantilever Arrays,” International Workshop on Nanomechanical Sensors, Copenhagen, Denmark, May 7-10, 2006.
64. Gregory P. Nordin, Seunghyun Kim, Yusheng Qian, Jong Wok Noh, and Jianhua Jiang, “In-Plane Photonic Transduction of SOI Microcantilever Sensors,” 3<sup>rd</sup> International Conference on Group IV Photonics, Ottawa, Canada, September 13-15, 2006. Paper WA3.
65. Nazli Rahmanian, Seunghyun Kim, and Gregory P. Nordin, “Fabrication and characterization of air-trench waveguide beamsplitters in perfluorocyclobutyl polymers,” in *Frontiers in Optics 2006*, OSA Technical Digest, (Optical Society of America, Washington DC, 2006), Paper FWM1.
66. Gregory P. Nordin, Jong Wok Noh, Yusheng Qian, and Seunghyun Kim, “Silicon photonics for microcantilever-based chemical and biological sensors,” 210<sup>th</sup> Electrochemical Society’s Third International Symposium on Integrated Optoelectronics, Cancun, Mexico, October 29 – November 3, 2006. Paper 1277 **(Invited Paper)**

67. Gregory P. Nordin, Seunghyun Kim, Jong Wok Noh, and Yusheng Qian, “Photonic transduction of microcantilever sensor arrays,” in *Micro (MEMS) and Nanotechnologies for Defense and Security*, Thomas George and Zhongyang Cheng, Editors, Proceedings of SPIE 6556 (2007). (no manuscript)
68. Gregory P. Nordin, Seunghyun Kim, Jong Wok Noh, and Yusheng Qian, “In-plane transduction of nanomechanical microcantilever motion to enable sensor arrays,” NSTI Nanotech 2007, Santa Clara, California, May 20-24, 2007.
69. Gregory P. Nordin, Jong Wook Noh, Yusheng Qian, Peter Song, Ryan Anderson, and Seunghyun Kim, “Demonstration of in-plane photonic transduction for microcantilever arrays,” International Workshop on Nanomechanical Sensors, Montreal, Canada, May 28-30, 2007.
70. Gregory P. Nordin, Jong Wok Noh, Yusheng Qian, Jiquo Song, and Seunghyun Kim, “Photonics-enabled microcantilever arrays for sensor applications,” Workshop on Integrated Photonics and Nanophotonics Research and Applications, Salt Lake City, Utah, July 9-11, 2007.
71. Yusheng Qian, Jiquo Song, Seunghyun Kim, and Gregory P. Nordin, “Compact 90° bends and splitters for silicon rib waveguides,” Workshop on Integrated Photonics and Nanophotonics Research and Applications, Salt Lake City, Utah, July 9-11, 2007.
72. Jong Wook Noh, Ryan Anderson, Seunghyun Kim, and Gregory P. Nordin, “Photonic readout of microcantilevers for sensor applications,” in *Frontiers in Optics 2007*, OSA Technical Digest, (Optical Society of America, Washington DC, 2007), Paper FTuD7.
73. Gregory P. Nordin, Seunghyun Kim, Jong Wok Noh, Weisheng Hu, Ryan Anderson, Yusheng Qian, Jiquo Song, Stan Ness, “Progress toward parallel microcantilever array readout enabled by in-plane photonic transduction,” International Workshop on Nanomechanical Sensors, Mainz, Germany, May 19-21, 2008.
74. Gregory P. Nordin, “MEMS-Based Chemical and Biological Sensors,” Intelligence Community Academic Summit, College Park, Maryland, June 23-26, 2008.
75. Stanley J. Ness, Seunghyun Kim, and Gregory P. Nordin, “Deposition of functionalization materials on photonic microcantilever chemical/biological sensors using inkjet technology,” NSTI Nanotech 2009, Houston, Texas, May 3-7, 2009.
76. Gregory P. Nordin, Seunghyun Kim, Jong Wook Noh, Ryan Anderson, Weisheng Hu, Stan Ness, Bryan Haslam, and Jack Dong, “Photonic microcantilever arrays with integrated microfluidics,” International Workshop on Nanomechanical Cantilever Sensors, Jeju, South Korea, May 20-22, 2009.

77. Bryan Haslam, Seunghyun Kim, Weisheng Hu, and Gregory P. Nordin, “Microfluidic closed volume reflow pump,” MicroTAS, Jeju, South Korea, November 2-5, 2009.
78. Gregory P. Nordin, Seunghyun Kim, Jong Wook Noh, Weisheng Hu, Ryan Anderson, Stan Ness, William Dahlquist, Bryan Haslam, and Jack Dong, “In-plane photonic readout of microcantilever arrays integrated with microfluidics for biosensing,” MicroTAS, Jeju, South Korea, November 2-5, 2009.
79. Gregory P. Nordin, Seunghyun Kim, Jong Wook Noh, Weisheng Hu, Ryan Anderson, Stan Ness, William C. Dahlquist, and Danny C. Richards, “Flow rate detection and preliminary biological molecule sensing results with photonic microcantilever array,” International Workshop on Nanomechanical Cantilever Sensors, Banff, Canada, May 20-22, 2010.
80. Gregory P. Nordin, Seunghyun Kim, Weisheng Hu, Ryan Anderson, Jong Wook Noh, Stan Ness, William C. Dahlquist, and Danny C. Richards, “Demonstration of microcantilever biosensor array with in-plane photonic transduction mechanism,” MicroTAS, Groningen, Netherlands, October 3-7, 2010.
81. Gregory P. Nordin, Seunghyun Kim, Weisheng Hu, Ryan Anderson, Jong Wook Noh, Stan Ness, William C. Dahlquist, and Danny C. Richards, “Microcantilever arrays with in-plane photonic readout for biosensing,” 218<sup>th</sup> ECS Meeting, Las Vegas, Nevada, October 10-15, 2010. (**Invited Paper**)
82. Ryan R. Anderson, Weisheng Hu, Jong Wook Noh, Stanley J. Ness, Timothy M. Gustafson, Danny C. Richards, Seunghyun Kim, Brian A. Mazzeo, Adam T. Woolley, and Gregory P. Nordin, “Demonstration of transient deflection response for microcantilever arrays integrated with polydimethylsiloxane (PDMS) microfluidics,” International Workshop on Nanomechanical Cantilever Sensors, Dublin, Ireland, May 11-13, 2011.
83. Chad Rogers, J. Pagaduan, Gregory P. Nordin, and Adam T. Woolley, “Utilizing Polymerized Polyethylene Glycol Diacrylate for Microfluidic Valves,” Pittcon 2012, Orlando, FL, March 2012.
84. Chad Rogers, Joseph B. Oxborrow, Long-Fang Tsai, Gregory P. Nordin, and Adam T. Woolley, “Polymerized Poly(ethylene glycol) Diacrylate Microfluidic Membrane Valves,” Pittcon 2014, Chicago, IL, March 2014.
85. Gregory P. Nordin, Chad Rogers, Kamran Qaderi, and Adam T. Woolley, “3D Printed Poly(ethylene glycol) Diacrylate Microfluidic Devices With Integrated Valves,” Pittcon 2015, New Orleans, LA, March 2015 (Invited talk).

86. Hua Gong, Michael Beauchamp, Steven Perry, Adam T. Woolley, and Gregory P. Nordin, “Optical Formulation of 3D Printer Resin for Minimum Microfluidic Flow Channel Size,” Pittcon 2016, Atlanta, GA, March 2016.
87. Michael Beauchamp, Hua Gong, Steven Perry, Gregory P. Nordin, and Adam T. Woolley, “Chemical Analysis Applications and Optical Properties of 3D Printed <100  $\mu\text{m}$  Dimension Microfluidic Channels,” Pittcon 2016, Atlanta, GA, March 2016.
88. Hua Gong, Adam T. Woolley, Gregory P. Nordin, “3D Printed Microfluidic Pumps and Multiplexers,” MicroTAS 2016, Dublin, Ireland, October 2016.

### Other Invited Presentations

1. G. P. Nordin, “Two Examples of Photonics at UAH: Polarization Filter Arrays and Photonic Crystals,” College of Engineering Seminar Series, University of Cincinnati, Nov. 18, 2002.
2. G. P. Nordin, “Nano and Microphotonics and Application to Chemical and Biological Sensing With Integrated Microfluidics,” Electrical and Computer Engineering Department, Brigham Young University, June 16, 2005.
3. G. P. Nordin, “Nano and Microphotonics and Application to Chemical and Biological Sensing With Integrated Microfluidics,” College of Optics and Photonics, University of Central Florida, June 20, 2005.
4. G. P. Nordin, “Nano and Microphotonics and Application to Chemical and Biological Sensing With Integrated Microfluidics,” Sandia National Laboratory, June 30, 2005.

### Technical Reports

1. M. A. Jensen and G. P. Nordin, “Finite-Aperture Wire Grid Polarizers,” Technical Report No. 99-08 Brigham Young University Microwave Earth Remote Sensing Laboratory, [http://www.ee.byu.edu/ee/mers/MERS\\_reports.html](http://www.ee.byu.edu/ee/mers/MERS_reports.html) (1999).

### Patents

1. Y. Sun, S. T. Kowel, and G. P. Nordin, “Liquid crystal adaptive lens with closed-loop electrodes and related fabrication methods and control methods,” US Patent 6,778,246. Issued 8/17/04.

**Curriculum Vitae—Gregory P. Nordin**

2. G. P. Nordin, S. Kim, J. Cai, and J. Jiang, “Waveguide including at least one photonic crystal region for directing signals propagating therethrough,” US Patent 6,804,446. Issued 10/12/04.
3. G. P. Nordin and J. Cardenas Gonzalez, “Optical waveguide microcantilever with differential output and associated methods of cantilever sensing,” US Patent 7,189,362. Issued 3/13/07.
4. Lixia Li, G. P. Nordin Jianhua Jiang, Jennifer M. English, “Planar lightwave circuit waveguide bends and beamsplitters,” US Patent 7,206,470. Issued 4/17/07.
5. M. A. Abushagur, T. Ferguson, J. English, G. P. Nordin, “MEMS Micro-Translation Stage With Indefinite Linear Travel Capability,” US Patent 7,265,476. Issued 09/08/07.
6. Yongbin Lin, G. P. Nordin, Seunghyun Kim “Ultra-Compact Planar AWG Circuits and Systems,” Application number 11950310, submitted 12/04/07.

**Funding Summary (1992 – present)**

|  |                     |
|--|---------------------|
| <b>Single-Investigator Contracts and Grants:</b>         | <b>\$7,360,141</b>  |
| <b>Multi-Investigator Contracts and Grants as PI:</b>    | <b>\$10,104,981</b> |
| <b>Multi-Investigator Contracts and Grants as Co-PI:</b> | <b>\$3,512,218</b>  |
| <b>Total:</b>  | <b>\$20,977,340</b> |

**Funding Details – Single-Investigator Contracts and Grants (sorted by end date)**

|   |             |
|---|-------------|
| <b>DARPA</b> (as subcontractor to Clemson University)   |             |
| “Laboratory for Advanced Photonic Composites” (10/11/02-9/26/05)  | \$1,673,560 |
| “Laboratory for Advanced Photonic Composites” (10/10/05-4/21/12) (BYU)  | \$1,767,180 |
| <b>National Science Foundation/Defense Intelligence Agency/MASINT/NCMR</b>  |             |
| “MEMS-Based Chemical and Biological Sensors” (07/01/05-08/31/11)  | \$627,700   |
| <b>Defense Intelligence Agency/MASINT/NCMR/PNNL</b>   |             |
| “PNNL Partnership—Chem/Bio Sensors” (03/11/09-09/30/09)   | \$103,508   |
| <b>Innolume, Inc.</b> (San Jose, CA)  |             |
| “Silicon Photonic Device Development” (8/15/06 – 2/29/08)   | \$43,110    |
| <b>ACTR</b> (Provo, UT)   |             |
| “Prototype Device Fabrication” (8/15/06 – 12/31/07)   | \$81,901    |
| <b>Tetramer, Inc</b> (Clemson, SC)  |             |
| “New PFCB Polymers for High Speed Electronically Tunable Fiber Optic Filter”<br>(11/26/05 – 11/25/07)                                     | \$21,000    |
| <b>Army Research Laboratory</b> (as subcontractor to NC State University)   |             |
| “Photonic MEMS Sensors” (8/1/04-7/31/06)  | \$236,100   |
| <b>Army/SED</b>   |             |
| “Investigations into the Excitation and Relaxation of Carriers, Excitons, and Phonons in<br>Hetero- and Nanostructures” (9/6/05-12/31/05) | \$51,505    |
| <b>FAA</b> (as subcontractor to University of Alabama)  |             |
| “Multi-Channel Fiber Optic Gyroscope” (1/1/00-5/15/05)  | \$1,018,563 |
| <b>Polaris Sensor Technologies, Inc.</b> (Huntsville, AL)   |             |
| “Diamond Etch Development” (3/3/04-4/30/04)   | \$7,299     |
| “Diamond Diffractive Optical Element” (9/21/04-12/21/04)  | \$15,700    |
| <b>Nanochip, Inc.</b> (San Jose, CA)  |             |
| “SiO <sub>2</sub> Nano-Feature Etch” (11/22/04-11/29/04)  | \$2,012     |
| <b>CFD Research Corporation</b> (Huntsville, AL)  |             |
| “Microfabrication of CFDRC Bead-Based Biochip Designs” (10/1/02-10/31/04)   | \$40,091    |



**Curriculum Vitae—Gregory P. Nordin**

**General Dynamics**

“Wire Polarizer Analysis” (7/13/04-9/30/04) \$4,504

**MEMS-Optical, Inc.** (Huntsville, AL)

“Reactive Ion Etching Service” (7/31/98-9/30/98) \$2,000  
“Reactive Ion Etching Services” (8/25/98-9/25/98) \$2,500  
“FDTD Software Program Development” (2/18/00-5/31/01) \$38,998  
“Task Order Contract” (7/27/00-6/30/02) \$20,000  
“Reactive Ion Etching” (9/18/00-3/31/01) \$60,567  
“Materials and Supplies Funding” (2/20/01-3/31/01) \$1,433  
“Reactive Ion Etching of Various Materials for Microfabrication” (5/11/01-2/19/02) \$60,575  
“Fabricate Sample Antenna Structures Based on Bowtie Design” (11/8/01-11/20/01) \$1,425  
“FDTD” (2/5/02-9/5/02) \$32,690  
“Multiple Purchase Orders” (11/11/02-9/30/04) \$3,775

**Brother International Corporation** (Memphis, TN)

“Vapor Deposition Service” (3/6/03-5/5/03) \$3,012

**Goodrich** (Danbury, CT)

“Wire Polarizer Fabrication” (5/8/02-3/31/03) \$135,882

**Oak Ridge National Laboratory**

“SEM Imaging Lithography” (10/1/02-3/31/03) \$4,999

**Rice Systems** (Huntington Beach, CA)

“ZBLAN Waveguides” (8/2/02-12/15/02) \$23,000

**OPTS, Inc.** (Huntsville, AL)

“Task Order Contract, Thin Film Stress” (9/1/00-4/16/02) \$60,000

**DRS Sensors & Targeting Systems, Inc** (Anaheim, CA)

“Modeling of Fine-Line Lithography Performance” (8/28/01-3/31/02) \$15,500

**Morgan Research Corporation** (Huntsville, AL)

“SOI DRIE Silicon Release Processing” (12/18/02-3/24/02) \$3,077

**ERIM/Veridian International** (Ann Arbor, MI)

“Polarimetric Imaging” (4/17/00-8/31/00) \$9,970  
“Polarimetric Enhanced Thermal Sensing System” (9/20/00-12/31/00) \$11,744  
“Polarimetric Enhanced Thermal Sensing System II” (2/2/01-1/1/02) \$22,666

**SY Technology, Inc** (Huntsville, AL)

“Reactive Ion Etching” (5/12/98-9/30/98) \$5,000  
“Analysis of Lithography on Wafers” (8/29/01-10/15/01) \$1,500

**Curriculum Vitae—Gregory P. Nordin**

**National Science Foundation**

“Stratified Volume Holographic Optical Elements for Volume Holographic Data Storage”  
(8/1/96 – 7/31/01), NSF CAREER Development Award \$310,000

**New Focus, Inc.** (San Jose, CA)

“Liquid Crystal Device Research” (5/21/01-8/24/01) \$8,329

**Nichols Research Corporation/CSC, Inc.** (Huntsville, AL)

“Design & Fabrication of Micro-Optic Devices” (9/1/96-5/31/97) \$34,000

“Diffractive Optical Element Mid-IR Camera Development” (1/29/97-1/31/98) \$60,243

“Development & Fabrication of Micro-Optics for DEWAR Upgrade” (9/15/97-1/31/98)\$15,000

“Initiate Diffractive Optical Element Design for Pixel Array” (2/9/98-9/30/98) \$16,000

“Diffractive Optical Element Design for an Effective 256x256 Pixel Array” (2/9/98-9/30/98) \$22,000

“Labor for Waveplate and Wire Grid Array Fabrication” (3/1/98-9/30/98) \$8,832

“Continuing Research Effort for Diffractive Optical Element Design” (4/1/98-6/30/99)\$194,399

“Diffractive Optical Element, continuation” (8/26/98-9/30/98) \$13,215

“Development of Full Polarimetric Micro-Optics” (10/9/98-4/30/99) \$20,000

“Development of Full Polarimetric Micro-Optics II” (8/25/98-5/15/99) \$53,883

“Continuation of Micro-Optics Development” (1/1/99-4/30/99) \$87,768

“Polarimetric Micro-Optics” (6/1/99-5/31/00) \$302,461

**Funding Details – Multi-Investigator Contracts and Grants as PI**

**National Science Foundation**

“SIRG: Photonic Microcantilever Arrays for Chemical and Biological Sensing” (1/1/05-9/30/10), Nordin portion: \$1,256,564, Moved to BYU 01/06 Total: \$1,575,000

“Integrated Research Environment for Intermeshed Optoelectronics” (5/15/98-9/30/01),  
NSF funds: \$1,843,016 with Nordin portion: ~50%.  
Total with university match: \$3,791,329

“Integrated MEMS Photonics for Computer and Communication Systems” (2/1/01-1/31/05), NSF funds: \$2,250,000 with Nordin portion: ~50%.  
Total with university match: \$4,738,652

**Funding Details – Multi-Investigator Contracts and Grants as Co-PI**

**National Science Foundation**

“MRI: Acquisition of Chlorine-Based Reactive Ion Etcher” (8/1/07-7/31/09), \$300,000

**DARPA** (as subcontractor to Clemson University)

“Laboratory for Advanced Photonic Composites” (7/19/01-11/18/02),  
Nordin portion: ~\$700,000 \$765,500

**MICOM/DARPA**

“ICVision 3-D Display: Extension to Full Color” (4/1/95-9/30/95), Nordin portion:  
~\$25,000 \$100,000

## Curriculum Vitae—Gregory P. Nordin

### NASA

“Chemical and Biological Microelectromechanical Smart Sensor Arrays” (8/1/01-7/31/06), Nordin portion: ~\$77,000 \$1,059,963

### National Science Foundation

“Alabama Consortium for Optical Technology” (10/1/95-9/30/98),  
Nordin portion: ~\$350,000 \$1,254,408

### MEMS-Optical, Inc. (Huntsville, AL)

“Investigation of Candidate Photoresist/Developer and Etch Chemistries for DOEs on CaF<sub>2</sub>” (10/1/01-3/19/02) \$18,484

“Ion Beam Milling Development for CaF<sub>2</sub>” (4/29/02-7/5/02) \$13,863

### Donations

Feb. 2002, JDS-Uniphase, photonics equipment, \$102,778

March 2000, \$500,000 cash donation to LICOS from local benefactor in March, 2000 to purchase microfabrication equipment and expand cleanroom (UAH team that arranged for donation: Provost McManus, M. Abushagur, G. Nordin, Engineering Dean Aunon, and ECE Chair Adhami). G. Nordin in charge of use of all funds.

August 2000, \$1,500,000 cash donation to LICOS from local benefactor to purchase micro/nanofabrication equipment and further expand cleanroom (UAH team that arranged for donation: Provost McManus, M. Abushagur, G. Nordin, Engineering Dean Aunon, and ECE Chair Adhami). G. Nordin in charge of use of all funds.