Robert G. Lindquist

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Profile

- Accomplished researcher in both academic and industrial settings
- Experienced manager in bringing research innovation to commercial production
- Technical and program lead for large interdisciplinary efforts
- Executive administrator for service-oriented research operations

Education

- Ph.D. in Electrical Engineering from The Pennsylvania State University (1992)
- BS in Electrical Engineering from The Pennsylvania State University (1986)

Professional Experience

The University of Alabama in Huntsville (UAH) (July 2003- Present)

UAH is a comprehensive, research-intensive university that is a part of the University of Alabama System. UAH anchors the 2nd largest research park in the US, Cumming Research Park, and is near NASA Marshall Space Flight Center (MSFC) and the Redstone Arsenal.

Vice President for Research and Economic Development (2022 to Present and May 2018 to 2021)

Lead the research and economic development operations at UAH with six service organizations, seventeen research centers and one incubators.

- In FY2019, UAH had a 10% increase in research expenditure totaling $110 million which is the highest recorded total in UAH history,
- Developed relationship with the FBI leading to first major UAH award totaling over $1.3 million.
- Opened UAH's 1st Business Incubator and within eight months has over 20 companies and 70% occupancy
- Work collaboratively with Huntsville Chamber of Commerce to attract and expand operations of companies like Boeing, Aerojet Rocketdyne, GE Aviation, etc.

Interim Provost and Executive VP for Academic Affairs (2021-2022)

Associate Vice President for Contract and Grants (2017 to Present)
Associate Vice President for Research and Economic Development (2014 to 2017)

The change in the title merely reflects recently added responsibilities. Manage all operations related to pre- and post-awards for contracts and grants including the Office of Proposal Development (OPD), the Office of Sponsored Programs (OSP). Contracts and Grants Accounting (C&G), and Research Information Systems (RIS) as well as the Office of Environmental Health and Safety (OEHS).

- Managed transition of compliance from OMB Circulars to Uniform Guidance.
- Championed the change from a cash-based leave to an accrual-based leave which resulted in > $0.5 M annually in savings to the State.
- Administer the internal research grant process for distributing ~$2M annually.
- Worked with Huron Consulting to get additional 2% increase in the negotiated F&A rate for DOD specific contracts to assist in the cost of increased compliance.
- Point of contact to faculty and researchers with respect to compliance to University, State, and Federal regulations as related to research grants/contracts.
- Developed and implemented assessment process for the research organization in order to achieve Southern Association of Colleges and Schools (SACS) accreditation

Chair of the Electrical and Computer Engineering (ECE) Department (2010 to 2014)
ECE department is one of the largest departments at UAH with approximately twenty faculty members with 600 undergraduates and 200 graduates pursuing degrees in Electrical, Computer, and Optical Engineering.

- Department graduated an average of 95 Bachelors, 43 Masters and 6 Doctorates per year
- Rank 38th in the nation for the production of EE Bachelors by Engineering by Numbers in 2014

Director of the Center for Applied Optics (CAO) (2005 to 2010)
CAO is the focus of optics research at UAH with eleven faculty and staff in addition to twenty-three affiliated faculty. It is also the home for the Nano and Micro Devices Center which includes a 7,000 sq. ft. cleanroom facility.

- Research expenditures averaged $3M annually with funding coming from NASA and DOD
- CAO's personnel were in the design and testing of the James Webb Space Telescope that will be launched in 2020

Professor in the Electrical and Computer Engineering Department (2003 to Present)
Research interests include chemical and biological sensor, fiber optics, plasmonics, photonics and terahertz components mostly using liquid crystalline materials.

- Principal Investigator of >$6.8M in contract and grants from National Science Foundation, NASA, Army and Industry.
- Detected ppbs of DMMP (simulant of Sarin Gas) using capacitive transduction in liquid crystal based sensor
- Graduated eight doctoral students in the past ten years and have maintained active research program despite significant administrative responsibilities.

Corning Incorporated, Sullivan Research Center (June 1997- June 2003)

Liquid Crystal Technology Manager (2000 to 2003)
Managed the technology and pilot line manufacturing groups for the LC component in Corning PurePath™ wavelength selective switch and dynamic spectral equalizer product line. At its peak, the group consisted of 3 scientists, 15 engineers, 30 process technicians, and 6 support professionals.

- Turned around an unstable pilot operation with yield <5% to a stable operation with yield >45%
- Developed and delivered a next generation design that enable the product launch of the PurePath Wave Blocker (WB) with significant performance improvement in PDL, insertion loss, flexible channel shapes, etc.
- Brought four fundamentally different LC products to pilot production and sale.
- Best New Product Award at Optical Fiber Conference in 2000

Project Manager (1999 to 2000)
Managed a $3 million research project within a matrix organization to design and prototype a planar liquid crystal optical cross connect. The cross functional team included efforts in inorganic (PECVD) waveguides, polymer waveguides, LC alignment layers, deep RIE, optical design, electronics and micro fabrication.

- Demonstrated switching and built 4 x 4 prototype with electronics
- Developed both organic and inorganic high index(n = 1.7) planar waveguides
- Achieved >89 deg. wall verticality in RIE silica trenches. (Critical for low-loss)

Senior Research Scientist (1997 to 1999)
Individual contributor working in the thin film and surfaces core technology at Corning's Research Facility in Sullivan Park, Corning, NY.

- Invented method, developed process, and built initial high contrast LC SLMs that enabled the product launch of the PurePath™ wavelength selective switch (WSS) and dynamic spectral equalizer (DSE).
- 11 patents in display and telecommunication technologies

The University of Alabama in Huntsville (UAH) (August 1992-May 1997)

Associate Professor in Electrical and Computer Engineering Dept. (1996 to 1997)
Assistant Professor in Electrical and Computer Engineering Dept. (1992 to 1996)
Research interest include liquid crystalline devices particularly high resolution 2-D and 3D displays, integration of liquid crystal component on silicon VLSI electronic, diffractive optical elements(DOEs), CMOS analog design of LC drivers and optical receivers, polymer dispersed liquid crystals, and optical interconnects.

- Fabricated and tested the highest resolution tunable diffraction grating ever formed by electric field penetrating a liquid crystal film (Grating period of 0.8um)

- Developed, fabricated and tested compact VLSI drive circuitry for LC on silicon displays.
- Prototyped a real time auto stereoscopic 3-D display with motion parallax based on integrating an LCD with a diffractive optic overlay.

Selected Funded Research Projects

Principal Investigator on 41 contracts and grants with revenues of approximately $6.8M.

- "Enhancing Nano/Bio Sensors in the Terahertz Regime Via Research in Tunable Metamaterials Using Liquid Crystals," Alabama Commission on Higher Education (ACHE), $75,000 (9/2015 - 9/2018).
- "Electrically Tunable Epsilon-Near-Zero Perfect Light Absorbers for Color Filter and Biosensing Applications," ACHE, $50,000 (9/2016 - 9/2018).
- (Co-I ; PI, Dr. Laurie Joiner) "Enhancing Undergraduate Education in Signals and Signal Processing using Ultrawideband Radar," National Science Foundation (NSF), $199,220 (9/2013 - 8/2017).
- "Opto-MicroFluidic Sensors Using Liquid Crystals," ACHE, $75,000, 9/2012 -8/2015.
- "Enhancing Alabama's Research Capability in Nanotechnology," NSF EPSCoR, $458,994, (9/2011 - 8/2014).
- "Advanced Optical Fabrication and Testing," NASA Marshall Space Flight Center (MSFC), $499,982 (9/2009 - 11/2010).
- "MRI: Acquisition of Deterministic Polishing Tool," NSF, $851,725, (9/2009 - 8/2012).
- "Integration of MEMs, Photonics and Micro-fluidics," NASA MSFC, $557,536, (9/2009 - 8/2010).
- "Center for Optical Sensing and Spectroscopy," NSF EPSCoR, $100,000, (9/2008 - 8/2013).
- "Center for Interdisciplinary Discovery via Engineered Nanotechnology," NSF EPSCoR, $450,976 (9/2008 - 8/2013).
- "Bridging Nanotechnology to Device Realization," NASA Goddard Space Flight Center (GSFC), $673,478, (9/2007 - 3/2011).
- "Optical Materials: Electronics on Glass," NASA MSFC, $299,869 (10/2006 - 11/2010).
- "Chemical and Biological Sensors with Passive Telemetry," NASA MSFC, $148,832 (1/2006 -1 2/2007).
- "Alabama Center for Nanostructure Materials," NSF, $120,000, (5/2005 - 10/2008).

- "Capacitive Sensing for LC Chemical and Biological Sensors," NSF, $310,127, (8/2004 - 7/2008).

Program Manager for:

- W31P4Q-15-D-0062 : "Mission Support of Weapon Systems, Sub-systems, and Component and Manufacturing Technologies," US Army Aviation and Missile Research Development and Engineering Command, $48.6M, (9/2015 - 9/2018)

Patents

-1- "Systems and methods for tuning resonators," John D. Williams and Robert G. Lindquist, Assignee: University of Alabama in Huntsville, US Patent #9,722,566 (August, 2017)

-2- "Systems and methods for localized surface plasmon resonance sensing," Yongbin Lin, Robert G. Lindquist, and Yang Zou, Assignee: University of Alabama in Huntsville, US Patent #8,879,065 (November, 2014)

-3- "Wavelength compensation in a WSXC using off-voltage control," J. Michael Harris and Robert G. Lindquist, Assignee: Corning Incorporate, US Patent #6,775,044 (August, 2004)

-4- "Spatial light modulators with improved inter-pixel performance," Lisa Caracci, John Kondis, Robert G. Lindquist, Rui-Qing Ma, Carina Reisin, and Brad Scott, Assignee: Corning Incorporate, US Patent #6,710,758 (March, 2004)

-5- "Wavelength compensation in a WSXC using off-voltage control," J. Michael Harris and Robert G. Lindquist, Assignee: Corning Incorporate, US Patent #6,567,202 (May, 2003)

-6- "Low-index waveguide liquid crystal cross-connect," Stephen J. Caracci, Thomas M. Leslie, Robert John Kondis, Robert G. Lindquist, Rui-Qing Ma, and James V. Suggs, Assignee: Corning Incorporate, US Patent #6,563,973 (May, 2003)

-7- "Liquid crystal planar non-blocking NxN cross-connect," Thomas Leslie and Robert G. Lindquist, Assignee: Corning Incorporate, US Patent #6,559,921 (May, 2003)

-8- "Wavelength selective cross-connect switch using a MEMS shutter array," Robert G. Lindquist, Assignee: Corning Incorporate, US Patent #6,535,311 (March 2003)

-9- "Symmetric wavelength selective switch for interconnecting two WDM rings," Christopher P. Brophy and Robert Lindquist, Assignee: Corning Incorporate, US Patent #6,532,318 (March 2003)

-10- "Variable delay device for an optical component such as a polarization mode dispersion compensator," Dipakbin Q. Chowdhury, Robert G. Lindquist and Ashiqur Rahman, Assignee: Corning Incorporate, US Patent #6,417,948 (July 2002)

-11- "Variable delay device for an optical component such as a polarization mode dispersion compensator," Dipakbin Q. Chowdhury, Robert G. Lindquist and Ashiqur Rahman, Assignee: Corning Incorporate, US Patent #6,417,948 (July 2002)

-12- "Lateral field based liquid crystal electro-optic polarizer," Robert G. Lindquist, Assignee: Corning Incorporate, US Patent #6,388,730 (May 2002)

-13- "Electronic display device for simultaneously displaying 2D and 3D images," Venkata Bhagavatula and Robert G. Lindquist, Assignee: Corning Incorporate, US Patent #6,137,456 (October 2000)

Publications

Refereed Articles:

-1- "Magnetic and Optical Study of Nematic Liquid Crystal E7 Mixed Fe3O4 Ferrofluid," A. Alomari, M. Pour and R. G. Lindquist, in *IEEE Transactions on Magnetics*, vol. 55, no. 12, pp. 1-7, Dec. 2019, Art no. 4601007.

-2- "Tunabilty of terahertz metamaterials using liquid crystal,"Emin Gulduren, Abubaker M. Tareki, and Robert G. Lindquist, *Proc. SPIE 10917, Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XII*, 1091724 (1 March 2019); https://doi.org/10.1117/12.2508923

-3- "A Reconfigurable Microstrip Patch Antenna Using Liquid Crystals,"A. Alomari, M. Pour and R. Lindquist, *2018 6th IEEE International Conference on Wireless for Space and Extreme Environments* (WiSEE), Huntsville, AL, USA, 2018, pp. 68-70.

-4- "Label-free detection of DNA hybridization with a compact LSPR-based fiber-optic sensor," Savannah Kaye, Zheng Zeng, Mollye Sanders, Krishnan Chittur, Paula Koelle, Robert Lindquist, Upender Manne, Yongbin Lin, and Jianjun Wei, *Analyst*, 142, 1974-1981, (2017). doi: 10.1039/C7AN00249A

-5- "Investigation of tunable terahertz metamaterial perfect absorber with anisotropic dielectric liquid crystal," Mohammed Hokumabadi, Abubaker Tareki, Elmer Rivera, Patrick Kung, Robert Lindquist, and Seongsin Kim, *AIP Advances*, 7, 015102 (2017).

-6- "Terahertz Transparent Electrode Using Tripod Metal Aperture Array," A. M. Tareki; R. G. Lindquist; W. Kim; M. S. Heimbeck; J. Guo, *IEEE Trans. Terahertz Science and Technology* , vol.99, (2016), doi: 10.1109/TTHZ.2016.2625044.

-7- "Tunable amplitude and phase modulation in terahertz regime using transverse stratified configuration," D. Lo Forti, R. G. Lindquist, and M. S. Heimbeck, *Progress In Electromagnetics Research*, Vol. 150, 59-71, (2015). http://www.jpier.org/pier/pier.php?paper=14092002

-8- "An enhanced LSPR fiber-optic nanoprobe for ultrasensitive detection of protein biomarkers," Mollye Sanders, Yongbin Lin, Jianjun Wei, Taylor Bono, Robert G. Lindquist, Biosensors and Bioelectronics, Volume 61, Pages 95-101, (2014).

-9- "Liquid Crystal Sensor Microchip," Hassanzadeh, A.; Lindquist, R.G., *Sensors Journal, IEEE*, vol.12, no.5, pp.1536,1544, (2012).

-10- "Design of an a-Si:H Interface Circuit for Liquid Crystal Chemical and Biological Sensor Array," Hassanzadeh, A.; Lindquist, R.G.; Dashen Shen, *Sensors Journal, IEEE* , vol.12, (2012).

-11- "Influence of the bias voltage on surface-driven orientational transitions for liquid crystal based chemical and biological sensors," Y. Zou, J. Namkung, Y. Lin, D. Ke and R. G. Lindquist, *J. Phys. D: Appl. Phys.* 44, (2011).

-12- "A reflection-based localized surface plasmon resonance fiber-optic probe for biochemical sensing," Y. Lin, Y. Zou and R. Lindquist, *Biomedical Optical Express*, 2, 478-484, (2011).

-13- "Interference colors of nematic liquid crystal films at different applied voltages and surface anchoring conditions," Y. Zou, J. Namkung, Y. Lin, D. Ke and R. Lindquist, *Optics Express* 19, 3297-3303, (2011).

-14- "E-beam patterned gold nanodot arrays on optical fiber tips for localized surface plasmon resonance biochemical sensing," Y. Lin, Y. Zou, Y. Mo, J. Guo and R. Lindquist, *Sensors* 10, 9397-9406, (2010).

-15- "Gravitational field-induced orientational transition of aligned nematic liquid crystals," Y. Zou, Y. Lin, J. Namkung, D. Ke and R. Lindquist, *Liquid Crystals* 37, 1165-1169, (2010). (Shortlisted for the Luckhurst-Samulski Prize 2010)

-16- "Optical monitoring of anchoring change in vertically aligned thin liquid crystal film for chemical and biological sensor," Y. Zou, J. Namkung, Y. Lin and R. G. Lindquist, *Applied Optics* 49, 1865-1869 (2010)

-17- "Capacitive Techniques to Monitor of Anchoring Energy for Liquid Crystal Sensors." Jun Namkung, Yang Zou, Aladdin Abu-Abed, and Robert G. Lindquist, IEEE Sensor Journal, *IEEE Sensor Journal*,, Vol. 10, No. 9, (2010).

-18- "Surface plasmon resonance in nanostructure metal films under the Kretschmann configuration," H. Leong, J. Guo, R. Lindquist, and Q. Liu, Journal of Applied Physics, vol. 106, p. 124314, (2009).

-19- "Demonstration of an ultra-wideband optical fiber inline polarizer with metal nano-grid on the fiber tip," Y. Lin, J. Guo and R. Lindquist, Optics Express, vol. 17, pp: 17206-18393, Sept. 28, (2009).

-20- "Capacitive Techniques to Monitor Anchoring Energy in Liquid Crystal Based Sensors," J. Namkung, Y. Zou, A. Hassanzadeh, A. Abu-abed, and R. Lindquist, IEEE Sensor and Application Symposium, page(s): 114-117 (2009).

-21- "Optical tracking of the director axis in liquid crystal Sensors,"Abu-Abed, A.S.; Lindquist, R.G. IEEE Sensor and Application Symposium, page(s): 245-248 (2009).

-22- "Capacitive Transduction for Liquid Crystal – Based Sensors : Part II," Alaeddin Abu-Abed, Robert Lindquist, *IEEE Sensor Journal*, Vol. 8, No.9, pp 1557-1564, (2008).

-23- "Capacitive Interdigitated Sensor with Inhomogeneous Nematic Liquid Crystal Film," Alaeddin Abu-Abed, Robert Lindquist, *Progress in Electromagnetic Research B*, Vol. 7, 75-87, (2008).

-24- "Flat top liquid crystal tunable filter using coupled Fabry-Perot Cavities," Shadi A. Alboon and Robert G. Lindquist, *Optics Express*, Vol. 16, Issue 1, pp. 231-236 (2008).

-25- "Capacitive Transduction for Liquid Crystal – Based Sensors : Part I," Alaeddin Abu-Abed, Woo-Hyuck Choi, and Robert Lindquist , *IEEE Sensor Journal*, Vol. 7, No.12, pp 1617-1624, (2007).

-26- "Capacitive Based Liquid Crystal Chemical and Biological Sensors," Abu-Abed, A.; Lindquist, R.G.; Jovanov, S.; Jovanov, E.; Jun Namkung; Abbott, N., *IEEE Sensor 2007 Proceeding*, Atlanta Georgia, Page(s): 1040-1043(2007)

-27- "Capacitive Transduction in Partially Disordered Systems: Application to LC-Based Biosensors," Alaeddin Abu-Abed and Robert Lindquist, *SAS 2007 Proceedings*, San Diego, CA, (2007).

-28- "Liquid Crystal Sensors with Capacitive Transduction," Robert Lindquist, Alaeddin Abu-Abed, Woo-Hyuck Choi, "*IEEE Sensor 2006 Proceeding*, Daegu, Korea, (2006).

-29- "Model of a MEMS sensor using a common gate MOSFET differential amplifier", D.J. Coe, J.M. English, T.J. Kaiser and R.G Lindquist, *Journal of Physics D, Applied Physics*, Vol. 39, pp 4353-4358, (2006).

-30- "Design of a MEMS Accelerometer using an Integrated Common Gate Differential MOSFET Amplifier", D.J. Coe, J.M. English, T.J. Kaiser and R.G Lindquist, *Sensor Letters*, Vol.4, 1-7, (2006).

-31- "Stability of pre-tilt angle and polar anchoring strength and its impact on the performance of liquid crystal devices," R. Ma, R. G. Lindquist, and D. Acquard, *Opt. Express* **11,** 3649-3657 (2003),

-32- "Three-Dimensional Display Utilizing a Diffractive Optical Element and an Active Matrix Liquid Crystal Display", G. Nordin, M. Jones, J. Kulick, R.G. Lindquist, and Stephen Kowel, *Optical Engineering,* vol. 35, no. 12, pp. 3404-12, (1996)

-33- "An Optoelectronic Design of the Simultaneous Optical Multiprocessor Exchange Bus," R.G. Lindquist, J. Kulick, W. Cohen, R. Gaede, B. Wells, M. Abushagur, D. Shen, C. Katasinis, and S.T. Kowel, *SPIE Photonic West Symposium on Optoeleconic Interconnects*, *SPIE Proceedings Vol. 3005*, pp.303-313 (1997).

-34- "Low-Coherence Reflectometry Based on DFWM in a Thin Liquid Layer," V. Fleurov, D. Brown, A. Dergachev, S. Mirov, and R.G. Lindquist, Nonlinear Optical Liquids, *SPIE Proceedings Vol. 2853*, pp.126-134 (1996).

-35- "High-resolution liquid crystal diffractive optics, " S.T. Kowel, R.G. Lindquist, G.P. Nordin, M. Friends, and J.H. Kulick, *IS&T/SPIE symposium on Electronic Imaging: Science & Technology*, San Jose, CA (1996) (invited Paper).

-36- "Presentation and demonstration of a full-color ICVision holographic stereogram display," J.H. Kulick, M. Jones, G.P. Nordin, R.G. Lindquist, and S.T. Kowel, *IS&T/SPIE Symposium on Electronic Imaging: Science & Technology*, San Jose, CA (1996) (invited Paper).

-37- " A Pixel-Scale Digital-to-Analog Converter for Liquid Crystal on VLSI Displays," A. Thomsen, R.G. Lindquist, J.H. Kulick, P.J. Nasiatka, G.P. Nordin, and S.T. Kowel, *IEEE Transaction on Circuits and Systems I*, 42(9), (1995).

-38- "A Real-Time 3-D Display Based on the Partial Pixel Architecture," M. Jones, G. Nordin, J. Kulick, R.G. Lindquist, and S. Kowel, *Optics Letters*, 20 (12), (1995)

-39- "Pulse-width modulation drive technique for high-resolution liquid-crystal gratings," R.G. Lindquist, G.P. Nordin, A. Thomsen, P.J. Nasiatka, J.H. Kulick, and S.T. Kowel, *Optics Letters*, 20 (5), (1995).

-40- "All-Optical Switching of Infrared Optical Radiation Using Isotropic Liquid Crystal, " P.G. LoPresti, P. Zhou, R.G. Lindquist, and I.C. Khoo, *IEEE Journal of Quantum Electronics*, 31 (4), (1995).

-41- "A Liquid Crystal-on-Silicon Implementation of the Partial Pixel 3-D Display Architecture," G.P. Nordin, J.H. Kulick, R.G. Lindquist, P.J. Nasiatka, M.W. Jones, M. Friends, and S.T. Kowel, *Applied Optics*, 34 (19), (1995).

-42- "Electrostatic and Diffraction Analysis of a Liquid Crystal Device Utilizing Fringing Fields: Applications to 3-D Displays," J. Kulick, J. Jarem, R.G. Lindquist, S. Kowel, M. Friends, and T. Leslie, *Applied Optics*, 34 (11), (1995).

-43- "Partial Pixel: A 3-D Diffractive Display Architecture," J. Kuick, G.P. Nordin, A. Parker, S. Kowel, R.G. Lindquist, M. Jones, and P. Nasiatka, *Journal of Optical Society of America A*. 20 (1), (1995).

-44- "Demonstration of a Novel 3-D Autostereoscopic Display," G.P. Nordin, J. Kulick, M. Jones, P. Nasiatka, R.G. Lindquist, and S. Kowel, *Optics Letters*, 19 (12), (1994).

-45- "High Resolution Liquid Crystal Phase Grating Formed by Fringing Fields From Interdigitated Electrodes," R.G. Lindquist, J. Kulick, G. Nordin, J. Jarem, S.T. Kowel, M. Friends, and T.M. Leslie, *Optics Letters*, 19 (9), (1994).

-46- "Isotropic Liquid Crystalline Film and Fiber Structures for Optical Limiting Application," I.C. Khoo, S. Lee, P.G. LoPresti, R.G. Lindquist, and H. Li, *Int. J. Nonl. Opt. Phys*., 2 (4), (1993).

-47- "Infrared and Visible Laser-Induced Thermal and Density Optical Nonlinearities in Nematic and Isotropic Liquid Crystals, "R.G. Lindquist, P.G. LoPresti, and I.C. Khoo, *SPIE vol.1692* (1992).

-48- "Dynamics of Picosecond Laser Induced Density, Temperature, Flow and Reorientational Effects in the Mesophases of Liquid Crystals," I.C. Khoo, R.G. Lindquist, R.R. Michael, R.J. Mansfield, and P.G. LoPresti, *J of Applied Physics* 69 (7), 3853-3859 (1991).

-49- "Experimental Studies of the Dynamics and Parametric Dependencies of Total-Internal-Reflection to Transmission Switching and Limiting Effects," I.C. Khoo, R.R. Michael, R.J. Mansfield, R.G. Lindquist, P. Zhou, C. Cipparone, and F. Simoni, *JOSA B* 8 (7), 1464-1470 (1991).

-50- "Picosecond-Millisecond Optical Nonlinearities of Liquid Crystals for Limiting and Switching Applications," I.C. Khoo, R.G. Lindquist, R.R. Michael, R.J. Mansfield, P. Zhou, and P.G. LoPresti, *SPIE vol. 1307*, 336-349 (1990).

-51- "Transient and Stationary Wavemixing and Interface Switching with Liquid Crystals," I.C. Khoo, R.R. Michael, R.G. Lindquist, P. Zhou, and R.J. Mansfield, *Mol. Cryst. Liq. Cryst.* 179, 163-172 (1990).

-52- "Quantitative Analysis of Picosecond Transient Multiwave-Mixing-Mediated Beam Amplification Effect in Silicon," I.C. Khoo, P. Zhou, R.G. Lindquist, and P.G. LoPresti, *Phys. Rev. A 41*, 408-413 (1990).

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