EXECUTIVE SUMMARY

Internationally published and invited researcher/entrepreneur/professor with 12 years professional experience in industrial laboratories, successful founder of a company, and 19 years experience as a professor.

- **Researcher**: Authored or co-authored ~**300** refereed journal and conference publications; **8285** total citations, and an h-index of **49** (Google Scholar). I am considered a foremost expert in optoelectronic packaging and integration, micro-electro-mechanical systems, and energy.
- **Entrepreneur**: I am author of 87 issued patents; co-founded *Aralight* to commercialize advanced optoelectronic techniques I have invented, raising $10 million venture capital.
- **Professor**: As Principal Investigator at the University of Delaware (UD), I have raised ~ $10 million in grants in energy efficiency, optoelectronics, fiber sensors, and photovoltaics. I have graduated 6 PhD, and 17 MS students and developed 4 new courses.

EDUCATION AND TRAINING

• University of California at Santa Barbara	Electrical Engineering	BS ‘83
• Princeton University	Electrical Engineering	MA’85
• Princeton University	Electrical Engineering	PhD ’88

PROFESSIONAL EXPERIENCE

2018- **Professor, University of Delaware**

I currently have a group of 2 PhD students working in the fields of optoelectronic packaging and integration, renewable energy and energy systems. While here at the University of Delaware, I have authored 31 journal publications and 49 conference proceedings.

2002-2018 **Associate Professor, University of Delaware**

2000-2002 **Chief Scientist, Aralight, Inc.**

This startup was formed from Lucent to commercialize the integrated two-dimensional vcsel/detector-circuit chip technology that I invented at Bell Labs. Starting with four of us, we raised $10 million and grew our organization to 35 people. I established technical directions, managed intellectual property, and made prototypes of our first product, which performed flawlessly at the 2002 Optical Fiber Communications Conference.

1988-2000 **Member of Technical Staff, AT&T, Bell Labs, AT&T (1988-2006), Lucent Technologies**

I was an “inventor-on-demand” routinely providing new device technology to satisfy system requirements. I view myself as a physical solution maker and problem solver, both theoretical and experimental, not attached to any particular technology, but developing in any platform that meets the requirements, from micromechanics to optics to high-speed electronics.

NOTABLE RECENT PUBLICATIONS

- Evaluation of 3D printed optofluidic smart glass prototypes (cited 26 times, Google Scholar); Daniel Wolfe, K.W. Goossen, Optics Express vol. 26, p. A85-A98 (2018).
- A signal acquisition system for non-intrusive load monitoring of residential electrical loads based on switching transient voltages (cited 18 times, Google Scholar); Cesar Duarte, Paul Delmar, Kenneth Barner, Keith Goossen, 2015 Clemson University Power Systems Conference (PSC), p. 1-6.
- Fiber Bragg grating sensors toward structural health monitoring in composite materials: Challenges and solutions (cited 554 times, Google Scholar); D Kinet, P Mégret, KW Goossen, L Qiu, D Heider, C Caucheteur, Sensors 14 (4), 7394-7419 (2014).

RECENT AWARDS AND PROFESSIONAL RECOGNITION

- Editor, Materials Special Issue on Advanced Structural Health Monitoring in Materials, 2020
- Editor, Materials Special Issue on Advanced Materials for Smart and Functional Windows, 2020
- 2015 Department of Energy Industrial Assessment Center Program Excellence in Research Award
- 2013 Best Paper Award, IEEE Optical Interconnects Conference, "Loss analysis for a two wire optical waveguide for chip-to-chip communication"
- 2012 Department of Energy Industrial Assessment Center Program Center of Excellence Award
- Senior Member, IEEE

RECENT INVITED TALKS AND PAPERS

- 2023 P2 Webinar on Energy Efficiency in Automotive and Metal Manufacturing.
- 2022 ECU Webinar on Energy Efficiency, "Savings opportunities in compressed air and refrigerated spaces."
- 2020 Manufacturing PACK Expo, "Energy and water savings, and emission reduction, in food/beverage plants."
- 2019 Rochester Institute of Optics Optics Colloquium, "Optofluidic Smart Glass for optically-configurable building envelopes and smart windows."
- 2018 Photonics Media Webinar, "Materials and Methods for Smart Glass, Smart Windows, and Building Shells."
- 2017 Delaware Annual Energy Conference, "Energy policy principles based on human perception to increase energy audit recommendation implementation rates"
- 2017 Department of Natural Resources and Environmental Control (DNREC) Analytical Support Conference, "The nexus of energy and environmental efficiency measures"
- 2014 Optics and Photonics News, "Negawatts: Optics, Photonics, and Energy Savings"
- 2014 Dupont Sustainability Conference, "Energy efficiency principles in supply chains"
- 2012 Greentouch Symposium on Energy Efficiency in Telecommunications, "Energy efficiency in data centers and telecommunications networks"

PHD DISSERTATIONS SUPERVISED

1. Jonathan Dickason, "Processing and Packaging for Large Format Infrared LED Emitter Arrays for Scene Generation" (2017)
2. Dan Wolfe, "Low Cost Controllable Optofluidic Smart Glass for Energy Efficiency, Thermal Management, and Privacy Applications" (2017); currently Forensic Engineer & Scientist, ARCCA Inc.
3. Cesar Antonio Duarte Gualdron, "Non-intrusive monitoring of electrical loads based on switching transient voltage analysis: Signal acquisition and features extraction" (2013); currently Professor at Industrial University of Santander School of Electrical, Electronic and Telecommunications Engineering.
4. Cory Budischak, "What will be the role of solar hydrogen in our future energy system?" (2012); currently Department Chair, Energy Technologies at Delaware Technical Community College.
5. Liang Qiu, "Free space optical coupling of fiber optic sensors integrated with composite structures" (2011); currently Senior Optical Transceiver Designer at Intel Corporation.
6. Mike Teitelbaum, "Optical data porting to networks embedded in composite materials" (2009); currently Patent Examiner at USPTO.

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MASTER'S THESES SUPERVISED

1. Chase Lawrence, "Anti-reflection coatings for angled and prismatic surface," (2023)
2. Ian Guzman, "Classification Of High Frequency NILM Switching Transients based on Denoising Convolutional Neural Networks," (2022)
3. Sam Matylewicz, "Effect of white roof on ice rink refrigeration systems" (2021)
4. Andrew Sayanlar, Master's, Super luminescent emitter arrays (2020)
5. Matthew Sayanlar, Master's, Super luminescent emitter arrays (2020)
6. M.A. Sufian, "Investigation of the Christiansen Effect in indium tin oxide bulk material." (2020)
7. Sean Vernon, "Optofluidic smart glass response to differential temperature" (2019); currently Sustainability Manager at Delaware Army National Guard.
8. Xiaozhang Liu, "Optofluidic smart glass with wide angular performance" (2019); currently graduate student University of Washington.
9. Josh Dubey, "Investigation of an energy efficient pump speed control algorithm for controlling sump level" (2018); currently Engineer Exxon.
10. Fan Wang, "Photovoltaic system deployment optimization" (2014); currently graduate student at Philadelphia University.
11. Paul Del Mar, "Motor load detection for voltage transient based non-intrusive load monitoring" (2013); currently Manager - Project Development Engineering - Solar PV at Ameresco.
12. Kristen Pickelsimer, "On the use of scintillating fibers to concentrate solar light" (2011); currently Electronics Engineer, DOD.
13. Xi Long, "Design of a 9 stage 10 bit high speed pipeline analog to digital converter" (2010).
14. Gayathre Krishnan, "Doped and surface coated lithiated metal oxides—Synthesis and electrochemical performance as cathode materials in electrochemical energy storage devices" (2008); currently IT Professional, Wells Fargo.
15. Clara Paola Murcia Salazar, "THz emission from optimized p-doped silicon top devices" (2007); Cell Product Manager at MiaSolé.
16. Jyothi Gubbala, "An Automated process for embedding optical fibers in woven composites" (2005); currently Senior Marketing and Operations Manager, Confidential.
17. Ramsey Akl, "Above bandgap thermo-optic coefficient measurements for direct bandgap materials" (2005)

CURRENT GRADUATE STUDENTS SUPERVISED

18. Priscila Barbosa, PhD, Optofluidic smart glass with no refractive errors
19. (starting 6/25) Rocco Dumnich, PhD, Anti-reflective resonant structures

COURSES CREATED AND CURRENTLY TEACHING

1. ELEG 437 - Energy Systems: Energy flows are examined in our society including all sources, conversions and conversion efficiencies, and end uses. Both existing and alternative energy sources are presented, especially with regard to total resource availability. Thermodynamics of conversion efficiency is covered, as well as efficiency measures available in end use.
2. ELEG 427 - Terahertz and Millimeter-Wave Light Generation and Detection: Light is treated as an antenna phenomenon at radio wavelengths and a quantum effect near the visible. At terahertz frequencies and millimeter-wavelengths, these distinctions are blurred and both technologies exist. These technologies are described and a unified view of their principles is provided.

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3. ELEG 447 - Optical Properties of Solids: Techniques for the design of optical filters and optoelectronic devices with thin films and the fundamental electromagnetic and solid state physics that determine the optical properties of solids.

OTHER COURSES RECENTLY TAUGHT

1. ELEG 446 - Nanoelectronic Device Principles: Introduction to the operating principles of nanoscale optical and electronic devices, with emphasis on how nanotechnology and quantum mechanics affect devices with reduced sizes and dimensions. Develops the performance and limitations of devices based on quantum wells, wires, dots, and nanophase materials.
2. ELEG 460 - High Technology Entrepreneurship: Focuses on the critical financial, legal, scientific and engineering issues that must be confronted during the initial planning stages of a start-up enterprise. Students work in teams to develop a business plan for a real world/business product offering.

Expert Witness Cases

Cheetah Omni, LLC v. Tellabs, Inc., No. 6:11-cv-390 (E.D. Tex.). Expert witness for Tellabs, invalidity support, one expert report, one deposition.

JDS Uniphase Corporation v. CoAdna Photonics, Inc., No. 3:14-cv-*1091* (N.D. Calif.). Expert witness for CoAdna, one declaration.

Fujitsu Limited v. Tellabs, Inc., No. 1:09-cv-04350 (N.D. Ill.). Expert witness for Tellabs, one expert report.

*Finisar, Inc. v. Nistica, Inc.,*No. 4.13-cv-03345 (N.D. Calif.). Expert witness for Nistica, invalidity support and infringement defense, two expert reports, two depositions, numerous declarations, two trials and testimony, won both.

Oyster Optics LLC v. Cisco, etc. 2016-cv-01301 (Tex). Expert witness for Oyster, invalidity defense and infringement support, several declarations, three depositions.

Oyster Optics LLD v. Infinera, 2:16-cv-01295-JRG. Expert witness for Oyster, two expert reports, infringement and validity, single deposition covering both.

University of Michigan v. Leica, 5:19-cv-07470-LHK. Expert witness for U. Michigan, one declaration.

Capella Photonics, Inc. v. Fujitsu Network Communications, Inc., 2:20-CV-0076-JRG. Expert witness for Fujitsu, one expert report.

II-VI, Inc. v. Soto brothers, IPR2021-00085. Expert witness for II-VI, three declarations.

Oyster Optics LLD v. Ciena, 4:17-CV-05920-JSW. Expert witness for Oyster, two expert reports, infringement and validity, two depositions.

Oyster Optics LLD v. Cisco, 2:20-cv-00211-JRG. Expert witness for Oyster, two expert reports, infringement and validity, two depositions.

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Oyster Optics LLD v. Infinera, 2:19-cv-00257-JRG. Expert witness for Oyster, two expert reports, infringement and validity, two depositions.

In re Reexamination of: U.S. Patent No. 6,683,858, Declaration in support of validity.

In support of validity of U.S. Patent No. 10,394,268, Declaration in support of validity, one deposition.

SVV v. defendants, 6:22-cv-511-513-ADA, 6:22-cv-639-641-ADA, No. 6:22-cv-00311-313, Declaration in support of claim construction; expert report for non-infringement, expert report on comparability of licenses, one deposition, one trial.

Resonant Systems (Revel) v. defendants, Case No. 7:23-cv-00077-ADA, two declarations, one deposition.

Senko and other Respondents v. US Conec, Investigation No. 337-TA-1399, declaration in support of claim construction.

GRANTS (Current Research Support)

1. "Reduction of energy, water, and hazardous material technical assistance for automotive manufacturing and maintenance facilities in the mid-Atlantic region," EPA, 11/1/25-10/31/27; $81,000, PI.
2. "Delaware Sustainable Energy Utility Program in Energy Efficiency," Energize Delaware, 7/1/24 - 6/30/25; $162,000, PI.
3. "Reduction of energy, water, and hazardous material technical assistance for automotive manufacturing and maintenance facilities in the mid-Atlantic region," EPA, 10/1/22-9/30/25; $73,500, PI.
4. "Reduction of energy, water, and hazardous material technical assistance for metal manufacturing facilities in the mid-Atlantic region," EPA, 10/1/22-9/30/25; $192,000, PI.
5. "University of Delaware Industrial Assessment Center," Department of Energy, 9/1/22-8/31/26; $1,200,717, PI.

Total Current Funding: $1,709,217 ($577,679/year)

Previous contracts: (prior funding = $7,311,793)

6. "Delaware Sustainable Energy Utility Program in Energy Efficiency," Energize Delaware, 7/1/23 - 6/30/24; $150,000, PI.
7. "Delaware Army National Guard Energy Assessment Program," 9/1/22-7/31/24, $80,000, PI
8. "Delaware Sustainable Energy Utility Program in Energy Efficiency," Energize Delaware, 7/1/22 - 6/30/23; $150,000, PI.
9. "University of Delaware Industrial Assessment Center," Department of Energy, 9/1/19-8/31/22; $510,000, PI.
10. "Reduction of energy, water, and hazardous material technical assistance for automotive manufacturing and maintenance facilities in the mid-Atlantic region," EPA, 10/1/20-9/30/22; $138,800, PI.
11. "Delaware Sustainable Energy Utility Program in Energy Efficiency," Energize Delaware, 7/1/21-6/30/22; $90,000, PI.
12. "Delaware Sustainable Energy Utility Program in Energy Efficiency," Energize Delaware, 7/1/20-6/30/21; $87,000, PI.

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13. "Delaware Sustainable Energy Utility Program in Energy Efficiency," 7/1/17-6/30/20; $281,000, PI. (these were 3 grants, each FY).
14. "Delaware Army National Guard Energy Assessment Program," 7/1/17-6/30/20; $92,000, PI.
15. "Narrowed bandwidth SWIR obscurants," 4/1/19-3/31/20; $125,000, PI
16. "Comcast Energy Assessment Program," 10/1/19-1/31/20; $24,000, PI.
17. "Reduction of energy, water, and hazardous material technical assistance for food and beverage manufacturers in the mid-Atlantic region," EPA, 10/1/18-9/30/20; $223,232, PI.
18. "RF-blocking window," 4/1/18-3/31/19; $40,000, co-PI.
19. "Obscurants with SWIR window," 4/1/18-3/31/19; $50,000, PI.
20. "Two-Color Superlattice LED Arrays for Advanced Infrared Projection Systems," subcontract from U. Iowa/Army Research Laboratories, 8/1/13-8/31/17; I am only a consultant on this subcontract with ~ $10,000/year support. I will note that awarding of this contract depending upon successful production of chips in the preceding one-color contract. Production of two-color chips on this contract has been moved to U. Iowa with me consulting.
21. "Delaware Sustainable Energy Utility Program in Energy Efficiency," 9/1/13-6/30/17; $398,000, Principal Investigator.
22. "University of Delaware Industrial Assessment Center," Department of Energy, 10/1/11 – 9/31/16; $1,000,000, Principal Investigator and Director.
23. "High-Performance MWIR/LWIR Multi-spectral Superlattice LED Arrays for Advanced Infrared Projection Systems," subcontract from U. Iowa/Army Research Laboratories, 1/1/08-2/28/13; $900,000 (Goossen's part), co-Principal Investigator.
24. "Optical interconnects on VLSI," DARPA, 4/1/09-9/30/11, $60,000 (Goossen only), co-Principal Investigator.
25. "50% Efficient Solar Cells, Phase 3," DuPont/DARPA, ~$40,000 (Goossen only), 6/1/09-12/31/11, co-Principal Investigator.
26. "University of Delaware Industrial Assessment Center," Department of Energy, 9/1/06-9/31/11; ~$780,000, Principal Investigator and Director.
27. "Multifunctional Composite Materials and Structures for Lightweight Vehicle Protection," Army Research Laboratory, $460,000 (Goossen only), 2/1/03 – 2/28/12, co-Principal Investigator.
28. "High sensitivity thermal focal plane arrays," Epitaxial Technologies/Missile Defense Agency, $250,000, 2/1/08-1/31/10, Principal Investigator.
29. "Microelectronic Precision Optical Element Fabrication." Defense Advanced Research Projects Agency, $100,000, 8/15/07 – 8/14/08, Principal Investigator.
30. "50% Efficient Solar Cells, Phase 2B," DuPont/DARPA, $422,414 (Goossen only), 7/23/07 – 7/22/08, co-Principal Investigator.
31. "50% Efficient Solar Cells, Phase 1-2A," DuPont/DARPA, $157,539 (Goossen only), 7/23/07 – 7/22/08, co-Principal Investigator.
32. "MEMS-Based Athermal Modulating Retroreflector," Office of Naval Research, $200,000, 2/1/03-7/31/04, Principal Investigator.
33. "Increased Reliability VCSEL Arrays," DARPA, $75,000, 2/1/03-1/31/04, Principal Investigator.
34. "Terahertz Nanodevices for Communication, Imaging Sensing and Ranging," Air Force Office of Scientific Research, $195,837 (Goossen only), 2/1/03-7/31/06, co-Principal Investigator.
35. "Fabrication of a Terahertz Imaging System," DARPA, $100,000 (Goossen only), 10/1/03-1/31/05, co-Principal Investigator.
36. "Millimeter wave Imaging," Office of Naval Research, $75,000 (Goossen only), 2/1/03-1/31/05, co-Principal Investigator.

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37. “Role of Photonics in the Battlefield,” Army Research Office, $21,971 (Goossen only), 1/31/03-12/31/03, co-Principal Investigator.
38. “Optoelectronics Center,” DARPA, $15,000 (Goossen only), 9/1/02-8/31/03.

ENERGY AUDIT REPORT UPDATE

In 2024, 56 reports were submitted having approximately 500 recommendations.

JOURNAL PUBLICATIONS

1. Evaluation of 3D printed optofluidic smart glass prototypes; D. Wolfe and K.W. GOOSSEN, *Optics Express*, 26 (2), A85-A98 (2018).
2. 512x512, 100 Hz Mid-Wave Infrared LED Microdisplay System; Garrett A Ejzak, Jonathan Dickason, Joshua A Marks, Kassem Nabha, Rodney T McGee, Nicholas A Waite, Jake T Benedict, Miguel A Hernandez, Sydney R Provence, Dennis T Norton, John P Prineas, Keith W GOOSSEN, Fouad E Kiamilev, Thomas F Boggess, *Journal of Display Technology* Vol: 12 Issue: 10 Pages: 1139-1144 Published 2016.
3. Design of IIR Multi-Notch Filters Based on Polynomially-Represented Squared Frequency Response; Duarte, Cesar; Barner, Kenneth E.; GOOSSEN, Keith, *IEEE Transactions on Signal Processing* Vol: 64 Issue: 10 Pages: 2613-2623 Published 2016.
4. Initial Study on Controllable Roofing System to Tailor Building Solar Loads for Increased HVAC Efficiency; Wolfe, D.M and GOOSSEN, K.W., *Journal of Solar Energy Engineering-Transactions of The ASME* vol. 137 (2015).
5. Experiences with non-intrusive monitoring of distribution transformers based on the on-line frequency response; Gomez-Luna, E (Gomez-Luna, E.); Duarte, C (Duarte, C.) ; Aponte, G (Aponte, G.); Pleite, J (Pleite, J.)[3]; GOOSSEN, KW (Goossen, K. W.), *Ingenieria E Investigacion*, Vol: 35 Issue: 1 Pages: 55-59 (2015).
6. Theoretical study of the effects of strain balancing on the bandgap of dilute nitride InGaSbN/InAs superlattices on GaSb substrates; *Infrared Physics & Technology* Vol: 69 Pages: 211-217 (2015).
7. Negawatts: Optics, Photonics and Energy Savings; GOOSSEN, K., *Optics and Photonics News* 25 (2014).
8. Fiber Bragg Grating Sensors toward Structural Health Monitoring in Composite Materials: Challenges and Solutions; Kinet, Damien; Megret, Patrice; GOOSSEN, Keith W.; et al., *Sensors* 14 (2014).
9. 512 Individually Addressable MWIR LED Arrays Based on Type-II InAs/GaSb Superlattices; Dennis T. Norton, Jonathon T. Olesberg, Rodney T. McGee, Nick Waite, Jonathon Dickason, GOOSSEN, KW, John Lawler, Gerry Sullivan, Amal Ikhlassi, Fouad Kiamelev, Edwin J. Koerperick, Thomas F. Boggess, *IEEE Journal Quantum of Electron* **49** (2013).
10. Loss Analysis for a two-wire optical waveguide for chip-to-chip optical communication; J. Dickason and GOOSSEN, KW, *Optics Express* 21 (2013).
11. Dual-prism coupler for board-level free-space optical interconnects: Design and Simulations; Nair, R. GOOSSEN, KW, and Haney, M., *Optical Engineering* 51 (2012).
12. Lateral spectrum splitting concentrator photovoltaics: direct measurement of component and submodule efficiency; Xiaoting Wang, Nick Waite, Paola Murcia, Keith Emery, Myles Steiner, Fouad Kiamilev, KEITH GOOSSEN, Christiana Honsberg, Allen Barnett, *Progress in Photovoltaics: Research and Applications* 20 (2012).
13. Free-space input and output coupling to an embedded fiber optic strain sensor: dual-ended interrogation via transmission; Qiu, L., Heider, D., O’Brien, D.J., Wetzel, E.D., GOOSSEN, K.W., *Optical Engineering* 50 (2011)

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14. Progress in low-power switched optical interconnects; Ashok V. Krishnamoorthy, GOOSSEN, KW, William Jan, Xuezhe Zheng, Ron Ho, Guoliang Li, Richard Rozier, Frankie Liu, Dinesh Patil, Jon Lexau, Herb Schwetman, Dazeng Feng, Mehdi Asghari, Thierry Pinguet, and John E. Cunningham, *IEEE J. Quantum Electronics,* 47 (2011).
15. Cost-effective integration of plastic optical fiber and total internal reflection mirrors in printed circuit boards for parallel optical interconnects; Teitelbaum, M., O'Brien, D.J., Wetzel, E.D., GOOSSEN, K.W., *Optical Engineering* 49, (2010).
16. Non-pigtail Optical Coupling to Embedded Fiber Bragg Grating Sensors; Qiu, L., Heider, D., O'Brien, D.J., Wetzel, E.D., GOOSSEN, K.W., *Optical Engineering* 49, (2010).
17. Effect of Face Separation on Corner Cube Reflectors; Nair, R., Teitelbaum, M., GOOSSEN, K.W., *Optical Engineering* 49 (2010).
18. Printed Circuit Board based Modulated Retroreflector using three Large Area Quantum Well Modulators; Nair, R., Teitelbaum, M., GOOSSEN, K.W., *Optical Engineering* 48, (2009).
19. High Detectivity Dilute Nitride Strained Layer Superlattice Detectors for LWIR and VLWIR Applications; Leye, A., Hier, H., Fathimulla, A., Lecates, M., Kolodzey, J., GOOSSEN, K.W., Coppinger, M., Bhurgava, N., *Infrared Physics and Technology* 52, p. 310-316 (2009).
20. Very High Efficiency Solar Cell Modules; Barnett, Kirkpatrick, Honsberg, Moore, Wanlass, Emery, Schwartz, Carlson, Bowden, Aiken, Gray, Kurtz, Kazmerski, Steiner, Gray, Davenport, Beulow, Takacs, Shatz, Bortz, Jani, GOOOSSEN, K.W., Kiamilev, Doolittle, Ferguson, Unger, Schmidt, Christensen, Salzman, *Progress in Photovoltaics, Research and Applications,* v 17, April 2009, p. 75-83.
21. Mirrored line-of-sight input nodes for embedded optical waveguides; Teitelbaum, Michael E. (Dept. of Electr. & Comput. Eng., Univ. of Delaware); Yarlagadda, Shridhar; O'Brien, Daniel J.; Wetzel, Eric D.; GOOSSEN, KEITH W. Source: *Optical Engineering*, v 47, November 2008, p. 1-8.
22. Normal incidence free space optical data porting to embedded communication links; Teitelbaum, Michael E. (Dept. of Electr. & Comput. Eng., Univ. of Delaware); Yarlagadda, Shridhar; O'Brien, Daniel J.; Wetzel, Eric D.; GOOSSEN, KEITH W. Source: *IEEE Transactions on Components and Packaging Technologies*, v 31, March 2008, p. 32-38.
23. Fabrication and yield of large-area quantum-well modulators; GOOSSEN, K.W. (Dept. of Electr. & Comput. Eng., Univ. of Delaware) Prather, D. Source: *IEEE Photonics Technology Letters,* v 19, November 2007, p. 21-24.
24. Microelectromechanical etalon modulator designs with wide angular tolerance for free-space optical links; GOOSSEN, K.W. (Dept. of Electr. & Comput. Eng., Univ. of Delaware) Source: *IEEE Photonics Technology Letters*, v 18, n 8, April 2006, p 959-61
25. 1 × 12 VCSEL array with optical monitoring via flip-chip bonding; GOOSSEN, K.W. (Dept. of Electr. & Comput. Eng., Univ. of Delaware); Cunningham, J.E.; Krishnamoorthy, A.V. Source: *IEEE Photonics Technology Letters*, v 18, n 11, June 2006, p 1219-21
26. Optically absorbing metallization; GOOSSEN, K.W. (Dept. of Electr. & Comput. Eng., Univ. of Delaware) Source: *Journal of Electronic Materials*, v 34, n 9, Sept. 2005, p L34-6
27. Free-space optical link by microelectromechanical system array and corner cube reflector; Changping Luo (Dept. of Electr. & Comput. Eng., Univ. of Delaware); GOOSSEN, K.W. Source: *IEEE Photonics Technology Letters*, v 17, n 6, June 2005, p 1316-18
28. Terahertz emission from electrically pumped gallium doped silicon devices; Lv, P.-C. (Dept. of Electr. & Comput. Eng., Univ. of Delaware); Troeger, R.T.; Kim, S.; Ray, S.K.; GOOSSEN, K.W.; Kolodzey, J.; Yassievich, I.N.; Odnoblyudov, M.A.; Kagan, M.S. Source: *Applied Physics Letters*, v 85, n 17, 25 Oct. 2004, p 3660-2

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29. Optical microelectromechanical system array for free-space retrocommunication; Changping Luo (Dept. of Electr. & Comput. Eng., Univ. of Delaware); GOOSSEN, K.W. Source: *IEEE Photonics Technology Letters*, v 16, n 9, Sept. 2004, p 2045-7
30. A 36-channel parallel optical interconnect module based on optoelectronics-on-VLSI technology; Cook, C. (AraLight Inc., NJ, USA); Cunningham, J.E.; Hargrove, A.; Ger, G.G.; GOOSSEN, K.W.; Jan, W.Y.; Kim, H.H.; Krause, R.; Manges, M.; Morrissey, M.; Perinpanayagam, M.; Persaud, A.; Shevchuk, G.J.; Sinyansky, V.; Krishnamoorthy, A.V. Source: *IEEE Journal of Selected Topics in Quantum Electronics*, v 9, n 2, March-April 2003, p 387-99
31. Interference-based micromechanical spectral equalizers; Ford, J.E. (Dept. of Electr. & Comput. Eng., Univ. of California, La Jolla, CA, USA); GOOSSEN, K.W.; Walker, J.A.; Neilson, D.T.; Tennant, D.M.; Seo Yeon Park; Sulhoff, J.W. Source: *IEEE Journal of Selected Topics in Quantum Electronics*, v 10, n 3, May-June 2004, p 579-87
32. A tunable dispersion compensating MEMS all-pass filter; Madsen, C.K. (Lucent Technol. Bell Labs, Murray Hill, NJ, USA); Walker, J.A.; Ford, J.E.; GOOSSEN, K.W.; Nielsen, T.N.; Lenz, G. Source: *IEEE Photonics Technology Letters*, v 12, n 6, June 2000, p 651-3
33. 16×16 VCSEL array flip-chip bonded to CMOS VLSI circuit; Krishnamoorthy, A.V. (Lucent Technol. Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Chirovsky, L.M.F.; Rozier, R.G.; Chandramani, P.; Hui, S.P.; Lopata, J.; Walker, J.A.; D'Asaro, L.A. Source: *IEEE Photonics Technology Letters*, v 12, n 8, Aug. 2000, p 1073-5
34. Micromechanical gain slope compensator for spectrally linear optical power equalization; GOOSSEN, K.W. (Lucent Technol. Bell Labs, Holmdel, NJ, USA); Walker, J.A.; Neilson, D.T.; Ford, J.E.; Knox, W.H. Source: *IEEE Photonics Technology Letters*, v 12, n 7, July 2000, p 831-3
35. Triggered receivers for optoelectronics VLSI; Krishnamoorthy, A.V. (Lucent Technol., AT&T Bell Labs, Holmdel, NJ, USA); Rozier, R.G.; Woodward, T.K.; Chandramani, P.; GOOSSEN, K.W.; Tseng, B.J.; Walker, J.A.; Jan, W.Y.; Cunningham, J.E. Source: *Electronics Letters*, v 36, n 3, 3 Feb. 2000, p 249-50
36. Optoelectronic/VLSI; GOOSSEN, K.W. (Bell Labs, Lucent Technol., Holmdel, NJ, USA) Source: *IEEE Transactions on Advanced Packaging*, v 22, n 4, Nov. 1999, p 561-7
37. On the design of coplanar bond wires as transmission lines; GOOSSEN, K.W. (Bell Labs, Lucent Technol., Holmdel, NJ, USA) Source: *IEEE Microwave and Guided Wave Letters*, v 9, n 12, Dec. 1999, p 511-13
38. Electroabsorption in extremely shallow quantum wells: Comparison between theory and experiment; Chen, X. (Dept. of Phys., Univ. of Manchester Inst. of Sci. & Technol., UK); Earnshaw, M.P.; GOOSSEN, K.W.; Batty, W.; Allsopp, D.W.E.; Grey, R. Source: *Journal of Applied Physics*, v 85, n 10, 15 May 1999, p 7231-8
39. Implant-apertured and index-guided vertical-cavity surface-emitting lasers (I^2-VCSELs) Chirovsky, L.M.F. (AT&T Bell Labs, Murray Hill, NJ, USA); Hobson, W.S.; Leibenguth, R.E.; Hui, S.P.; Lopata, J.; Zydzik, G.J.; Giaretta, G.; GOOSSEN, K.W.; Wynn, J.D.; Krishnamoorthy, A.V.; Tseng, B.J.; Vandenberg, J.M.; D'Asaro, L.A. Source: *IEEE Photonics Technology Letters*, v 11, n 5, May 1999, p 500-2
40. Vertical-cavity surface-emitting lasers flip-chip bonded to gigabit-per-second CMOS circuits; Krishnamoorthy, A.V. (Bell Labs, Lucent Technol., Holmdel, NJ, USA); Chirovsky, L.M.F.; Hobson, W.S.; Leibengath, R.E.; Hui, S.P.; Zydzik, G.J.; GOOSSEN, K.W.; Wynn, J.D.; Tseng, B.J.; Lopata, J.; Walker, J.A.; Cunningham, J.E.; D'Asaro, L.A. Source: *IEEE Photonics Technology Letters*, v 11, n 1, Jan. 1999, p 128-30
41. The AMOEBA switch: an optoelectronic switch for multiprocessor networking using dense-WDM; Krishnamoorthy, A.V. (Lucent Technol., AT&T Bell Labs, Holmdel, NJ, USA); Ford, J.E.; Kiamilev, F.E.; Rozier, R.G.; Hunsche, S.; GOOSSEN, K.W.; Tseng, B.; Walker, J.A.; Cunningham, J.E.; Jan,

Resonant Systems, Inc., Ex. 2010
Sony Interactive Entertainment Inc., etc. v. Resonant Systems, Inc., IPR2024-00806

W.Y.; Nuss, M.C. Source: *IEEE Journal of Selected Topics in Quantum Electronics*, v 5, n 2, March-April 1999, p 261-75

42. Micromechanical fiber-optic attenuator with 3 μs response; Ford, J.E. (Lucent Lab., AT&T Bell Labs, Holmdel, NJ, USA); Walker, J.A.; Greywall, D.S.; GOOSSEN, K.W. Source: *Journal of Lightwave Technology*, v 16, n 9, Sept. 1998, p 1663-70
43. On the operational and manufacturing tolerances of GaAs-AlAs MQW modulators; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y.; Leibenguth, R. Source: *IEEE Journal of Quantum Electronics*, v 34, n 3, March 1998, p 431-8
44. Optoelectronic-VLSI: photonics integrated with VLSI circuits; Krishnamoorthy, A.V. (Lucent Technol., Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W. Source: *IEEE Journal of Selected Topics in Quantum Electronics*, v 4, n 6, Nov.-Dec. 1998, p 899-912
45. Parallel operation of 50 element two-dimensional CMOS smart-pixel receiver array; Woodward, T.K. (Lucent Technol., AT&T Bell Labs, Holmdel, NJ, USA); Lentine, A.L.; Krishnamoorthy, A.V.; GOOSSEN, K.W.; Walker, J.A.; Cunningham, J.E.; Jan, W.Y.; Tseng, B.T.; Hui, S.P.; Leibenguth, R.E. Source: *Electronics Letters*, v 34, n 10, 14 May 1998, p 936-7
46. Very large arrays of flip-chip bonded 1.55 μm photodetectors; GOOSSEN, K.W. (Lucent Technol., Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Zhang, G.; Walker, J.A. Source: *Journal of Lightwave Technology*, v 16, n 6, June 1998, p 1056-61
47. Large array of GaAs modulators and detectors flip-chip solder bonded to silicon CMOS using InGaP as the selective etch stop for GaAs substrate removal; Kuo, J.M. (AT & T Bell Labs, Murray Hill, NJ, USA); Wang, Y.C.; GOOSSEN, K.W.; Chirovsky, L.M.F.; Hui, S.P.; Tseng, B.T.; Walker, J.; Lentine, A.L.; Leibenguth, R.E.; Livescu, G.; Jan, W.Y.; Cunningham, J.E.; D'Asaro, L.A.; Ron, A.; Dahringer, D.; Kossives, D.; Bacon, D.D.; Morrison, R.L.; Novotny, R.A.; Buchholz, D.B.; Mayo, W.E. Source: *Journal of Crystal Growth*, v 175-1762, May 1997, p 971-6
48. Dual-function detector-modulator smart-pixel module; Krishnamoorthy, A.V. (Bell Labs, Lucent Technol., Holmdel, NJ, USA); Woodward, T.K.; GOOSSEN, K.W.; Walker, J.A.; Hui, S.P.; Tseng, B.; Cunningham, J.E.; Jan, W.Y.; Kiamilev, F.E.; Miller, D.A.B. Source: *Applied Optics*, v 36, n 20, 10 July 1997, p 4866-70
49. Demultiplexing 2.48-Gb/s optical signals with a CMOS receiver array based on clocked-sense-amplifiers; Woodward, T.K. (Lucent Technol., AT&T Bell Labs, Holmdel, NJ, USA); Lentine, A.L.; GOOSSEN, K.W.; Walker, J.A.; Tseng, B.T.; Hui, S.P.; Lothian, J.; Leibenguth, R.E. Source: *IEEE Photonics Technology Letters*, v 9, n 8, Aug. 1997, p 1146-8
50. Measurement of effective drift velocities of electrons and holes in shallow multiple-quantum-well p-i-n modulators; Ching-Mei Yang (Center for Laser Studies, Univ. of Southern California, Los Angeles, CA, USA); Canoglu, E.; Garmire, E.; GOOSSEN, K.W.; Cunningham, J.E.; Jan, W.Y. Source: *IEEE Journal of Quantum Electronics*, v 33, n 9, Sept. 1997, p 1498-506
51. Modulator-driver circuits for optoelectronic VLSI; Woodward, T.K. (Lucent Technol., AT&T Bell Labs, Holmdel, NJ, USA); Krishnamoorthy, A.V.; GOOSSEN, K.W.; Walker, J.A.; Tseng, B.; Lothian, J.; Hui, S.; Leibenguth, R. Source: *IEEE Photonics Technology Letters*, v 9, n 6, June 1997, p 839-41
52. Optoelectronic VLSI switching chip with greater than 1 Tbit/s potential optical I/O bandwidth; Lentine, A.L. (Bell Labs, Lucent Technol., Naperville, IL, USA); GOOSSEN, K.W.; Walker, J.A.; Cunningham, J.E.; Jan, W.Y.; Woodward, T.K.; Krishnamoorthy, A.V.; Tseng, B.J.; Hui, S.P.; Leibenguth, R.E.; Chirovsky, L.M.F.; Novotny, R.A.; Buchholz, D.B.; Morrison, R.L. Source: *Electronics Letters*, v 33, n 10, 8 May 1997, p 894-5
53. Progress in optoelectronic-VLSI smart pixel technology based on GaAs/AlGaAs MQW modulators; Krishnamoorthy, A.V. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W. Source: *International Journal of Optoelectronics*, v 11, n 3, May-June 1997, p 181-98

Resonant Systems, Inc., Ex. 2010
Sony Interactive Entertainment Inc., etc. v. Resonant Systems, Inc., IPR2024-00806

54. Operation of a single-ended 550 Mbit/s, 41 fJ, hybrid CMOS/MQW receiver-transmitter; Krishnamoorthy, A.V. (AT&T Bell Labs, Holmdel, NJ, USA); Woodward, T.K.; GOOSSEN, K.W.; Walker, J.A.; Lentine, A.L.; Chirovsky, L.M.F.; Hui, S.P.; Tseng, B.; Leibenguth, R.; Cunningham, J.E.; Jan, W.Y. Source: *Electronics Letters*, v 32, n 8, 11 April 1996, p 764-6

55. A 1.5 Mb/s operation of a MARS device for communications systems applications; Walker, J.A. (Lucent Technol., Holmdel, NJ, USA); GOOSSEN, K.W.; Arney, S.C.; Frigo, N.J.; Iannone, P.P. Source: *Journal of Lightwave Technology*, v 14, n 10, Oct. 1996, p 2382-6

56. Clocked-sense-amplifier-based smart-pixel optical receivers; Woodward, T.K. (Bell Labs. Innovations, Lucent Technol., Holmdel, NJ, USA); Krishnamoorthy, A.V.; GOOSSEN, K.W.; Walker, J.A.; Cunningham, J.E.; Jan, W.Y.; Chirovsky, L.M.F.; Hui, S.P.; Tseng, B.; Kossives, D.; Dahringer, D.; Bacon, D.; Leibenguth, R.E. Source: *IEEE Photonics Technology Letters*, v 8, n 8, Aug. 1996, p 1067-9

57. Field-induced exciton ionization studied by four-wave mixing; Koch, M. (Fachbereich Phys., Philipps-Univ., Marburg, Germany); von Plessen, G.; Meier, T.; Feldmann, J.; Koch, S.W.; Thomas, P.; Gobel, E.O.; GOOSSEN, K.W.; Kuo, J.M.; Kopf, R.F. Source: *Hot Carriers in Semiconductors*, 1996, p 3-6

58. Observation of a magnetic-field-induced transition in the behavior of extremely shallow quantum well excitons; Fritze, M. (AT&T Bell Labs, Holmdel, NJ, USA); Perakis, I.E.; Getter, A.; Knox, W.; GOOSSEN, K.W.; Cunningham, J.E.; Jackson, S.A. Source: *Physical Review Letters*, v 76, n 1, 1 Jan. 1996, p 106-9

59. High-speed optoelectronic VLSI switching chip with >4000 optical I/O based on flip-chip bonding of MQW modulators and detectors to silicon CMOS; Lentine, A.L. (Bell Lab., Lucent Technol., Naperville, IL, USA); GOOSSEN, K.W.; Walker, J.A.; Chirovsky, L.M.F.; D'Asaro, L.A.; Hui, S.P.; Tseng, B.J.; Leibenguth, R.E.; Cunningham, J.E.; Jan, W.Y.; Kuo, J.-M.; Dahringer, D.W.; Kossives, D.P.; Bacon, D.D.; Livescu, G.; Morrison, R.L.; Novotny, R.A.; Buchholz, D.B. Source: *IEEE Journal of Selected Topics in Quantum Electronics*, v 2, n 1, April 1996, p 77-84

60. Exciton ionization induced by an electric field in a strongly coupled GaAs/$Al_xGa_{1-x}As$ superlattice; von Plessen, G. (Dept. of Phys., Philipps-Univ., Marburg, Germany); Meier, T.; Koch, M.; Feldmann, J.; Thomas, P.; Koch, S.W.; Gobel, E.O.; GOOSSEN, K.W.; Kuo, J.M.; Kopf, R.F. Source: *Physical Review B (Condensed Matter)*, v 53, n 20, 15 May 1996, p 13688-93

61. A hybrid-SEED smart pixel array for a four-stage intelligent optical backplane demonstrator; Rolston, D.R. (Dept. of Electr. Eng., McGill Univ., Montreal, Que., Canada); Plant, D.V.; Szymanski, T.H.; Hinton, H.S.; Hsiao, W.S.; Ayliffe, M.H.; Kabal, D.; Venditti, M.B.; Desai, P.; Krishnamoorthy, A.V.; GOOSSEN, K.W.; Walker, J.A.; Tseng, B.; Hui, S.P.; Cunningham, J.E.; Jan, W.Y. Source: *IEEE Journal of Selected Topics in Quantum Electronics*, v 2, n 1, April 1996, p 97-105

62. 1-Gb/s two-beam transimpedance smart-pixel optical receivers made from hybrid GaAs MQW modulators bonded to 0.8 μm silicon CMOS; Woodward, T.K. (AT&T Bell Labs, Holmdel, NJ, USA); Krishnamoorthy, A.V.; Lentine, A.L.; GOOSSEN, K.W.; Walker, J.A.; Cunningham, J.E.; Jan, W.Y.; D'Asaro, L.A.; Chirovsky, L.M.F.; Hui, S.P.; Tseng, B.; Kossives, D.; Dahringer, D.; Leibenguth, R.E. Source: *IEEE Photonics Technology Letters*, v 8, n 3, March 1996, p 422-4

63. Fabrication of a mechanical antireflection switch for fiber-to-the-home systems; Walker, J.A. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Arney, S.C. Source: *Journal of Microelectromechanical Systems*, v 5, n 1, March 1996, p 45-51

64. Photonic page buffer based on GaAs multiple-quantum-well modulators bonded directly over active silicon complementary-metal oxide-semiconductor (CMOS) circuits; Krishnamoorthy, A.V. (AT&T Bell Labs, Holmdel, NJ, USA); Ford, J.E.; GOOSSEN, K.W.; Walker, J.A.; Lentine, A.L.; Hui, S.P.; Tseng, B.; Chirovsky, L.M.F.; Leibenguth, R.; Kossives, D.; Dahringer, D.; D'Asaro, L.A.; Kiamilev, F.; Aplin, G.F.; Rozier, R.G.; Miller, D.A.B. Source: *Applied Optics*, v 35, n 14, 10 May 1996, p 2439-48

65. Arrays of optoelectronic switching nodes comprised of flip-chip-bonded MQW modulators and detectors on silicon CMOS circuitry; Lentine, A.L. (AT&T Bell Labs, Naperville, IL, USA); GOOSSEN, K.W.; Walker, J.A.; Chirovsky, L.M.F.; D'Asaro, L.A.; Hui, S.P.; Tseng, B.T.; Leibenguth, R.E.; Kossives, D.P.; Dahringer, D.W.; Bacon, D.D.; Woodward, T.K.; Miller, D.A.B. Source: *IEEE Photonics Technology Letters*, v 8, n 2, Feb. 1996, p 221-3
66. Low-temperature growth of 850 nm quantum well modulators for monolithic integration to very large scale integrated electronics on GaAs; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Jan, W.Y.; Walker, J.A.; Pathak, R.N. Source: *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)*, v 13, n 2, March-April 1995, p 653-6
67. Monolithic integration of 850 nm quantum well modulators to very large scale integrated electronics on GaAs; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Jan, W.Y.; Walker, J.A.; Pathak, R.N. Source: *Journal of Crystal Growth*, v 150, n 1-4, pt.2, May 1995, p 1363-7
68. Antiresonant Fabry-Perot quantum well modulator to actively modelock and synchronise solid-state lasers; Brovelli, L.R. (Inst. for Quantum Electron., Swiss Federal Inst. of Technol., Zurich, Switzerland); Lanker, M.; Keller, U.; GOOSSEN, K.W.; Walker, J.A.; Cunningham, J.E. Source: *Electronics Letters*, v 31, n 5, 2 March 1995, p 381-2
69. Normally on GaAs/AlAs multiple-quantum well Fabry-Perot transmission modulator with ON/OFF contrast ratios >7.4; Chih-Hsiang Lin (Dept. of Electr. & Comput. Eng., Missouri Univ., Columbia, MO, USA); GOOSSEN, K.W.; Sadra, K.; Meese, J.M.; Chun-Jen Weng Source: *Applied Physics Letters*, v 66, n 10, 6 March 1995, p 1222-4
70. Electric-field-induced exciton ionization in a GaAs/AlGaAs superlattice; von Plessen, G. (Dept. of Phys., Philipps-Univ., Marburg, Germany); Meier, T.; Kochi, M.; Feldmann, J.; Koch, S.W.; Thomas, P.; Gobel, E.O.; GOOSSEN, K.W.; Kuo, J.M.; Kopf, R.F. Source: *Nuovo Cimento D*, v 17D, ser.1, n 11-, Nov.-Dec. 1995, p 1759-62
71. Ring oscillators with optical and electrical readout based on hybrid GaAs MQW modulators bonded to 0.8 μm silicon VLSI circuits; Krishnamoorthy, A.V. (AT&T Bell Labs, Holmdel, NJ, USA); Woodward, T.K.; Novotny, R.A.; GOOSSEN, K.W.; Walker, J.A.; Lentine, A.L.; D'Asaro, L.A.; Hui, S.P.; Tseng, B.; Leibenguth, R.; Kossives, D.; Dahringer, D.; Chirovsky, L.M.F.; Aplin, G.F.; Rozier, R.G.; Kiamilev, F.E.; Miller, D.A.B. Source: *Electronics Letters*, v 31, n 22, 26 Oct. 1995, p 1917-18
72. Optical bandwidth considerations in p-i-n multiple quantum-well modulators; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *Journal of Lightwave Technology*, v 13, n 3, March 1995, p 461-4
73. High yield, low cost Fabry-Perot modulators utilizing correctable partial antireflection coatings; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y.; Centanni, J. Source: *Applied Physics Letters*, v 66, n 9, 27 Feb. 1995, p 1041-3
74. GaAs MQW modulators integrated with silicon CMOS; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Walker, J.A.; D'Asaro, L.A.; Hui, S.P.; Tseng, B.; Leibenguth, R.; Kossives, D.; Bacon, D.D.; Dahringer, D.; Chirovsky, L.M.F.; Lentine, A.L.; Miller, D.A.B. Source: *IEEE Photonics Technology Letters*, v 7, n 4, April 1995, p 360-2
75. Surfactant assisted growth of 850 nm light modulators; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Jan, W.; Williams, M.D. Source: *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)*, v 13, n 2, March-April 1995, p 646-9
76. 3-D integration of MQW modulators over active submicron CMOS circuits: 375 Mb/s transimpedance receiver-transmitter circuit; Krishnamoorthy, A.V. (AT&T Bell Labs, Holmdel, NJ, USA); Lentine, A.L.; GOOSSEN, K.W.; Walker, J.A.; Woodward, T.K.; Ford, J.E.; Aplin, G.F.; D'Asaro, L.A.; Hui, S.P.; Tseng, B.; Leibenguth, R.; Kossives, D.; Dahringer, D.; Chirovsky, M.F.; Miller, D.A.B. Source: *IEEE Photonics Technology Letters*, v 7, n 11, Nov. 1995, p 1288-90

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Sony Interactive Entertainment Inc., etc. v. Resonant Systems, Inc., IPR2024-00806

77. Normally-on GaAs/AlAs multiple-quantum-well Fabry-Perot reflection modulators for large two-dimensional arrays; Chih-Hsiang Lin (Dept. of Electr. & Comput. Eng., Missouri Univ., Columbia, MO, USA); GOOSSEN, K.W.; Sadra, K.; Meese, J.M. Source: *Applied Physics Letters*, v 65, n 10, 5 Sept. 1994, p 1242-4

78. Picosecond carrier escape by resonant tunneling in pseudomorphic InGaAs/GaAsP quantum well modulators; Froberg, N.M. (AT&T Bell Labs, Holmdel, NJ, USA); Johnson, A.M.; GOOSSEN, K.W.; Cunningham, J.E.; Santos, M.B.; Jan, W.Y.; Wood, T.H.; Burrus, C.A., Jr. Source: *Applied Physics Letters*, v 64, n 13, 28 March 1994, p 1705-7

79. Influence of scattering on the formation of Wannier-Stark ladders and Bloch oscillations in semiconductor superlattices; von Plessen, G. (Dept. of Phys., Philipps-Univ., Marburg, Germany); Meier, T.; Feldmann, J.; Gobel, E.O.; Thomas, P.; GOOSSEN, K.W.; Kuo, J.M.; Kopf, R.F. Source: *Physical Review B (Condensed Matter)*, v 49, n 19, 15 May 1994, p 14058-61

80. Strain and As species dependent group V incorporation in GaAsP during gas source molecular beam epitaxy; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); Santos, M.B.; GOOSSEN, K.W.; Chiu, T.H.; Williams, M.D.; Jan, W.; Storz, F. Source: *Journal of Crystal Growth*, v 136, n 1-4, March 1994, p 282-6

81. Electroabsorption in ultranarrow-barrier GaAs/AlGaAs multiple quantum well modulators; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *Applied Physics Letters*, v 64, n 9, 28 Feb. 1994, p 1071-3

82. InGaAs/GaAs shallow quantum well optical switches grown by metalorganic vapor phase epitaxy Lee, S.W. (Dept. of Electron. & Electr. Eng., Pohang Inst. of Sci. & Technol., South Korea); Chu, K.U.; Kim, S.W.; Park, S.; Kwon, O'D.; GOOSSEN, K.W.; Pei, S.S. Source: *Applied Physics Letters*, v 64, n 23, 6 June 1994, p 3065-7

83. Stacked-diode electroabsorption modulator; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *IEEE Photonics Technology Letters*, v 6, n 8, Aug. 1994, p 936-8

84. Carrier escape tunnelling out of shallow multiple quantum wells studied by transient four-wave mixing; von Plessen, G. (Dept. of Phys., Marburg Univ., Germany); Feldmann, J.; GOOSSEN, K.W.; Schlichtherle, B.; Gobel, E.O.; Miller, D.A.B.; Cunningham, J.E. Source: *Semiconductor Science and Technology*, v 9, n 5S, May 1994, p 523-5

85. Silicon modulator based on mechanically-active anti-reflection layer with 1 mbit/sec capability for fiber-in-the-loop applications; GOOSSEN, K.W. (AT&T Bell Labs, Murray Hill, NJ, USA); Walker, J.A.; Arney, S.C. Source: *IEEE Photonics Technology Letters*, v 6, n 9, Sept. 1994, p 1119-21

86. Growth of GaAs light modulators on Si by gas source molecular-beam epitaxy for 850 nm optical interconnects; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Walker, J.A.; Jan, W.; Santos, M.; Miller, D.A.B. Source: *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)*, v 12, n 2, March-April 1994, p 1246-50

87. Dimerization induced incorporation nonlinearities in GaAsP; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); Santos, M.B.; GOOSSEN, K.W.; Williams, M.D.; Jan, W. Source: *Applied Physics Letters*, v 64, n 18, 2 May 1994, p 2418-20

88. Gas composition dependence of silicon nitride used as gallium diffusion barrier during GaAs molecular beam epitaxy growth on Si complementary metal oxide semiconductor; Walker, J.A. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Cunningham, J.E.; Jan, W.Y. Source: *Journal of Electronic Materials*, v 23, n 10, Oct. 1994, p 1081-3

89. InGaAs-InP P-I (MQW)-N surface-normal electroabsorption modulators exhibiting better than 8:1 contrast ratio for 1.55-μm applications grown by gas-source MBE; Pathak, R.N. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Cunningham, J.E.; Jan, W.Y. Source: *IEEE Photonics Technology Letters*, v 6, n 12, Dec. 1994, p 1439-41

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Sony Interactive Entertainment Inc., etc. v. Resonant Systems, Inc., IPR2024-00806

90. Escape tunneling out of shallow multiple quantum wells studied by transient four-wave mixing; von Plessen, G. (Dept. of Phys., Marburg Univ., Germany); Feldmann, J.; Gobel, E.O.; GOOSSEN, K.W.; Miller, D.A.B.; Cunningham, J.E. Source: *Applied Physics Letters*, v 63, n 17, 25 Oct. 1993, p 2372-4
91. GaAs 850 nm modulators solder-bonded to silicon; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *IEEE Photonics Technology Letters*, v 5, n 7, July 1993, p 776-8
92. Dimerization induced Be segregation in GaAs; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Chiu, T.H.; Williams, M.D.; Jan, W.; Storz, F. Source: *Applied Physics Letters*, v 62, n 11, 15 March 1993, p 1236-8
93. Strain-balanced InGaAs/GaAsP multiquantum well reflection modulator operating near 1.06 μm on GaAs and silicon substrates; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Santos, M.B.; Jan, W.Y. Source: *Electronics Letters*, v 29, n 22, 28 Oct. 1993, p 1985-6
94. Measurement of modulation saturation intensity in strain-balanced, undefected InGaAs/GaAsP modulators operating at 1.064 μm; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Santos, M.B.; Jan, W.Y. Source: *Applied Physics Letters*, v 63, n 4, 26 July 1993, p 515-17
95. Independence of absorption coefficient-linewidth product to material system for multiple quantum wells with excitons from 850 nm to 1064 nm; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Santos, M.B.; Cunningham, J.E.; Jan, W.Y. Source: *IEEE Photonics Technology Letters*, v 5, n 12, Dec. 1993, p 1392-4
96. Growth of pseudomorphic $In_xGa_{1-x}As/GaP_yAs_{1-y}$ multiple quantum well structures on GaAs by gas source molecular beam epitaxy; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Jan, W. Source: *Journal of Crystal Growth*, v 127, n 1-4, Feb. 1993, p 184-8
97. Interleaved-contact electroabsorption modulator using doping-selective electrodes with 25°C to 95°C operating range; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y.; Miller, D.A.B. Source: *IEEE Photonics Technology Letters*, v 5, n 2, Feb. 1993, p 181-4
98. Shallow quantum well excitons: 2D or 3D? ; Brener, I. (AT&T Bell Labs, Holmdel, NJ, USA); Knox, W.H.; GOOSSEN, K.W.; Cunningham, J.E. Source: *Physical Review Letters*, v 70, n 3, 18 Jan. 1993, p 319-22
99. Voltage-tunable multiple quantum well photodetector vertically integrated with voltage-tunable multiple quantum well filter; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Santos, M.B.; Jan, W.Y. Source: *Applied Physics Letters*, v 62, n 25, 21 June 1993, p 3229-31
100. Electric field dependence of exciton spin relaxation in GaAs-AlGaAs quantum wells; Vinattieri, A. (AT&T Bell Labs, Holmdel, NJ, USA); Shah, J.; Damen, T.C.; GOOSSEN, K.W.; Pfeiffer, L.N.; Maialle, M.Z.; Sham, L.J. Source: *Applied Physics Letters*, v 63, n 23, 6 Dec. 1993, p 3164-6
101. Growth of $Ga_{1-x}In_xAs/GaAs_{1-y}P_y$ multiple quantum well structures by gas source molecular beam epitaxy; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); Goossen, K.; Williams, M.; Jan, W. Source: *Journal of Vacuum Science & Technology B (Microelectronics Processing and Phenomena)*, v 10, n 2, March-April 1992, p 949-52
102. Growth of shallow AlGaAs/GaAs quantum wells by gas-source molecular beam epitaxy; Jan, W.Y. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; GOOSSEN, K.W.; Knox, W. Source: *Journal of Vacuum Science & Technology B (Microelectronics Processing and Phenomena)*, v 10, n 2, March-April 1992, p 972-4
103. Defect-free modulator at 1.06 μm using a strain-balanced multiquantum well; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *Electronics Letters*, v 28, n 19, 10 Sept. 1992, p 1833-4

104. >30 GΩ isolation of GaAs devices on doped Si via undoped buffer layers-application to symmetric self-electrooptic effect devices; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y.; Walker, J.A. Source: *IEEE Photonics Technology Letters*, v 4, n 7, July 1992, p 763-5
105. Terahertz emission in single quantum wells after coherent optical excitation of light hole and heavy hole excitons; Planken, P.C.M. (AT&T Bell Labs, Holmdel, NJ, USA); Nuss, M.C.; Brener, I.; GOOSSEN, K.W.; Luo, M.S.C.; Lien Chuang, S.; Pfeiffer, L. Source: *Physical Review Letters*, v 69, n 26, 28 Dec. 1992, p 3800-3
106. Pseudomorphic InGaAs-GaAsP quantum well modulators on GaAs; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Williams, M.; Jan, W.Y. Source: *Applied Physics Letters*, v 60, n 6, 10 Feb. 1992, p 727-9
107. THz pulses from the creation of polarized electron-hole pairs in biased quantum wells Planken, P.C.M. (AT&T Bell Labs, Holmdel, NJ, USA); Nuss, M.C.; Knox, W.H.; Miller, D.A.B.; GOOSSEN, K.W. Source: *Applied Physics Letters*, v 61, n 17, 26 Oct. 1992, p 2009-11
108. Single-layer structure supporting both heterojunction bipolar transistor and surface-normal modulator; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *IEEE Photonics Technology Letters*, v 4, n 4, April 1992, p 393-5
109. Monolithic integration of normally-on and normally-off asymmetric Fabry-Perot modulators by selective antireflection coating; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *Applied Physics Letters*, v 60, n 24, 15 June 1992, p 2966-8
110. Monolithic optical fiber stub array; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Walker, J.A. Source: *Optics Letters*, v 17, n 5, 1 March 1992, p 381-3
111. Measured transition from two-dimensional to three-dimensional electroabsorption as quantum-well barriers are lowered; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Williams, M.D.; Storz, F.G.; Jan, W.Y. Source: *Physical Review B (Condensed Matter)*, v 45, n 23, 15 June 1992, p 13773-6
112. Growth of InGaAs/InP optical modulator structures by chemical beam epitaxy; Chiu, T.H. (AT&T Bell Lab., Holmdel, NJ, USA); GOOSSEN, K.W.; Williams, M.D.; Storz, F.G. Source: *Applied Physics Letters*, v 60, n 19, 11 May 1992, p 2365-7
113. Terahertz surface impedance of thin $YBa_2Cu_3O_7$ superconducting films; Nuss, M.C. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Mankiewich, P.M.; O'Malley, M.L. Source: *Applied Physics Letters*, v 58, n 22, 3 June 1991, p 2561-3
114. Exploiting Si/$CoSi_2$/Si heterostructures grown by mesotaxy; White, A.E. (AT&T Bell Labs, Murray Hill, NJ, USA); Short, K.T.; Karen Maex; Hull, R.; Yong-Fen Hsieh; Audet, S.A.; GOOSSEN, K.W.; Jacobson, D.C.; Poate, J.M. Source: *Nuclear Instruments & Methods in Physics Research, Section B (Beam Interactions with Materials and Atoms)*, v B59-B60, pt.1, July 1991, p 693-7
115. $Al_xGa_{1-x}As$-AlAs quantum well surface-normal electroabsorption modulators operating at visible wavelengths; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Yan, R.H.; Cunningham, J.E.; Jan, W.Y. Source: *Applied Physics Letters*, v 59, n 15, 7 Oct. 1991, p 1829-31
116. Terahertz time-domain measurement of the conductivity and superconducting band gap in niobium; Nuss, M.C. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Gordon, J.P.; Mankiewich, P.M.; O'Malley, M.L.; Bhushan, M. Source: *Journal of Applied Physics*, v 70, n 4, 15 Aug. 1991, p 2238-41
117. Time-domain measurement of the surface resistance of $YBa_2Cu_3O_7$ superconducting films up to 500 GHz; Nuss, M.C. (AT&T Bell Lab., Holmdel, NJ, USA); GOOSSEN, K.W.; Mankiewich, P.M.; O'Malley, M.L.; Marshall, J.L.; Howard, R.E. Source: *IEEE Transactions on Magnetics*, v 27, n 2, pt.2, March 1991, p 863-6

118. Fast escape of photocreated carriers out of shallow quantum wells; Feldmann, J. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Miller, D.A.B.; Fox, A.M.; Cunningham, J.E.; Jan, W.Y. Source: *Applied Physics Letters*, v 59, n 1, 1 July 1991, p 66-8

119. Monolayer δ-doped heterojunction bipolar transistor characteristics from 10 to 350 K; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Kuo, T.Y.; Jan, W.Y.; Fonstad, C.G. Source: *Applied Physics Letters*, v 59, n 6, 5 Aug. 1991, p 682-4

120. High-power extremely shallow quantum-well modulators; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Chirovsky, L.M.F.; Morgan, R.A.; Cunningham, J.E.; Jan, W.Y. Source: *IEEE Photonics Technology Letters*, v 3, n 5, May 1991, p 448-50

121. Planarization of emitter-base structure of heterojunction bipolar transistors by doping selective base contact and nonalloyed emitter contact; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Kuo, T.Y.; Cunningham, J.E.; Jan, W.Y.; Ren, F.; Fonstad, C.G. Source: *IEEE Transactions on Electron Devices*, v 38, n 11, Nov. 1991, p 2423-6

122. Low-voltage, high saturation, optically bistable self-electro-optic effect devices using extremely shallow quantum wells; Morgan, R.A. (AT&T Bell Labs, Solid State Technol. Center, Breinigsville, PA, USA); Asom, M.T.; Chirovsky, L.M.F.; Focht, M.W.; Glogovsky, K.G.; Guth, G.D.; Pyrzybylek, G.J.; Smith, L.E.; GOOSSEN, K.W. Source: *Applied Physics Letters*, v 59, n 9, 26 Aug. 1991, p 1049-51

123. Propagation of picosecond electrical pulses on a silicon-based microstrip line with buried cobalt silicide ground plane; Roskos, H. (AT&T Bell Labs, Holmdel, NJ, USA); Nuss, M.C.; GOOSSEN, K.W.; Kisker, D.W.; White, A.E.; Short, K.T.; Jacobson, D.C.; Poate, J.M. Source: *Applied Physics Letters*, v 58, n 23, 10 June 1991, p 2604-6

124. Gas source molecular beam epitaxy growth of heterojunction bipolar transistors containing 1 monolayer δ-Be; Cunningham, J.E. (AT&T Bell Labs, Holmdel, NJ, USA); Kuo, T.Y.; Ourmazd, A.; Goossen, K.; Jan, W.; Storz, F.; Ren, F.; Fonstad, C.G. Source: *Journal of Crystal Growth*, v 111, n 1-4, May 1991, p 515-20

125. Planarized Be δ-doped heterostructure bipolar transistor fabricated using doping selective contact and selective hole epitaxy; Kuo, T.Y. (MIT, Cambridge, MA, USA); Cunningham, J.E.; GOOSSEN, K.W.; Ourmazd, A.; Jan, W.; Fonstad, C.G.; Ren, F. Source: *Japanese Journal of Applied Physics, Part 2 (Letters)*, v 30, n 2B, 15 Feb. 1991, p L262-5

126. Ultrasensitive electroabsorption due to Wannier-Stark localization in extremely shallow superlattices at 77 K; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *Applied Physics Letters*, v 59, n 27, 30 Dec. 1991, p 3622-4

127. Sub-band-gap superconductor absorption in Bardeen-Cooper-Schrieffer framework using the Mattis-Bardeen approach; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Nuss, M.C. Source: *Journal of Applied Physics*, v 67, n 10, 15 May 1990, p 6568-70

128. Effect of optical phonons on femtosecond pulse propagation in coplanar striplines; Hasnain, G. (AT&T Bell Labs, Murray Hill, NJ, USA); GOOSSEN, K.W.; Knox, W.H. Source: *Applied Physics Letters*, v 56, n 6, 5 Feb. 1990, p 515-17

129. Ultrafast nonlinear optical effects in biased semiconductor quantum wells; Chemla, D.S. (AT&T Bell Labs, Holmdel, NJ, USA); Schmitt-Rink, S.; Knox, W.H.; Miller, D.A.B.; GOOSSEN, K.W.; Hasnain, G. Source: *Physica Status Solidi B*, v 159, n 1, 1 May 1990, p 11-28

130. Observation of room-temperature blue shift and bistability in a strained InGaAs-GaAs <111> self-electro-optic effect device, GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Caridi, E.A.; Chang, T.Y.; Stark, J.B.; Miller, D.A.B.; Morgan, R.A. Source: Applied Physics Letters, v 56, n 8, 19 Feb. 1990, p 715-17

131. GaAs-AlAs low-voltage refractive modulator operating at 1.06 μm; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *Applied Physics Letters*, v 57, n 8, 20 Aug. 1990, p 744-6

132. Heterostructure bipolar transistor employing carbon-doped base grown with trimethyl-Ga and arsine; Kuo, T.Y. (Dept. of Electr. Eng., MIT, Cambridge, MA, USA); Chiu, T.H.; Cunningham, J.E.; GOOSSEN, K.W.; Fonstad, C.G.; Ren, F. Source: *Electronics Letters*, v 26, n 16, 2 Aug. 1990, p 1260-2
133. $YBa_2Cu_3O_7$ superconductors for high-speed interconnects; Nuss, M.C. (AT&T Bell Lab., Holmdel, NJ, USA); GOOSSEN, K.W.; Mankiewich, P.M.; Howard, R.E.; Straughn, B.L.; Berkstresser, G.W.; Brandle, C.D. Source: *IEEE Electron Device Letters*, v 11, n 5, May 1990, p 200-2
134. Monolayer Be δ-doped heterostructure bipolar transistor fabricated using doping selective base contact; Kuo, T.Y. (AT&T Labs, Holmdel, NJ, USA); Cunningham, J.E.; GOOSSEN, K.W.; Jan, W.Y.; Fonstad, C.G.; Ren, F. Source: *Electronics Letters*, v 26, n 15, 19 July 1990, p 1187-8
135. Proposed ultrahigh frequency microstrip utilising buried silicide groundplane; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); White, A.E.; Short, K.T. Source: *Electronics Letters*, v 26, n 1, 4 Jan. 1990, p 49-50
136. Direct demonstration of a misfit strain-generated electric field in a [111] growth axis zinc-blende heterostructure; Caridi, E.A. (AT&T Bell Labs, Holmdel, NJ, USA); Chang, T.Y.; GOOSSEN, K.W.; Eastman, L.F. Source: *Applied Physics Letters*, v 56, n 7, 12 Feb. 1990, p 659-61
137. Photocurrent saturation in short-period superlattice modulators; GOOSSEN, K.W. (AT & T Bell Labs, Holmdel, NJ, USA); Zucker, J.E.; Jospeh, I.-Bar; Kuo, J.M.; Kopf, R.M.; Miller, D.A.B.; Chemla, D.S. Source: *Electronics Letters*, v 26, n 11, 24 May 1990, p 736-7
138. Excitonic electroabsorption in extremely shallow quantum wells; GOOSSEN, K.W. (AT&T Bell Labs, Holmdel, NJ, USA); Cunningham, J.E.; Jan, W.Y. Source: *Applied Physics Letters*, v 57, n 24, 10 Dec. 1990, p 2582-4
139. GaAs-AlGaAs multiquantum well reflection modulators grown on GaAs and silicon substrates; GOOSSEN, K.W. (AT&T Bell Lab., Holmdel, NJ, USA); Boyd, G.D.; Cunningham, J.E.; Jan, W.Y.; Miller, D.A.B.; Chemla, D.S.; Lum, R.M. Source: *IEEE Photonics Technology Letters*, v 1, n 10, Oct. 1989, p 304-6
140. Femtosecond excitonic optoelectronics; Knox, W.H. (AT&T Bell Lab., Holmdel, NJ, USA); Henry, J.E.; GOOSSEN, K.W.; Li, K.D.; Tell, B.; Miller, D.A.B.; Chemla, D.S.; Gossard, A.C.; English, J.; Schmitt-Rink, S. Source: *IEEE Journal of Quantum Electronics*, v 25, n 12, Dec. 1989, p 2586-95
141. Investigation of high-temperature superconductors with terahertz bandwidth electrical pulses; Nuss, M.C. (AT&T Bell Lab., Holmdel, NJ, USA); GOOSSEN, K.W. Source: *IEEE Journal of Quantum Electronics*, v 25, n 12, Dec. 1989, p 2596-607
142. Propagation of terahertz bandwidth electrical pulses on $YBaCu_3O_{7-\delta}$ transmission lines on lanthanum aluminate; Nuss, M.C. (AT&T Bell Labs, Holmdel, NJ, USA); Mankiewich, P.M.; Howard, R.E.; Straughn, B.L.; Harvey, T.E.; Brandle, C.D.; Berkstresser, G.W.; GOOSSEN, K.W.; Smith, P.R. Source: *Applied Physics Letters*, v 54, n 22, 29 May 1989, p 2265-7
143. Room-temperature operation of a GaAs/AlGaAs superlattice self-electrooptic-effect device; Kuo, J.M. (AT&T Bell Lab., Murray Hill, NJ, USA); Kopf, R.F.; Bar-Joseph, I.; GOOSSEN, K.W.; Miller, D.A.B.; Chemla, D.S. Source: *IEEE Transactions on Electron Devices*, v 36, n 11, pt.1, Nov. 1989, p 2614-15
144. Room-temperature electroabsorption and switching in a GaAs/AlGaAs superlattice; Bar-Joseph, I. (AT&T Bell Labs, Holmdel, NJ, USA); GOOSSEN, K.W.; Kuo, J.M.; Kopf, R.F.; Miller, D.A.B.; Chemla, D.S. Source: *Applied Physics Letters*, v 55, n 4, 24 July 1989, p 340-2
145. Modeling of picosecond pulse propagation in microstrip interconnections of integrated circuits; GOOSSEN, K.W. (Los Alamos Nat. Lab., NM, USA); Hammond, R.B. Source: *IEEE Transactions on Microwave Theory and Techniques*, v 37, n 3, March 1989, p 469-78
146. Grating enhancement of quantum well detector response; GOOSSEN, K.W. (Dept. of Electr. Eng., Princeton Univ., NJ, USA); Lyon, S.A.; Alavi, K. Source: *Applied Physics Letters*, v 53, n 12, 19 Sept. 1988, p 1027-9

147. Photovoltaic quantum well infrared detector; GOOSSEN, K.W. (Dept. of Electr. Eng., Princeton Univ., NJ, USA); Lyon, S.A.; Alavi, K. Source: *Applied Physics Letters*, v 52, n 20, 16 May 1988, p 1701-3
148. Performance aspects of a quantum-well detector; GOOSSEN, K.W. (Dept. of Electr. Eng., Princeton Univ., NJ, USA); Lyon, S.A. Source: *Journal of Applied Physics*, v 63, n 10, 15 May 1988, p 5149-53
149. Conduction-band offset determination in GaAs-$Al_xGa_{1-x}As$ through measurement of infrared internal photoemission; GOOSSEN, K.W. (Dept. of Electr. Eng., Princeton Univ., NJ, USA); Lyon, S.A.; Alavi, K. Source: *Physical Review B (Condensed Matter)*, v 36, n 17, 15 Dec. 1987, p 9370-3
150. Grating enhanced quantum well detector; GOOSSEN, K.W. (Dept. of Electr. Eng., Princeton Univ., NJ, USA); Lyon, S.A. Source: *Applied Physics Letters*, v 47, n 12, 15 Dec. 1985, p 1257-9

CONFERENCE PROCEEDINGS (UNIVERSITY OF DELAWARE)

1. Classification of high frequency NILM transients based on convolutional neural networks," I Guzman, KW Goossen, and K Barner, 2022 IEEE Green Energy and Smart Systems (IGESSC) 1-6 (2022).
2. 2022 ECU Webinar on Energy Efficiency, "Savings opportunities in compressed air and refrigerated spaces."
3. Effect of white roofing on refrigerated spaces, S. Matylewicz and KW Goossen, ICEESEM 2021: XV. International Conference on Energy Efficiency and Sustainable Energy Management, Nov. 2021.
4. Energy efficiency opportunities in the automatic sector, KW Goossen, EPA Webinar (2021).
5. Energy efficiency opportunities in industrial refrigeration, R. Nigro and KW Goossen, EPA Webinar (2020).
6. Investigation of the Christiansen Effect in bulk indium tin oxide materials, MA Sufian and KW Goossen, Image Sensing Technologies: Materials, Devices, Systems, and Applications VII (2020).
7. Energy and water savings, and emission reduction, in food/beverage plants, Invited Talk, Manufacturing PACK Expo (2020).
8. Optofluidic Smart Glass for optically-configurable building envelopes and smart windows, Invited talk, Optics Colloquium at the Rochester Institute of Optics (2019).
9. Materials and Methods for Smart Glass, Smart Windows, and Building Shells, Photonics Media Webinar (2018).
10. Investigation of an Energy Efficient Pump Speed Control Algorithm for Controlling Sump Level, EPEC 2018 October 10-11, 2018.
11. Optofluidic smart glass with wide angular performance, Smart Materials and Nondestructive Evaluation for Energy Systems IV, 2018.
12. Energy policy principles based on human perception to increase energy audit recommendation implementation rates; KW Goossen, Delaware Annual Energy Conference, 2017.
13. The nexus of energy and environmental efficiency measures; KW Goossen, Department of Natural Resources and Environmental Control (DNREC) Analytical Support Conference (2017).
14. Cycling and Performance Data of 3D Printed Optofluidic Smart Glass; D Wolfe, K Goossen, Novel Optical Materials and Applications, 2017.
15. Low Cost Optofluidic Smart Glass; D Wolfe, K Goossen, Specialty Optical Fibers, JW4A.3 2016
16. Optimization of Thin Film Coatings for Textured Silicon Solar Cell Above Low Band Gap Solar Cell; C. Longhitano and KW GOOSSEN, IEEE Photovoltaic Specialist Conference 2015.
17. A Signal Acquisition System for Non-Intrusive Load Monitoring of Residential Electrical Loads based on Switching Transient Voltages; 2015 Clemson University Power Systems Conference, C Duarte, P Delmar, K Barner, K GOOSSEN.
18. Optimized Optical Structures for Active Modulated Reflectance Roofing System; D. Wolfe and KW GOOSSEN, American Solar Energy Society Solar 2014.

Resonant Systems, Inc., Ex. 2010
Sony Interactive Entertainment Inc., etc. v. Resonant Systems, Inc., IPR2024-00806

19. Active Modulated Reflectance Roofing System to Tailor Building Solar Loads for Increased HVAC Efficiency; D. Wolfe and KW GOOSSEN, ASME 2014 8th International Conference on Energy Sustainability.
20. Non-Intrusive Monitoring of Power Transformers based on Transient Signals Analysis using Wavelet Transform; E. Gómez-Luna, C. Duarte, G. Aponte, J. Pleite, KW GOOSSEN, IPST2013.
21. Loss analysis for a two wire optical waveguide for chip-to-chip communication, J. Dickason and KW GOOSSEN, IEEE Optical Interconnects 2013.
22. Non-Intrusive Load Monitoring Based on Switching Voltage Transients and Wavelet Transforms; C. Duarte, P. Delmar, E. Luna, K. Barner and KW GOOSSEN, FIIW 2012, Oak Ridge TN, October 6-9 2012.
23. Energy Audit Methodologies for Information Technology Installations; KW GOOSSEN, Telecommunications Industry Association Annual Meeting, Dallas, TX, June 6-9 2012.
24. Chip-scale multiple quantum well based optical interconnects; R. Nair, T. Gu, M. E. Teitelbaum, K. W. GOOSSEN, F. Kiamilev, and M. W. Haney, Conference on Lasers and Electro-Optics (CLEO) 2011.
25. Demonstration of chip-scale optical interconnects based on the integration of polymer waveguides and multiple quantum well modulators on silicon; R. Nair, T. Gu, K. W. Goossen, F. Kiamilev, and M. W. Haney, IEEE Photonics 2011 Conference, Arlington, VA, USA, 9-13 October 2011.
26. Increased Efficiency of Photovoltaic Modules via Groundwater Cooling; Budischak, C., and GOOSSEN, K.W., ES Fuel Cell 2011.
27. Application of Radiant Barriers to Reduce Heat Loss in Process Equipment; GOOSSEN, K.W., and Wetzel, A., Society of Automotive Engineers Annual Conference (2011).
28. Experimental studies of the Franz-Keldysh effect in CVD grown GeSi epi on SOI; Ying Luo, John Simons, Joannes Costa, Ivan Shubin, Winnie Chen, Bill Frans, Mac Robinson, Roshanak Shafiiha, Shirong Liao, Ning-Ning Feng, Xuezhe Zheng, Guoliang Li, Jin Yao, Hiren Thacker, Mehdi Asghari, Keith Goossen, Kannan Raj, Ashok V Krishnamoorthy, John E Cunningham, SPIE OPTO 2011.
29. Normal free space coupling of reflection-based fiber Bragg grating sensors embedded in composite materials; Qiu, L., Heider, D., O'Brien, D.J., Wetzel, E.D., and GOOSSEN, K.W., LEOS Annual Meeting, 2011.
30. Free space optical coupling of completely embedded fiber Bragg Grating Sensors; Qiu, L., Heider, D., O'Brien, D.J., Wetzel, E.D., and GOOSSEN, K.W., SPIE Optical Engineering + Applications Conference, San Diego, CA (2010).
31. Conical Couplers for Non-Pigtailed, Free-Space Optical Coupling to Fiber Optic Sensors for Bridge Monitoring; Qiu, L., Heider, D., O'Brien, D.J., Wetzel, E.D., and GOOSSEN, K.W., International Conf. of Bridge Maintenance, Safety, and Management (2010).
32. Free Space Optical Coupling of Reflection Based Fiber Bragg Grating Sensors; Qiu, L., Heider, D., O'Brien, D.J., Wetzel, E.D., and GOOSSEN, K.W., SPIE Smart Structures and NDE (2010).
33. Outdoor Measurements for High Efficiency Solar Cell Assemblies; X. Wang, N. Waite, P. Murcia, K. Emery, M. Steiner, F. Kiamilev, K. Goossen, C. Honsberg, and A. Barnett, 24th European Photovoltaic Solar Energy Conference (2009).
34. Free Space Optical Coupling to Embedded Fiber Bragg Grating Sensors through Panel Surfaces; Qiu, L., Teitelbaum, M., Heider, S., O'Brien, D.J., Wetzel, E.D. and GOOSSEN, K.W., American Society of Composites 24th Annual Meeting (2009)
35. High Detectivity Dilute Nitride Strained Layer Superlattice Detectors for LWIR and VLWIR Applications; Aina, L., Heir, H., Fathimulla, A., Lecates, M., GOOSSEN, K.W., Kolodzey, J., and Coppinger, M., *Quantum Structure Infrared Photodetector 2009 International Conference.*

Resonant Systems, Inc., Ex. 2010
Sony Interactive Entertainment Inc., etc. v. Resonant Systems, Inc., IPR2024-00806

36. PCB-based Modulated Retroreflector using Large-area Quantum Well Modulators; Nair, R., Teitelbaum, M., and GOOSSEN, K.W., *20th Annual Workshop on Interconnections within High-Speed Digital Systems* (2009).
37. Plastic Optical Fiber Embedded Directly in Printed Circuit Boards for Parallel Optical Interconnection Applications between Chips; Teitelbaum, M., and GOOSSEN, K.W., *20th Annual Workshop on Interconnections within High-Speed Digital Systems* (2009).
38. Normal Free Space Optical Coupling to Fiber Bragg Grating Sensors; Qiu, L., Teitelbaum, M. Heider, S., O'Brien, D.J., Wetzel, E.D., and GOOSSEN, K.W., *SPIE Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems* (2009).
39. Passive and Active Data Porting to Composite Integrated Optical Fibers via Integrated Optics; M. E. Teitelbaum, D. J. O'Brien, E. D. Wetzel, and GOOSSEN, K.W., *Proceedings of SPIE,* San Diego, CA (2008).
40. Fabrication and Yield of Large Area Quantum Well Modulators; GOOSSEN, K.W and Prather, D., *IEEE Lasers and Elecro-optics Society Annual Meeting* (2007).
41. Input nodes for normal incidence free-space communication to optical networks embedded in composites; M. E. Teitelbaum, D. J. O'Brien, S. Yarlagadda, E. D. Wetzel, and GOOSSEN, K.W., *SAMPE Annual Conference*, Baltimore, MD (2007).
42. Multifunctional composites with integrated optical busses for data and sensing applications; Teitelbaum, M., O'Brien, D.J., Wells, N.D., Yarlagadda, S., Wetzel, E.D, and GOOSSEN, K.W., *Proceedings of the 25th Army Science Conference*, Orlando, FL (2006).
43. Free-space Optical Link by Mechanically-active Anti-Reflection Switch Array and Corner Cube Reflector; Changping Luo and GOOSSEN, K.W., *Conference on Lasers and Electro-optics* (2005).
44. Wireless optical communication to optical and electrical networks embedded in composites; Teitelbaum, M., Yarlagadda, S., O'Brien, D.J. Wetzel, E.D., and GOOSSEN, K.W., *SAMPE Annual Meeting* (2005).
45. Fitting Optical Interconnects to an Electronic World- Packaging and Reliability Issues of Arrayed Optoelectronic Modules; GOOSSEN, K.W., *IEEE Lasers and Electro-optics Annual Meeting* (2004).
46. Reliability of Direct Mesa Flip-Chip Bonded VCSELs; Teitelbaum, M. and GOOSSEN, K.W., *IEEE Lasers and Electro-optics Annual Meeting* (2004).
47. Optical Microelectromechanical System Array for Free Space Retrocommunication; Luo, C. and GOOSSEN, K.W., *IEEE Lasers and Electro-optics Annual Meeting* (2004).
48. An Automated Process for Embedding Optical Fiber in Woven Composites; Gubbala, J., Yarlagadda, S., Caruso, R. Fecko, D., Wetzel, E.D. GOOSSEN, K.W., *SAMPE Materials and Processing* (2004).
49. 32 Channel Array of Ge-on-GaAs Photodiodes Operating at 1.3 um; GOOSSEN, K.W., Kolodzey, J., Dashiell, M.W., and Adam, T., *Integrated Photonics Research* (2002).

PATENTS

- 4,904,859: "Self Electrooptic Effect Device Employing Asymmetric Quantum Wells".
- 5,013,685: "Method of Making a Non-Alloyed Ohmic Contact to III-V Semiconductors-on-Silicon".
- 5,093,695: "Controllable Semiconductor Modulator Having Interleaved Contacts".
- 5,210,428: "Semiconductor Device Having Shallow Quantum Well Region".
- 5,170,455: "Optical Connective Device".
- 5,329,136: "Voltage Tunable Photodetector".
- 5,385,632: "Method for Manufacturing Integrated Semiconductor Devices"
- 5,443,685: "Composition and Method for Off-Axis Growth Sites on Nonpolar Substrates".
- 5,444,270: "Surface-normal Semiconductor Optical Cavity Devices with Antireflective Layers".

Resonant Systems, Inc., Ex. 2010
Sony Interactive Entertainment Inc., etc. v. Resonant Systems, Inc., IPR2024-00806

- 5,468,689: "Method for Preparation of SiNx Ga Diffusion Barrier for Use in MBE Growth of GaAs".
- 5,480,813: "Accurate In-Situ Lattice Matching by Reflection High Energy Electron Diffraction".
- 5,500,761: "Micromechanical Modulator".
- 5,510,277: "Surface Treatment for Silicon Substrates".
- 5,510,291: “Method for Making surface-Normal Semiconductor Optical Cavity Devices”.
- 5.573,975: “Surface-normal Semiconductor Optical Cavity Devices”.
- 5,578,162: “Integrated Composite Semiconductor Devices and Method for Manufacture”.
- 5,589,404: “Monolithically Integrated VLSI Optoelectronic Circuits and Method”.
- 5,589,974: “Micromechanical Modulator”.
- 5,605,856: “Method for Designing and Electronic Integrated Circuit with Optical I/O”.
- 5,625,733: “Arrangement for Interconnecting an Optical Fiber to an Optical Component”.
- 5,627,383: “Optoelectronic Devices Utilizing Multiple Quantum Well pin Structures”.
- 5,631,472: “Accurate In-Situ Lattice Matching by Reflection High Energy Electron Diffraction”.
- 5,636,052: “Direct View Display based on a Micromechanical Modulator”.
- 5,654,819: “Micromechanical Modulator”.
- 5,668,023: “Composition for Off-Axis Growth Sites on Nonpolar Substrates”.
- 5,698,452: “Method of Making Integrated Detector/Photoemitter with Non-Imaging Director”.
- 5,710,656: “Micromechanical Optical Modulator having a Reduced-mass Composite Membrane”.
- 5,735,950: “Method for Producing a Precise Alloy Composition”.
- 5,767,997: “Method and Arrangement for a Combined Modulator/Photodetector”.
- 5,784,187: “Wafer Level Integration of an Optical Modulator and III-V Photodetector”.
- 5,786,925: “Method, Composition for Arbitrary Angle Mirrors in Substrates for Hybrid Opt. Systems”.
- 5,825,528: “Phase-mismatched Fabry-Perot Cavity Micromechanical Modulator”.
- 5,838,484: “Micromechanical Optical Modulator with Linear Operating Characteristics”.
- 5,858,814: “Hybrid Chip and Method Thereof”.
- 5,870,221: “Micromechanical Modulator having Enhanced Performance”.
- 5,872,016: “Process of Making an Optoelectronic Device Utilizing MQW pin Structure”.
- 5,897,333: “Method for Forming Integrated Composite Semiconductor Devices”.
- 5,900,983: “Level-setting Optical Attenuator”.
- 5,914,804: “Double-cavity Micromechanical Optical Modulator with Plural Multilayer Mirrors”.
- 5,918,794: “Solder Bonding of Dense Arrays of Microminiature Contact Pads”.
- 5,923,951: “Method of Making a Flip-Chip Bonded GaAs-based Optoelectronic Device”.
- 5,940,723: “Heteroepitaxial Growth of III-V Materials”.
- 5,943,155: “MARS Optical Modulators”.
- 5,943,158: “Micromechanical, Anti-reflection, Switched Optical Modulator Array and Method”.
- 5,949,561: “Wavelength Demultiplexing Multiple Quantum Well Photodetector”.
- 5,949,571: “MARS Optical Modulators”.
- 5,962,846: “Redundant Linear Detection Arrays”.
- 5,975,408: “Solder Bonding of Electrical Components”.
- 5,977,571: “Low-loss Connecting Arrangement for Photodiodes”.

- 5,996,221: “Method for Thermocompression Bonding Structures”.
- 6,002,513: “Optical Modulator Providing Independent Control of Attenuation and Spectral Tilt”.
- 6,005,262: “Flip-chip Bonded VCSEL CMOS Circuit with Silicon Monitor Detector”.
- 6,034,431: “Electronic integrated circuit with optical inputs and outputs.”
- 6,048,751: “Process for manufacture of composite semiconductor devices.”
- 6,159,760: “Method of fabricating oxide-aperature vertical cavity surface emitting lasers.”
- 6,169,833: “CMOS-compatible optical bench.”
- 6,172,417: “Integrated Semiconductor Devices.”
- 6,222,206: “Wafer having Top and Bottom Emitting Vertical-Cavity Lasers.”
- 6,258,616: “Method of Making a Device having a Non-Alloyed Ohmic Contact to a Buried Doped Layer.”
- 6,271,943: “Wavelength Demultiplexing Stack Photodiode Detector with Electrical Isolation Layers.”
- 6,277,668: “Optical detector for minimizing optical crosstalk.”
- 6,307,691: “Optical filter and method for linearization of optical power equalizer.”
- 6,307,983: “Robotic optical cross-connect.”
- 6,321,010: “Optical microstructure and method of manufacture.”
- 6,337,753: “Optical power equalizer.”
- 6,388,322: “Article comprising a mechanically compliant bump.”
- 6,424,450: “Optical modulator having low insertion loss and wide bandwidth”
- 6,434,726: “System and method of transmission using coplanar bond wires.”
- 6,444,491: “Composite semiconductor devices and method for manufacture thereof.”
- 6,458,411: “Method of making a mechanically compliant bump.”
- 6,485,996: “Method of making a wafer having top and bottom emitting vertical-cavity lasers.”
- 6,501,589: “Article comprising a metallic anti-mirror.”
- 6,519,073: “Micromechanical modulator and methods for fabricating the same.”
- 6,631,246: “WDM communication system having tunable multi-channel dispersion compensating filters.”
- 6,643,052: “Apparatus comprising a micromechanical optical modulator.”
- 6,704,513: “Enhanced tilt optical power equalizer.”
- 6,707,840: “Vertical cavity surface emitting laser.”
- 6,718,086: “Article comprising a tunable filter.”
- 6,996,151: “Tin-oxide adhesion layer for metal-dielectric mirrors.”
- 7,180,902: “MARS optical modulators.”
- 7,387,451: “Composites for wireless optical communication.”
- 7,760,412: “Mechanically-active anti-reflection switch (MARS) modulator with wide angle tolerance.”
- 8,031,042: “Sensor and sensing utilizing a laser.”
- 8,417,340: “Implant with antenna array.”
- 8,635,817: “Reflective roof.”
- 8,712,203: “Formation of an optical waveguide.”
- 9,002,456: “Implant with antenna array.”