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LINCOLN LABORATORY

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

LINCOLN LABORATORY



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EXECUTIVE SUMMARY

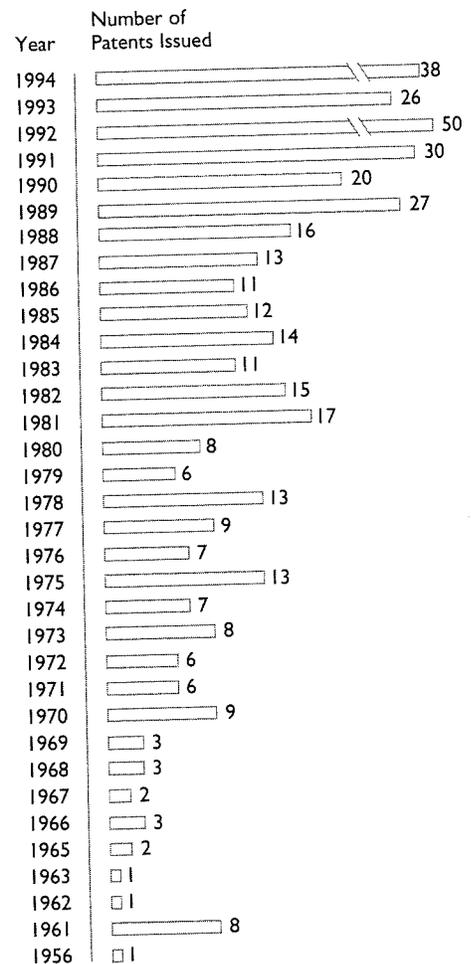
The rapidly changing and growing world of information and new technologies has made patents an increasingly valuable resource to industry and, as such, has significantly advanced the nation's preeminence as a global leader. Of the 5 million patents issued by the Patent and Trademark Office in U.S. history, 1 million were issued in only 14 years, from 1976 to 1991.¹

Over the years, Lincoln Laboratory's pioneers in research and development have helped carve out new industrial markets in American business. Their efforts not only advanced exploratory research among their colleagues but also paved the way for implementation of new technologies that are now standard nationwide. The philosophy of the Laboratory, which encourages creativity and the development of new ideas, has produced 416 patents, 276 of which are licensed. Many of these inventions have been licensed and protected worldwide.

Lincoln Laboratory's professional staff exemplifies the creativity, imagination, and innovation that has made the Laboratory so successful. Eighty-four percent of the professional staff hold advanced degrees, sixty-nine percent of which are in electrical engineering and physics disciplines, with others in diversified scientific fields and subject areas.

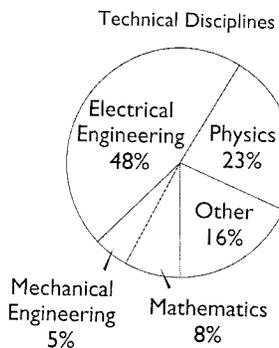
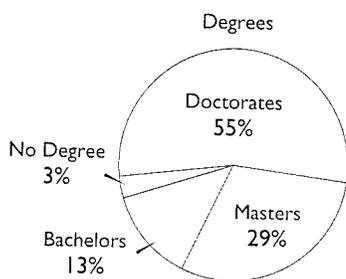
As early as 1956, one of the Laboratory's eminent scientists, **Professor Jay W. Forrester**, was issued a patent for his invention, the Magnetic Core Memory Device. This concept increased both the speed and reliability of computer memory systems at a time when "computer" was far from being a household word. Since that early initiative, the Laboratory has carried its research mission into fields ranging from material and devices to radar and optical systems, thereby broadening its national technical leadership. From 1968 to 1980, **Professor Henry I. Smith** pioneered the development of techniques at

MIT Lincoln Laboratory
Patents 1956-1994 (By Calendar Year)



1. "Patents: A Valuable Resource in the Information Age,"
Connie Wu and Ellen Calhoun, *Special Libraries Association*, Winter 1992.

MIT Lincoln Laboratory
Staff Composition
as of 1994



Lincoln Laboratory for fabricating submicrometer and nanometer structures. As current Director of the NanoStructures Laboratory at MIT, Professor Smith, along with his coworkers, is responsible for a number of innovations in submicrometer structures technology and applications, including x-ray lithography, for which he has been granted numerous patents. **Dr. John C.C. Fan**, Chairman and Chief Executive Officer of Kopin Corporation, which he founded in 1984, has been awarded patents for his concepts of Silicon-on-Insulator and Thin-Film Ltoff. For his work in Solid State, **Dr. Aram Mooradian** has been granted several United States and foreign patents based on his invention, the Solid State Microlaser, an optically pumped microlaser that can be mass-produced at low cost using semiconductor processing and packaging technology. Dr. Mooradian is Vice Chairman, Executive Vice President, and Chief Technical Officer of Micrator, a company he co-founded in 1989.

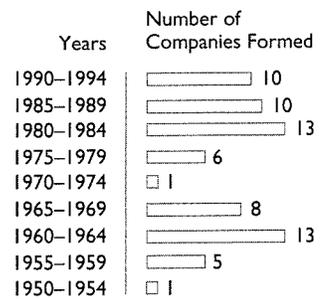
Today, Lincoln Laboratory researchers continue in the enterprising spirit of their predecessors. They are making enormous contributions that directly affect significant areas: microelectronics, the environment, cancer therapy, digital video transmissions, electronics, and optics. **Dr. Christine A. Wang**, **Mr. James W. Caunt**, and **Professor Robert A. Brown** combined their talents to design, build, and test a new reactor that produces the most precisely controlled and uniform semiconductor films reported to date. **Dr. Bernard B. Kosicki** has invented a method to treat the back surface of a back-illuminated charge-coupled device to stabilize the surface and improve the light collection efficiency. **Drs. Bernadette Johnson** and **John J. Zayhowski** are developing a low-cost sensor that has environmental applications in diverse areas such as soil and groundwater, landfills, and smokestacks. **Dr. Alan J. Fenn's** invention, the Adaptive Nulling Hyperthermia Array, holds promise to improve cancer therapy techniques on humans. **Dr. Alice M. Chiang**, whose work in developing the Matrix-Matrix Product Processor bestowed Lincoln Laboratory with the 1986 DARPA/STO Outstanding Technical Breakthrough Award, has been granted patents for her Video-Bandwidth Compression concept.

Dr. Carl O. Bozler has invented the Cleavage of Lateral Epitaxial Film for Transfer manufacturing process where a high-quality single-crystal film of a semiconductor can be peeled from the substrate on which it was grown and transferred to almost any other substrate. This invention can be applied to the manufacture of solar cells, light-emitting diodes, and active matrix liquid crystal display flat panel displays. Finally, Mr. Eric A. Swanson's invention, Optical Coherence Tomography, has ophthalmic applications that will provide an important new diagnostic capability for retinal diseases such as glaucoma and macular degeneration.

In addition to patent enterprises, Lincoln Laboratory research has produced an impressive number of spin-off companies throughout the country. Sixty-seven businesses have been spawned from Laboratory research, employing more than 136,000 people and generating more than \$16 billion in sales annually.² Moreover, Laboratory researchers have authored over 60 books, and each year they produce more than 500 journal articles, technical presentations at national and international conferences, and technical reports on a variety of topics in many fields.³ In 1988, the *Lincoln Laboratory Journal* was launched. This publication is distributed to almost 6,000 persons, agencies, institutions, and companies nationwide.

Responding to both professional challenges and public need, the Laboratory has grown into a multifaceted center of research and development. In this vanguard spirit, and determined in its commitment to excellence in the development of state-of-the-art technologies, Lincoln Laboratory continues to be the nation's launching pad from which today's research becomes tomorrow's reality.

Spin-Off Companies
By Five-Year Increments

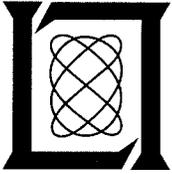


Total Number of
Companies Formed: 67

2. *Spin-Off Companies from MIT Lincoln Laboratory*, Lexington, Mass.: MIT Lincoln Laboratory (May 1995).

3. *Unclassified Publications of Lincoln Laboratory*, Lexington, Mass.: MIT Lincoln Laboratory (annual).

PATENT PROCESS

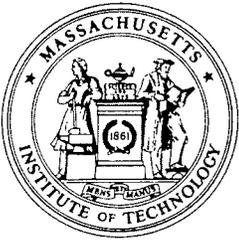


LINCOLN LABORATORY OVERVIEW

Since its establishment in 1951, MIT Lincoln Laboratory has actively pursued its mission to “carry out a program of research and development pertinent to national defense with particular emphasis on advanced electronics.” Toward this end, the Laboratory promotes scientific and technological research providing the best solutions to address the needs of the nation. By patenting and licensing inventions, technology originally developed to meet the specific needs of the Department of Defense and other government agencies can be applied to solve problems in the civilian sector; this substantially benefits the nation’s economy.

MIT TECHNOLOGY LICENSING OFFICE

The MIT Technology Licensing Office works with industry, venture capital sources, and entrepreneurs to find the best way to commercialize the new technologies developed at MIT and Lincoln Laboratory. Historically, the Massachusetts Institute of Technology’s approach has been to patent inventions. This past decade, however, the Institute brought a greater emphasis to licensing. The success of this change is impressive with over 100 patents issued last year alone; 56% of these patents were licensed or optioned at the time of issue (MIT and Lincoln Laboratory combined). A branch office opened at Lincoln Laboratory several years ago, which was a direct outcome of this success.



**SELECTED PROFILES
IN CREATIVITY**



Professor
Jay W. Forrester

Received a B.S. in Electrical Engineering from the University of Nebraska and an S.M. in Electrical Engineering from the Massachusetts Institute of Technology. In 1956, he joined the MIT faculty as Professor at its Sloan School of Management. He is now Germeshausen Professor Emeritus and Senior Lecturer at the Sloan School.

Multicoordinate Digital Information Storage (Magnetic Core Memory) Device

The Magnetic Core Memory Device, patented in 1956, consists of a plane array of small doughnut-shaped ferrite cores; four wires threaded through each core carry current pulses that

For over two decades, random-access, coincident-current magnetic storage was the standard memory device for high-speed digital computers.

were used to sense the information stored in the memory and to write in new information. This concept increased both the speed and reliability of computer memory systems. For over

two decades, random-access, coincident-current magnetic storage was the standard memory device for high-speed digital computers. Jay Forrester holds the basic patent for this invention.

United States patent 2,736,880 has been granted for this invention.

Solid State Microlaser

Microchip lasers are small, robust, compact, high-performance diode-pumped solid state lasers that can be manufactured in large volume at low cost and can perform with capabilities far beyond those of diode lasers. A relatively low-cost diode laser is used as an excitation source to pump a solid state laser "chip"

These output beam characteristics exceed those of typical diode lasers and open up numerous commercial applications not possible before.

made from Nd:YAG of less than 1 mm³ in size to convert the poor spatial mode output of the diode laser to a spectrally pure, low-noise beam. These

output beam characteristics exceed those of typical diode lasers and open up numerous commercial applications not possible before. Semiconductor device fabrication and packaging techniques are used to mass produce these devices.

The microchip laser concept was developed by Aram Mooradian at MIT Lincoln Laboratory. The patents and technology have been exclusively licensed from MIT by Micracor for commercial development. Commercial low-noise microchip lasers are being produced by Micracor for cable TV applications with output power levels of more than 100 mW cw at a wavelength of 1300 nm. These high-power, low-noise systems will provide performance beyond the present low-power DFB diode lasers for fiber-optical, high-channel-capacity cable TV. In addition, these devices are used in analog fiber link applications for remote operation of antenna systems. Tuning capability for such devices exceeds 50 GHz, which allows application to frequency-division-multiplexed communications as well as microwave radar systems. These microchip lasers have also been operated in the Q-switched mode with record short pulses of 200 picoseconds. These short-pulse, high-peak-power devices will find unique uses in medical, materials processing, and defense applications.

Several United States and foreign patents have been granted based on this invention.



Dr. Aram Mooradian

Received a B.S. in Physics from the Worcester Polytechnic Institute and a Ph.D., also in Physics, from Purdue University. He is Vice Chairman, Executive Vice President, and Chief Technical Officer of Micracor, a company he cofounded in 1989.

Dr. Bernard B. Kosicki

Received a B.A. in Physics with distinction from Wesleyan University in 1961. He obtained an M.A. (1962) and Ph.D. (1967) degrees from Harvard, both in Solid State Physics. Dr. Kosicki was a Member of Technical Staff at Bell Telephone Laboratories at Murray Hill for six years, where he conducted research on growth, structure, and dielectric and electroluminescent properties of various thin film materials and structures. He subsequently became involved in CCD and process technology shortly after these devices were invented. For the next ten years, Dr. Kosicki served in managerial positions at Sperry Research Center, General Instruments Microelectronics, and Fairchild Semiconductor; involved first in MNOS device development and pilot production, then in process and product engineering for microprocessor production, and finally in advanced silicon technology development.

Barrier Layer Device Processing

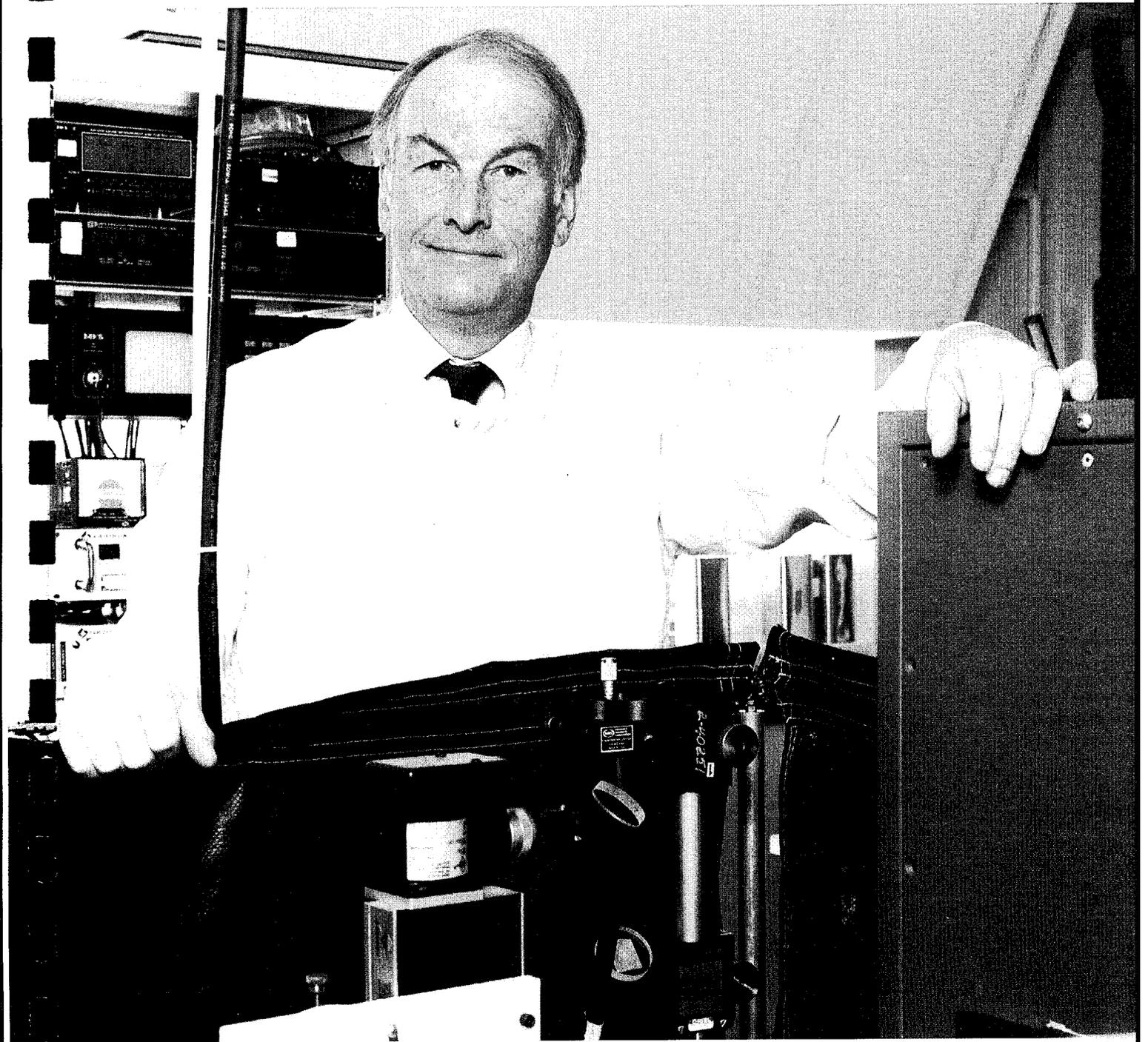
This patent disclosed a way to treat the back surface of a back-illuminated CCD to stabilize the surface and to improve the light collection efficiency. When the device is constructed, the

This patent disclosed a way to treat the back surface of a back-illuminated CCD to stabilize the surface and to improve the light collection efficiency.

thick wafer is first glued face down to a substrate with epoxy, then thinned to the desired thickness. The substrate gives it rigidity and mechanical strength after it is thinned.

Subsequently, the back surface must be treated in a way to improve its stability and light collection efficiency. Many previous researchers had used methods that were unstable in time and required complex ways of treating the surface temporarily with chemicals or charging it with light. Bernard Kosicki, along with colleagues, applied the laser doping process previously developed at Lincoln for this purpose. In contrast to some of the previous work cited above, it was compatible with maintaining the temperature of the thin-device-epoxy-substrate sandwich below the temperature that the epoxy could withstand while making the back surface treatment permanent.

United States patent 5,198,881 has been granted for this invention.





**Professor
Henry I. Smith**

Received a B.S. in Physics from Holy Cross. He has an M.S. and Ph.D. in Physics from Boston College. He pioneered the development of techniques for fabricating submicrometer and nanometer structures. From 1977 to 1980, he was an Adjunct Professor at MIT, where he established and directed the Submicron Structures Laboratory. In December 1980, Henry Smith was appointed a Professor of Electrical Engineering at MIT, where he now devotes full time to research and teaching. In January 1990, he was named to the Joseph F. and Nancy P. Keithley Chair in Electrical Engineering. He is currently Director of the NanoStructures Laboratory at MIT.

Comformable Photomask Lithography

In recent years, Henry Smith's research has emphasized submicron structures, nanofabrication, methods for preparing Semiconductor-on-Insulator films, electronic devices, quantum effects in sub-100-nm structures, and optoelectronic device fabrication.

Research has emphasized submicron structures, nanofabrication, methods for preparing Semiconductors-on-Insulator films, . . .

He and his coworkers are responsible for a number of innovations in submicrometer-structures

technology and applications, including conformable photomask lithography, x-ray lithography, spatial-phase-locked electron-beam lithography, interferometric alignment, graphoepitaxy, surface-energy-driven grain growth, achromatic holographic lithography, sub-100-nm Si MOSFETs, and a variety of quantum-effect structures such as lateral-surface-superlattices and planar-resonant-tunneling field-effect transistors in GaAs/AlGaAs.

Numerous United States patents have been granted for his work in x-ray lithography.

The CLEFT Process: Method of Producing Sheets of Crystalline Material

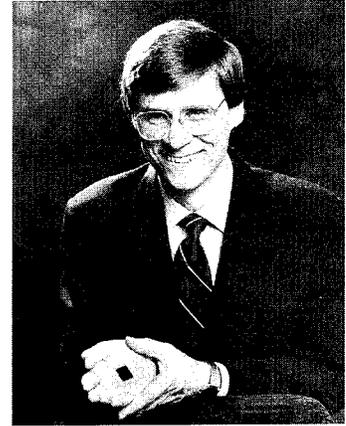
The Cleavage of Lateral Epitaxial Film for Transfer (CLEFT) process provides a manufacturing technique where a high-quality single-crystal film of a semiconductor, such as gallium arsenide or silicon, can be peeled from the substrate on which it was grown and transferred to almost any other substrate.

This is a potentially low-cost method for providing single crystal films since the original single crystal substrate, which is costly, can be reused for the preparation of additional films.

At MIT Lincoln Laboratory, a high-efficiency gallium arsenide solar cell was made on a CLEFT film and then transferred to a thin glass substrate, which resulted in a device measured to have record power-to-weight ratio, a highly desirable quality for use in space. The patents for the CLEFT process have been licensed to Kopin Corporation for application to the manufacture of solar cells, light-emitting diodes, and active matrix liquid crystal display flat panel displays.

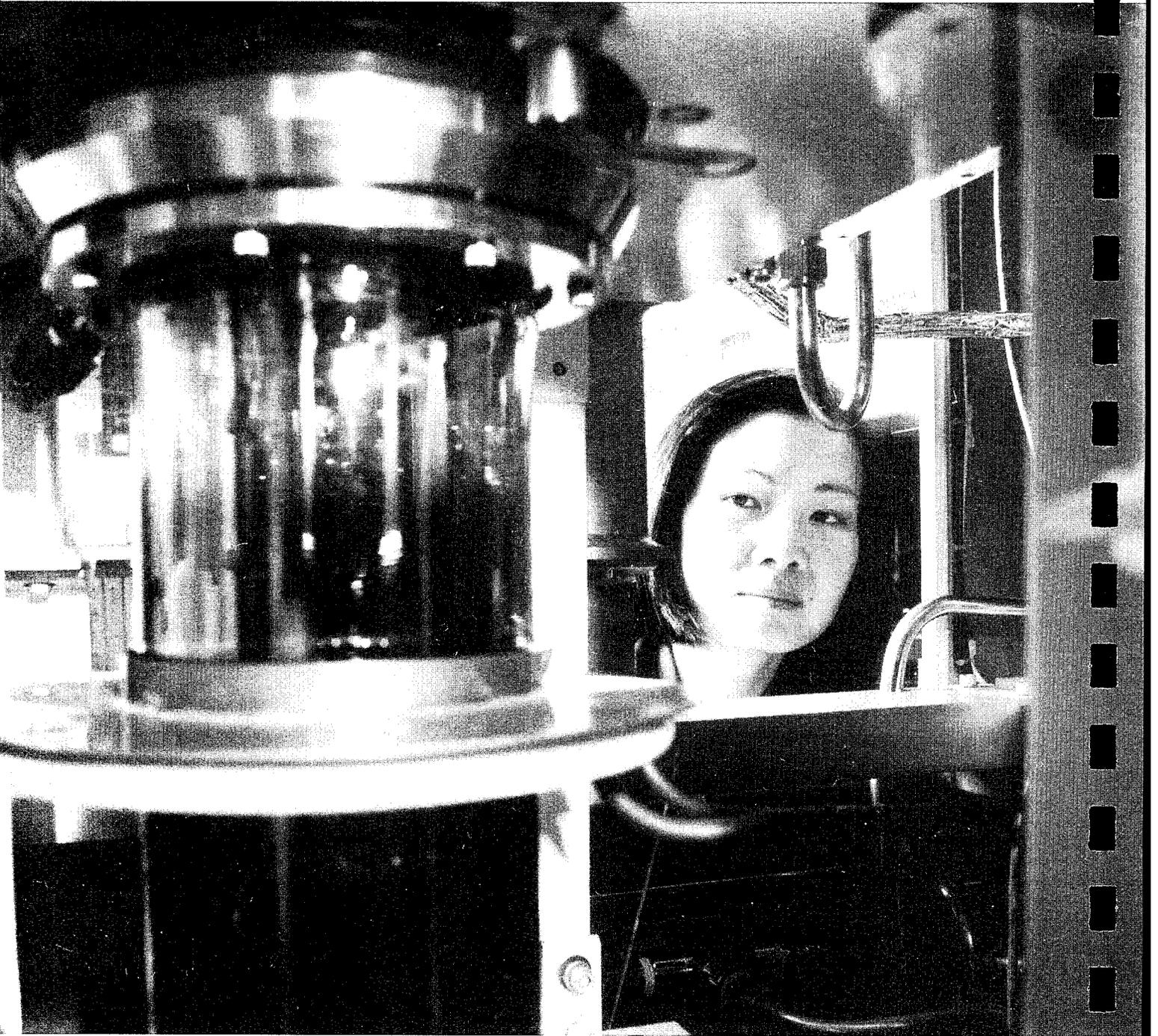
United States patents 4,727,047; 4,816,420; and 4,837,182 have been granted for this invention.

This is a potentially low-cost method for providing single crystal films since the original single crystal substrate, which is costly, can be reused for the preparation of additional



Dr. Carl O. Bozler

Received a B.S., an M.S., and a Ph.D. in Electrical Engineering from The Ohio State University, Columbus.



Vapor Phase Reactor for Making Multilayer Structures

A new reactor for producing semiconductor epitaxial layers such as GaAs, AlGaAs, and InGaAs has been designed, built, and tested. Results show that the reactor produces the most precisely controlled and uniform semiconductor films reported

Results show that the reactor produces the most precisely controlled and uniform semiconductor films reported to date.

to date. Recognizing that the specific dynamics of the gas in the reactor have a profound influence on film quality, the researchers used a light-scattering technique to visualize the gas flow in the reactor. A numerical model of reactor fluid flow and heat and mass transfer was developed to simulate epitaxial growth and to establish critical parameters for fabricating uniform layers with abrupt compositional changes.

The reactor, which permits the highly reproducible production of these epilayers, will increase yields and reduce production costs. The uniformity is especially critical for diode-pumped solid state lasers used in military applications, micro- and macromachining, and medical applications, as well as for coherent diode laser arrays used in space communications, optical recording, and optical computing. In addition, reduced maintenance and simplicity of design are attractive for commercialization.

United States patent 4,997,677 has been issued for this invention, which is licensed by Bellcore and Spire Corporation and commercially developed by Spire with the support of the U.S. Air Force.

Dr. Christine A. Wang

Received an S.B. in Materials Science and Engineering, an S.M. in Metallurgy, and a Ph.D. in Electronic Materials, all from the Massachusetts Institute of Technology.

Mr. James W. Caunt

Received an Associate's Degree in Mechanical Engineering from the Wentworth Institute of Technology, a B.S. in Industrial Technology from Northeastern University, and an M.B.A. from Babson College.

Professor Robert A. Brown

Received an S.B. and an M.S. from the University of Texas at Austin and a Ph.D. from the University of Minnesota. He is currently the Warren K. Lewis Professor and Head of the Department of Chemical Engineering at the Massachusetts Institute of Technology.

Mr. Eric A. Swanson

Received a B.S. degree in Electrical Engineering from the University of Massachusetts, Amherst, in 1982 and an S.M. degree in Electrical Engineering from the Massachusetts Institute of Technology in 1984. His Master's thesis work was done at MIT Lincoln Laboratory on optical spatial tracking.

Professor James G. Fujimoto

Received the following degrees from MIT: an S.B., an S.M., and a Ph.D. in Electrical Engineering.

Dr. David Huang

Received the following degrees from MIT: an S.B. and an S.M. in Electrical Engineering and a Ph.D. in Medical Engineering and Medical Physics. He has an M.D. from Harvard Medical School.

Optical Coherence Tomography

Optical coherence tomography (OCT) is a new technique for noncontact cross-sectional imaging based on optical coherence domain reflectometry (OCDR). OCDR uses a broad bandwidth light source, such as an LED, coupled to a Michelson interferometer. One arm of the interferometer leads to a reference mirror, the other to the sample of interest. Only when the reference and

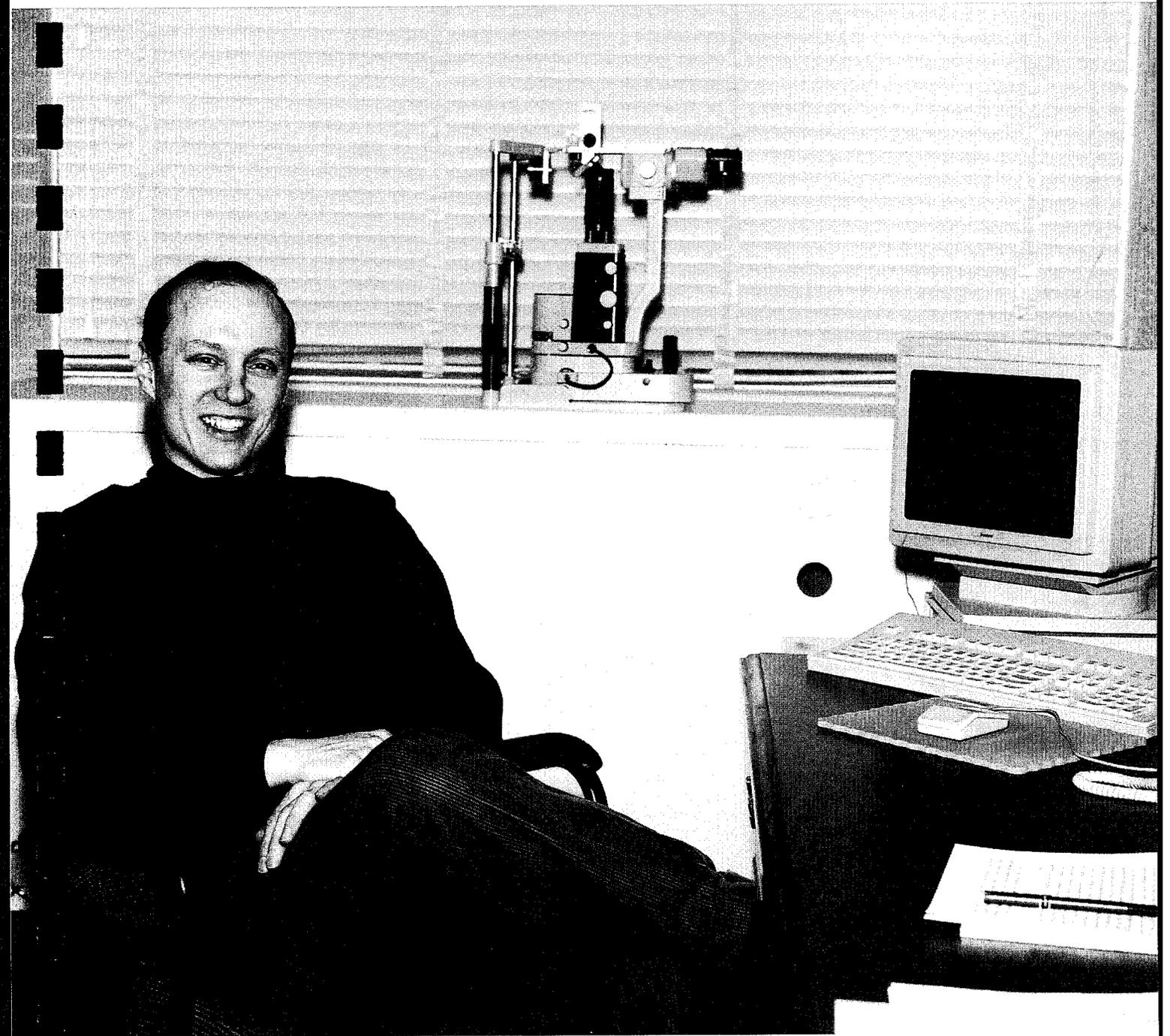
It allows for high-resolution imaging in biological tissue, particularly in ophthalmic applications where the OCT device may provide an important new diagnostic capability for a variety of retinal diseases such as glaucoma and macular degeneration.

sample arm lengths are matched to within the source coherence length is optical interference detected. By scanning, the reference mirror reflectivity profiles of the sample are obtained. Slew the reference mirror at a constant velocity allows for heterodyne detection at the

Doppler frequency shift, thereby achieving high-resolution ($\sim 10 \mu\text{m}$) and high-sensitivity ($\sim 100 \text{ dB}$) longitudinal ranging measurements. OCT, an extension of OCDR, combines multiple longitudinal scans to form gray scales or false color cross-sectional images.

Eric Swanson, along with James G. Fujimoto, Associate Professor in Electrical Engineering and Computer Science at MIT in Cambridge, and former MIT student David Huang developed this technology that has a wide range of applications, including measuring optical components and biological tissues. It allows for high-resolution imaging in biological tissue, particularly in ophthalmic applications where the OCT device may provide an important new diagnostic capability for a variety of retinal diseases such as glaucoma and macular degeneration.

United States patent 5,321,501 has been granted for this invention.





Dr. John C. C. Fan

Received a B.S. in Electrical Engineering from the University of California, Berkeley, and an M.S. and a Ph.D. in Applied Physics from Harvard University. He is the Chairman and Chief Executive Officer of Kopin Corporation in Taunton, Massachusetts.

High-Resolution Solid-State Imaging Devices Using Silicon-on-Insulator and Thin-Film Liftoff

Working with colleagues, John Fan has been granted many patents for the concepts of Silicon-on-Insulator and Thin-Film Liftoff. The combination of these technologies provides the

The approach is ideal for integrated displays providing fast, full-color, high-resolution images for multimedia applications.

foundation for high-resolution active-matrix liquid-crystal displays (AMLCDs) that operate at video speeds.

These imaging devices represent a major advance in the performance and manufacture of AMLCDs. The approach is ideal for integrated displays providing fast, full-color, high-resolution images for multimedia applications. Some of the applications range from portable presentation systems, to head-mounted displays for entertainment and industrial applications, to large screen monitors and televisions, including high-definition televisions.

Many United States patents (such as 4,371,421; 4,670,088; 4,727,047; and 5,273,616) have been granted and licensed by MIT.

Video-Bandwidth Compression

The emerging use of digital video transmission techniques minimizes channel noise and interference, which secures a robust transmission but increases the transmission bandwidth.

As a result of these inventions, a low-power multimedia terminal or a low-cost HDTV receiver based on charge-domain signal processing chips could be produced in the near future.

A low-power coder to encode a video signal at the transmitter end to reduce the channel transmission bit-rate requirement and a similar decoder to decode the information at the receiver end while maintaining a high picture quality.

For video compression applications, redundancy within a single frame can be reduced by an interframe, transform-domain coding technique. Recently, transform image coding based on the Discrete Cosine Transform (DCT) algorithm has been proven to be a near optimum method for good-quality, low-data-rate image transmission. Currently, interframe predictive coding has been widely used to remove redundancy between frames. For these applications, two charge-domain components have been invented: one is a two-dimensional (2D DCT), the other is a full search motion detection and estimation chip with a subpixel search resolution. Both chips can be used either in a video transmitter or receiver. As a result of these inventions, a low-power multimedia terminal or a low-cost HDTV receiver based on charge-domain signal processing chips could be produced in the near future.

United States patents 5,030,953 and 5,126,962 have been granted for this concept.

The bandwidth of the future high-definition television (HDTV) is at least a few hundred megahertz. It would be much more efficient, and in some cases necessary, to develop a compact, low-



Dr. Alice M. Chiang

Received a B.S. in Physics from the National Taiwan University and a Ph.D. in Physics from Virginia Polytechnic Institute and State University, Blacksburg. From 1973 to 1976, Dr. Chiang was employed at Honeywell Radiation Center, where she worked on mercury cadmium telluride (HgCdTe) and gallium phosphide photoconductive (PC) and photovoltaic (PV) detectors, solar cells, and pyroelectric detector arrays. Dr. Chiang's focus of research at Lincoln Laboratory has been on silicon charge-coupled devices for high-speed analog signal processing. Lincoln Laboratory was the recipient of the 1986 DARPA/STO Outstanding Technical Breakthrough Award for Dr. Chiang's achievement in developing the matrix-matrix product processor. She is a member of Sigma Pi Sigma and Phi Kappa Phi honor societies.

Dr. Bernadette Johnson

Received a B.S. degree in Physics from Dickinson College and the University of Heidelberg in Germany, an M.S. degree in Condensed Matter Theory from Georgetown University, and a Ph.D. in Plasma Physics from Dartmouth College. Before joining Lincoln Laboratory, Dr. Johnson worked for Applied Science Technology and the Argonne National Laboratories.

Dr. John J. Zayhowski

Received the following degrees from MIT: a joint S.M./S.B. in Electrical Engineering and Computer Science and a Ph.D. in Electrical Engineering. Before joining Lincoln Laboratory, he worked at the Texas Instruments Central Research Laboratory. Dr. Zayhowski is a Hertz Fellow and a member of Tau Beta Pi, Eta Kappa Nu, Sigma Xi, and the Optical Society of America.

Fiber-Optic Sensor for Remote Spectroscopy of Soil, Water, and Air Contaminants

Currently, two types of fiber-optic chemical sensors exist: one in which a chemically sensitive analyte or reagent is located at the tip of a fiber, and one in which the fiber serves as a light guide for laser radiation. In the first type, an analyte must be found for every chemical under investiga-

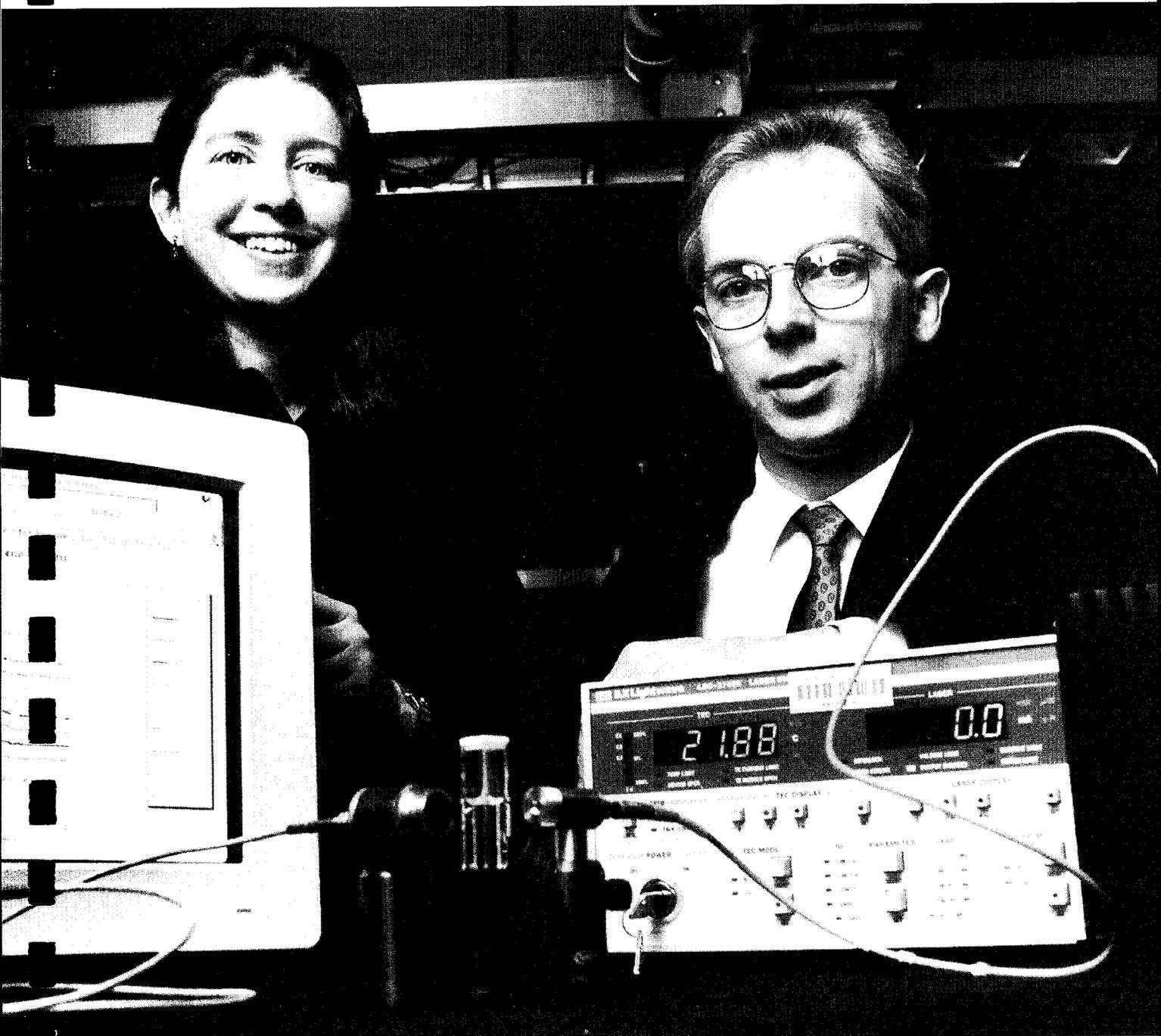
This sensor will be simple, low-cost, and suitable in hostile environments.

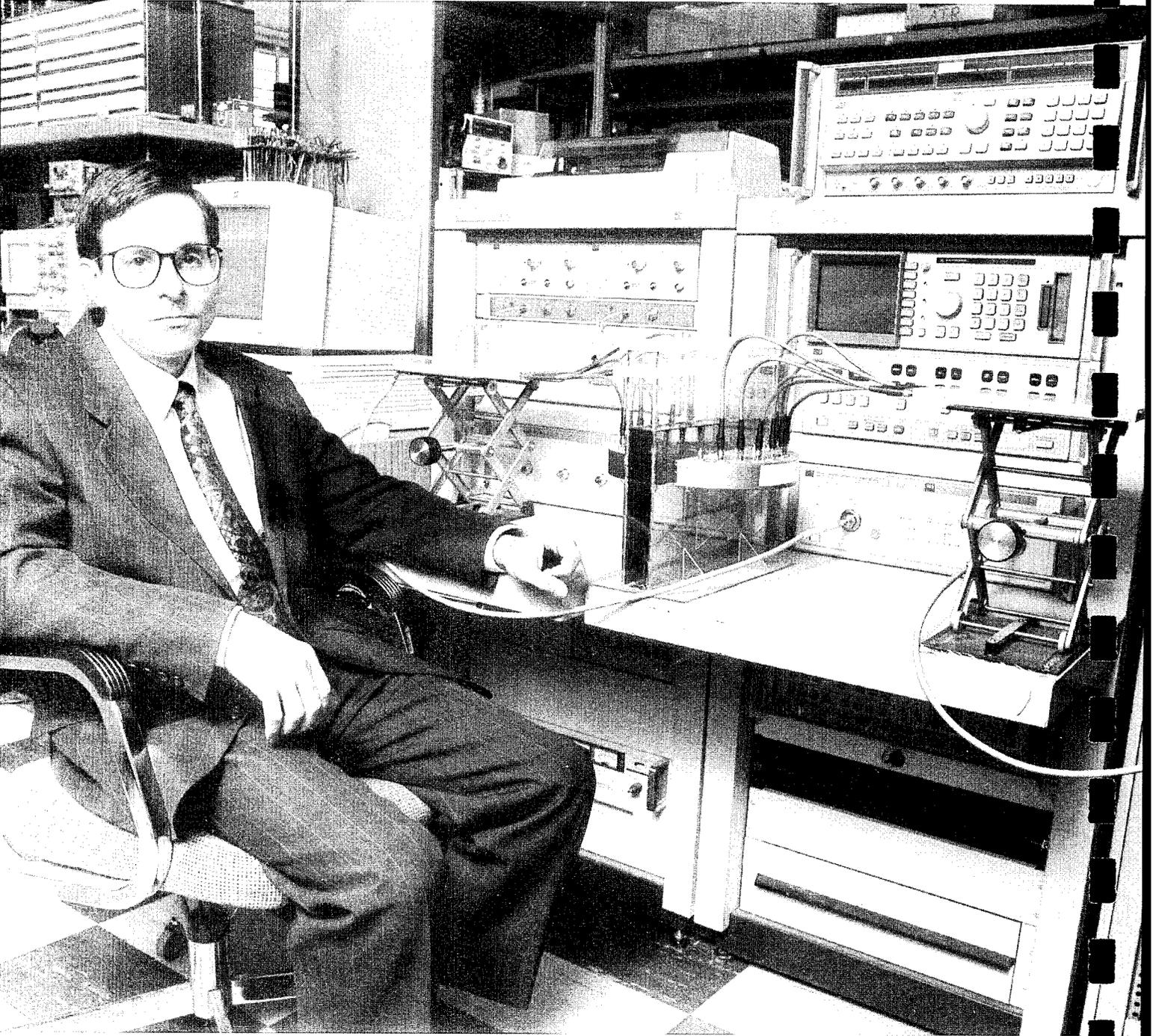
tion, and the sensors are often not reusable. In the second type, laser sources are restricted to the visible to near-infrared for long fiber lengths because ultraviolet (UV) radiation does not propagate well in fibers. Unfortunately, UV radiation can often provide the highest sensitivity measurements because of the (typically) strong absorption features and increased scattering cross sections compared to longer wavelengths.

Bernadette Johnson and John J. Zayhowski are developing a UV sensor consisting of a near-infrared diode pump that is coupled, via optical fiber, to a self-Q-switched frequency-tripled or -quadrupled solid-state laser. By locating the pump radiation and lasing materials at opposite ends of the fiber, they can take advantage of the high transmissivity of optical fiber for near-infrared radiation and produce UV radiation only at the location where the measurement is made, which can be hundreds of meters or even kilometers from the primary laser source. This sensor would use miniature lasers, developed at MIT Lincoln Laboratory, whose output would be pulsed, with pulse widths less than 1 nanosecond, to permit fluorescence lifetime measurements. Emitted or scattered radiation would be either collected by a second fiber and returned to a spectrometer for analysis or detected in situ by photodetectors collocated at the sensor head.

A sensor that permits in situ spectroscopy has application in areas as diverse as soil and groundwater monitoring of hydrocarbons, landfill monitoring of methane, and smokestack monitoring of polycyclic aromatic compounds. This sensor will be simple, low-cost, and suitable in hostile environments.

A patent for this invention is pending.





Adaptive Nulling Hyperthermia Array

Modern cancer treatment centers use tissue-heating “hyperthermia” to shrink cancerous tumors in the human body.

If the adaptive phased array hyperthermia technique can be used clinically on humans, an improved cancer therapy could be achieved.

However, the current clinical use of hyperthermia is hampered by the limited ability of existing equipment to selectively heat tumors. In this invention, adaptive nulling and/or focusing with auxiliary feedback field probes controls a high-power phased array hyperthermia system to reduce or enhance the field intensity at selected positions in and around the target body while maintaining a desired focus at a cancerous tumor. In so doing, “hot spots” in healthy tissue can be avoided or reduced while enhancing heating of a tumor during radio frequency (RF), microwave, or ultrasound hyperthermia treatment.

To date, preclinical testing of the adaptive phased array hyperthermia system at three medical centers has shown promising results.

If the adaptive phased array hyperthermia technique can be used clinically on humans, an improved cancer therapy could be achieved.

United States patent 5,251,645 has been granted for this invention.

Dr. Alan J. Fenn

Received a B.S. degree from the University of Illinois at Chicago and M.S. and Ph.D. degrees from Ohio State University, all in Electrical Engineering. Before coming to Lincoln Laboratory, Dr. Fenn worked for Martin Marietta Aerospace Corporation in Denver, Colorado. He has served as an associate editor in the area of adaptive arrays for the *IEEE Transactions on Antennas and Propagation*. He is a member of the American Society for Therapeutic Radiology and Oncology.

LIST OF PATENTS

2,736,880*

Multicoordinate Digital Information Storage Device

Forrester, J.W.
28 Feb. 1956

2,975,342

Narrow Base Planar Junction Punch-Thru Diode

Rediker, R.H.
14 Mar. 1961

2,978,704

Radome Structural Devices

Cohen, A.; Davis, P.; Orabona, J.F.
4 Apr. 1961

2,982,852

Anti-Multipath Communication System

Fano, R.M.
2 May 1961

2,982,853

Anti-Multipath Receiving System

Price, R.; Green, P.E., Jr.
2 May 1961

2,988,735

Magnetic Data Storage

Everett, R.R.; Walquist, R.L.
13 June 1961

2,990,259

Syringe-Type Single-Crystal Furnace

Moody, P.L.; Kolm, C.R.
27 June 1961

2,994,808

High Flux Density Apparatus

Kolm, H.H.
1 Aug. 1961

3,010,031*

Symmetrical Back-Clamped Transistor Switching Circuit

Baker, R.H.
21 Nov. 1961

3,011,711

Cryogenic Computing Devices

Buck, D.A.
5 Dec. 1961

3,037,192

Data Processing System

Everett, R.R.
29 May 1962

3,037,195

Data Filtering System

Bivans, E.W.
29 May 1962

3,077,578

Semiconductor Switching Matrix

Kingston, R.H.; McWhorter, A.L.
12 Feb. 1963

3,167,663

Magneto-Semiconductor Devices

Melngailis, I.; Calawa, A.R.; Rediker, R.H.
26 Jan. 1965

3,200,299

Superconducting Electromagnet

Autler, S.H.
10 Aug. 1965

3,252,334

Droplet Accelerometer

Lunde, B.K.
24 May 1966

3,281,802

Magnetic Memory Core

McMahon, R.E.
25 Oct. 1966

3,289,110*

Non-Reciprocal Multi-Element TEM Transmission Line Device

Weiss, J.A.
29 Nov. 1966

3,304,519

High Frequency Circulator Having a Plurality of Differential Phase Shifters and Intentional Mismatch Means

Weiss, J.A.
14 Feb. 1967

3,324,334*

Induction Plasma Torch with Means for Recirculating the Plasma

Reed, T.B.
6 June 1967

3,382,161

Electrolytic Separation of Transition Metal Oxide Crystals

Kunmann, W.; Ferretti, A.; Arnott, R.J.; Rogers, D.B.
7 May 1968

3,393,957

High-Frequency Light Modulator or Switch Using the Magneto-Optical Properties of Thin Magnetic Films

Smith, D.O.
23 July 1968

*Patent has been licensed.

3,395,345

Method and Means for Detecting the Period of a Complex Electrical Signal

Rader, C.M.

30 July 1968

3,425,051

Analog-to-Digital Converter

Smith, W.W.

28 Jan. 1969

3,444,468*

Data Transmission Method and System Utilizing Adaptive Equalization

Drouilhet, P.R.;

Holsinger, J.L.

13 May 1969

3,448,421

Shielded Magnetic Core

Berg, R.S.; Howland, B.

3 June 1969

3,488,644

Non-Destructive Read-Out Circuit for a Magnetic Memory Core

McMahon, R.E.

6 Jan. 1970

3,493,943

Magnetoresistive Associative Memory

Raffel, J.I.

3 Feb. 1970

3,495,224

Thin Film Memory System

Raffel, J.I.

10 Feb. 1970

3,497,698

Metal Insulator Semiconductor Radiation Detector

Phelan, R.J., Jr.;

Dimmock, J.O.

24 Feb. 1970

3,500,354

Content-Addressed Memory Using Optical Interrogation

Smith, D.O.; Harte, K.J.

10 Mar. 1970

3,515,606

Methods of Improving Magnetic Characteristics of Films for Memory Application

Crowther, T.S.

2 June 1970

3,516,080

Magneto-Optical Memory Sensing Using Thermal Modulation

Smith, D.O.

2 June 1970

3,518,578

Signal Compression and Expansion System

Oppenheim, A.V.;

Stockham, T.G.

30 June 1970

3,521,835

Synchronous Satellite

Braga-Illa, A.A.;

Morrow, W.E., Jr.

28 July 1970

3,566,383

Methods of Improving the Signal-to-Noise Ratio of Photon and Electron Beam Accessed Magnetic Film Memory System

Smith, D.O.

23 Feb. 1971

3,568,087

Optically Pumped Semiconductor Laser

Phelan, R.J., Jr.;

Rediker, R.H.

2 Mar. 1971

3,590,248

Laser Arrays

Chatterton, E.J., Jr.

29 June 1971

3,619,067*

Method and Apparatus for Determining Optical Focal Distance

Howland, B.; Proll, A.F.

9 Nov. 1971

3,625,660*

Method and Structure for Growing Crystals

Reed, T.B.; Pollard, E.R.

7 Dec. 1971

3,626,154*

Transparent Furnace

Reed, T.B.

7 Dec. 1971

3,636,471*

Method of and Apparatus for Enhancing Radiation from Indirect-Gap Semiconductors

Rediker, R.H.

18 Jan. 1972

3,649,838

Semiconductor Device for Producing Radiation in Response to Incident Radiation

Phelan, R.J., Jr.

14 Mar. 1972

3,655,986

Laser Device

Lax, B.

11 Apr. 1972

3,676,795

Multiple-Frequency Laser Apparatus and Method

Pratt, G.W., Jr.

11 July 1972

3,686,585*

Method of Stabilizing a Gas Laser

Javan, A.; Freed, C.

22 Aug. 1972

3,703,958

Eddy Current Apparatus and Method of Application to a Conductive Material

Kolm, H.H.

28 Nov. 1972

3,720,884*

Method and Apparatus for Compression of Optical Laser Pulses

Kelley, P.L.; Fisher, R.A.;

Gustafson, T.K.

13 Mar. 1973

3,742,229*

Soft X-Ray Mask Alignment System

Smith, H.I.; Spears, D.L.;

Stern, E.

26 June 1973

3,742,230*

Soft X-Ray Mask Support Substrate

Spears, D.L.; Smith, H.I.;

Stern, E.

26 June 1973

*Patent has been licensed.

3,743,842*

Soft X-Ray Lithographic Apparatus and Process

Smith, H.I.; Spears, D.L.; Stern, E.

3 July 1973

3,746,867

Radiation Responsive Signal Storage Device

Phelan, R.J., Jr.; Dimmock, J.O.

17 July 1974

3,748,492

Light-Triggered Electric Power Source

Baker, R.H.

24 July 1973

3,748,593*

Method and Means of Construction of a Semiconductor Material for Use as a Laser

Dimmock, J.O.; Melngailis, I.; Strauss, A.J.

24 July 1973

3,768,417

Transportation System Employing an Electromagnetically Suspended, Guided and Propelled Vehicle

Thornton, R.D.; Kolm, H.H.

30 Oct. 1973

3,789,327*

Micro-Acoustic Waveguide

Waldron, R.A.; Stern, E.

29 Jan. 1974

3,794,844*

Method and Means of Construction of a Semiconductor Material for Use in a Laser

Dimmock, J.O.; Melngailis, I.; Strauss, A.J.

26 Feb. 1974

3,818,243*

Error Correction by Redundant Pulse Powered Circuits

McMahon, R.E.

18 June 1974

3,827,953*

Process for Coating Refractory Metals with Oxidation-Resistant Metals

Haldeman, C.W.

6 Aug. 1974

3,831,173*

Ground Radar System

Lerner, R.M.

20 Aug. 1974

3,842,751

Transportation System Employing an Electromagnetically Suspended, Guided and Propelled Vehicle

Thornton, R.D.; Kolm, H.H.

22 Oct. 1974

3,857,990*

Heat Pipe Furnace

Steininger, J.; Reed, T.B.

31 Dec. 1974

3,863,070

Quantum Mechanical MOSFET Infrared Radiation Detector

Wheeler, R.H.; Ralston, R.W.

28 Jan. 1975

3,869,618

High-Power Tunable Far-Infrared and Submillimeter Source

Lax, B.; Aggarwal, R.L.

4 Mar. 1975

3,871,017

High-Frequency Phonon Generating Apparatus and Method

Pratt, G.W., Jr.

11 Mar. 1975

3,871,215

Opto-Electronic Apparatus to Generate a Pulse-Modulated Signal Indicative of the Mechanical State of a System

Pratt, G.W., Jr.; McMullin, G.

18 Mar. 1975

3,871,301

Stabilization and Ride Control of Suspended Vehicles Propelled by a Linear Motor

Kolm, H.H.; Thornton, R.D.

18 Mar. 1975

3,873,858*

Acoustic Surface Wave Phase Shifter

Burke, B.E.; Stern, E.; Bers, A.

25 Mar. 1975

3,879,235

Method of Growing from Solution Materials Exhibiting a Peltier Effect at the Solid-Melt Interface

Gatos, H.C.; Witt, A.F.; Lichtensteiger, M.

22 Apr. 1975

3,883,831*

Surface Wave Devices

Williamson, R.C.; Stern, E.

13 May 1975

3,886,530*

Signal Storage Device

Huber, E.E., Jr.; Cohen, M.S., Jr.; Smith, D.O.

27 May 1975

3,887,937

Semiconductor Sensor

Gatos, H.C.; Lagowski, J.

3 June 1975

3,897,766

Apparatus Adapted to Opto-Electrically Monitor the Output of a Prime Mover to Provide Signals Which Are Fed Back to the Input and Thereby Provide Control of the Prime Mover

Pratt, G.W., Jr.; McMullin, P.G.

5 Aug. 1975

3,912,394*

Method and System of Interferometric Measurements of Modulation Transfer Functions

Kelsall, D.

14 Oct. 1975

3,927,385

Light Emitting Diode

Pratt, G.W., Jr.

16 Dec. 1975

3,941,670

Method of Altering Biological and Chemical Activity of Molecular Species

Pratt, G.W., Jr.

2 Mar. 1976

3,950,645

Infrared Detection Tube

Rotstein, J.; Keyes, R.J.

13 Apr. 1976

3,963,515*

Vacuum Cleaning

Haldeman, C.W.;
Covert, E.E.

15 June 1976

3,965,277*

*Photoformed Plated
Interconnection of Embedded
Integrated Circuit Chips*

Guditz, E.A.; Burke, R.L.

22 June 1976

3,974,382*

*Lithographic Mask Attraction
System*

Bernacki, S.E.

10 Aug. 1976

3,974,412

*Spark Plug Employing Both
Corona Discharge and Arc
Discharge and a System
Employing the Same*

Pratt, G.W., Jr.

10 Aug. 1976

3,984,680*

*Soft X-Ray Mask Alignment
System*

Smith, H.I.

5 Oct. 1976

4,011,745

Semiconductor Sensors

Gatos, H.C.; Lagowski, J.

15 Mar. 1977

4,016,412*

*Surface Wave Devices for
Processing Signals*

Stern, E.; Williamson, R.C.

5 Apr. 1977

4,020,388

Discharge Device

Pratt, G.W., Jr.

26 Apr. 1977

4,027,383

Integrated Circuit Packaging

Herndon, T.O.; Raffel, J.I.

7 June 1977

4,038,216*

*Material and Method of
Making Secondary-Electron
Emitters*

Henrich, V.E.; Fan, J.C.C.

26 July 1977

4,049,891*

*Compositions for Fast Alkali-
Metal-Ion Transport*

Hong, H.Y.P.;
Goodenough, J.B.

20 Sep. 1977

4,055,758*

*Surface Wave Devices for
Processing Signals*

Stern, E.;
Williamson,
R.C.; Bers, A.;
Cafarella, J.H.

25 Oct. 1977

4,059,461*

*Method for Improving the
Crystallinity of Semiconduc-
tor Films by Laser Beam
Scanning and the Products
Thereof*

Fan, J.C.C.; Zeiger, H.J.

22 Nov. 1977

4,063,105

*Method of and Apparatus for
Generating Tunable Coherent
Radiation by Noncollinear
Phase-Matched Sum-
Difference Frequency Optical
Mixing*

Aggarwal, R.L.; Lee, N.K.;
Lax, B.

13 Dec. 1977

4,066,984*

*Surface Acoustic Wave
Devices for Processing and
Storing Signals*

Stern, E.;
Ingebrigtsen, K.A.

3 Jan. 1978

4,067,037*

*Transistor Having High F_t at
Low Currents*

Greiff, P.

3 Jan. 1978

4,075,706*

*Surface Wave Devices for
Processing Signals*

Stern, E.; Williamson,
R.C.; Smith, H.I.

21 Feb. 1978

4,087,719

Spark Plug

Pratt, G.W., Jr.

2 May 1978

4,087,976*

*Electric Power Plant Using
Electrolytic Cell-Fuel Cell
Combination*

Morrow, W.E., Jr.;
Hsu, M.S.

9 May 1978

4,093,927*

Pulsed Gas Laser

Levine, J.S.

6 June 1978

4,101,965*

*Surface Acoustic Wave
Devices for Processing and
Storing Signals*

Ingebrigtsen K.A.; Bers, A.;
Cafarella, J.H.

18 July 1978

4,107,544*

*Two-Photon Resonant Laser
Mixing in Molecular Liquids*

Kildal, H.; Brueck, S.R.J.

15 Aug. 1978

4,115,228*

*Method of Making
Secondary-Electron Emitters*

Henrich, V.E.; Fan, J.C.C.

19 Sep. 1978

4,115,280

*Apparatus for Altering the
Biological and Chemical
Activity of Molecular Species*

Pratt, G.W., Jr.

19 Sep. 1978

4,117,103*

*Lithium Ion Transport
Compositions*

Hong, H.Y.P.

26 Sep. 1978

4,119,855*

*Non-Vacuum Soft X-Ray
Lithographic Source*

Bernacki, S.E.

10 Oct. 1978

4,127,900*

Reading Capacitor Memories with a Variable Voltage Ramp

Raffel, J.I.; Yasaitis, J.A.
28 Nov. 1978

4,140,369

Efficient Light Diffuser

Howland, B.
20 Feb. 1979

4,142,924*

Fast-Sweep Growth Method for Growing Layers Using Liquid Phase Epitaxy

Hsieh, J.J.
6 Mar. 1979

4,150,177*

Method for Selectively Nickelating a Layer of Polymerized Polyester Resin

Guditz, E.A.; Burke, R.L.
17 Apr. 1979

4,166,669*

Planar Optical Waveguide, Modulator, Variable Coupler and Switch

Leonberger, F.J.;
Donnelly, J.P.
4 Sep. 1979

4,170,512*

Method of Manufacture of a Soft-X-Ray Mask

Flanders, D.C.; Smith,
H.I.; Dalomba, M.A.
9 Oct. 1979

4,172,882*

Lithium Ion Transport Compositions

Hong, H.Y-P.
30 Oct. 1979

4,184,172*

Dielectric Isolation Using Shallow Oxide and Polycrystalline Silicon

Raffel, J.I.; Bernacki, S.E.
15 Jan. 1980

4,186,045

Method of Epitaxial Growth Employing Electromigration

Gatos, H.C.;
Jastrzebski, L.L.
29 Jan. 1980

4,197,141*

Method for Passivating Imperfections in Semiconductor Materials

Bozler, C.O.; Fan, J.C.C.
8 Apr. 1980

4,200,395*

Alignment of Diffraction Gratings

Smith, H.I.; Austin, S.S.;
Flanders, D.C.
29 Apr. 1980

4,220,510*

Method for Separating Isotopes in the Liquid Phase at Cryogenic Temperature

Brueck, S.R.J.;
Osgood, R.M., Jr.
2 Sep. 1980

4,227,941*

Shallow-Homojunction Solar Cells

Bozler, C.O.; Chapman,
R.L.; Fan, J.C.C.;
McClelland, R.W.
14 Oct. 1980

4,231,819*

Dielectric Isolation Method Using Shallow Oxide and Polycrystalline Silicon Utilizing a Preliminary Etching Step

Raffel, J.I.; Bernacki, S.E.
4 Nov. 1980

4,242,736*

Capacitor Memory and Methods for Reading, Writing, and Fabricating Capacitor Memories

Raffel, J.I.; Yasaitis, J.A.
30 Dec. 1980

4,248,675*

Method of Forming Electrical Contact and Antireflection Layer on Solar Cells

Bozler, C.O.; Chapman,
R.L.; Fan, J.C.C.;
McClelland, R.W.
3 Feb. 1981

4,248,687*

Method of Forming Transparent Heat Mirrors on Polymeric Substrates

Fan, J.C.C.
3 Feb. 1981

4,254,174*

Supported Membrane Composite Structure and Its Method of Manufacture

Flanders, D.C.; Smith,
H.I.; Dalomba, M.A.
3 Mar. 1981

4,256,787*

Orientation of Ordered Liquids and Their Use in Devices

Flanders, D.C.; Shaver,
D.C.; Smith, H.I.
17 Mar. 1981

4,257,690

Eye Testing Chart

Howland, B.
24 Mar. 1981

4,258,375*

GaInAsP/InP Avalanche Photodiode and Method for Its Fabrication

Hsieh, J.J.; Hurwitz, C.E.
24 Mar. 1981

4,268,095*

Magnetic Bearing

Millner, A.R.
19 May 1981

4,268,808*

Acoustic Wave Device

Melngailis, J.
19 May 1981

4,274,737

Test Patterns for Lens Evaluation

Howland, B.
23 June 1981

4,283,235*

Dielectric Isolation Using Shallow Oxide and Polycrystalline Silicon Utilizing Selective Oxidation

Raffel, J.I.; Bernacki, S.E.
11 Aug. 1981

4,287,235*

X-Ray Lithography at (About) 100 Angstroms Linewidths Using X-Ray Masks Fabricated by Shadowing Techniques

Flanders, D.C.
1 Sep. 1981

4,287,485*

GaInAsP/InP Double-Heterostructure Lasers

Hsieh, J.J.

1 Sep. 1981

4,290,118*

Solid State Devices Combining the Use of Surface-Acoustic-Wave Devices and Charge-Coupled Devices

Stern, E.; Ralston, R.W.; Smythe, D.L., Jr.; Burke, B.E.

15 Sep. 1981

4,291,390*

Analog Solid State Memory

Stern, E.; Ralston, R.W.; Smythe, D.L., Jr.; Burke, B.E.

22 Sep. 1981

4,298,280*

Infrared Radar System

Harney, R.C.

3 Nov. 1981

4,298,953*

Programmable Zero-Bias Floating Gate Tapping Method and Apparatus

Munroe, S.C.

3 Nov. 1981

4,305,666*

Optical Heterodyne Detection System and Method

Becherer, R.J.; Veldkamp, W.B.

15 Dec. 1981

4,309,225*

Method of Crystallizing Amorphous Material with a Moving Energy Beam

Fan, J.C.C.; Zeiger, H.J.

5 Jan. 1982

4,312,915*

Cermet Film Selective Black Absorber

Fan, J.C.C.

26 Jan. 1982

4,313,159*

Data Storage and Access Apparatus

Shoap, S.D.

26 Jan. 1982

4,313,178*

Analog Solid State Memory

Stern, E.; Ralston, R.W.

26 Jan. 1982

4,320,247

Solar Cell Having Multiple P-N Junctions and Process for Producing Same

Gatos, H.C.; Chi, J-Y.

16 Mar. 1982

4,323,422*

Method for Preparing Optically Flat Damage-Free Surfaces

Calawa, A.R.; Gormley, J.V.; Manfra, M.J.

6 Apr. 1982

4,333,792*

Enhancing Epitaxy and Preferred Orientation

Smith, H.I.

8 June 1982

4,337,990*

Transparent Heat-Mirror

Fan, J.C.C.; Bachner, E.J.

6 July 1982

4,340,305*

Plate Aligning

Smith, H.I.; Austin, S.S.; Flanders, D.C.

20 July 1982

4,340,617*

Method and Apparatus for Depositing a Material on a Surface

Deutsch, T.E.; Ehrlich, D.J.; Osgood, R.M., Jr.

20 July 1982

4,342,970*

Acoustic Wave Device

Melngailis, J.; Haus, H.A.; Lattes, A.L.

3 Aug. 1982

4,352,105*

Display System

Harney, R.C.

28 Sep. 1982

4,357,183*

Heteroepitaxy Germanium Silicon on Silicon Utilizing Alloying Control

Fan, J.C.C.; Gale, R.P.

2 Nov. 1982

4,360,586*

Spatial Period Division Exposing

Flanders, D.C.; Smith, H.I.

23 Nov. 1982

4,366,338*

Compensating Semiconductor Materials

Turner, G.W.; Fan, J.C.C.; Salerno, J.P.

28 Dec. 1982

4,370,194*

Orientation of Ordered Liquids and Their Use in Devices

Shaver, D.C.; Smith, H.I.; Flanders, D.C.

25 Jan. 1983

4,371,421

Lateral Epitaxial Growth By Seeded Solidification

Fan, J.C.C.; Geis, M.W.; Tsaur, B-Y.

1 Feb. 1983

4,372,791*

Method for Fabricating DH Lasers

Hsieh, J.J.

8 Feb. 1983

4,372,996*

Method for Metallizing Aluminum Pads of an Integrated Circuit Chip

Guditz, E.A.; Burke, R.L.

8 Feb. 1983

4,376,228*

Solar Cells Having Ultrathin Active Layers

Fan, J.C.C.; Bozler, C.O.

8 Mar. 1983

4,376,285*

High-Speed Optoelectronic Switch

Leonberger, F.J.;
O'Donnell, F.J.

8 Mar. 1983

4,378,629*

Semiconductor Embedded Layer Technology Including Permeable Base Transistor, Fabrication Method

Bozler, C.O.; Alley, G.D.;
Lindley, W.T.;
Murphy, R.A.

5 Apr. 1983

4,382,660

Optical Transistors and Logic Circuits Embodying the Same

Pratt, G.W., Jr.; Jain, K.

10 May 1983

4,384,299*

Capacitor Memory and Methods for Reading, Writing, and Fabricating Capacitor Memories

Raffel, J.I.; Yasaitis, J.A.

17 May 1983

4,410,237*

Method and Apparatus for Shaping Electromagnetic Beams

Veldkamp, W.B.

18 Oct. 1983

4,420,873*

Optical Guided Wave Devices Employing Semiconductor-Insulator Structures

Leonberger, F.J.;
McClelland, R.W.;
Bozler, C.O.; Melngailis, I.

20 Dec. 1983

4,426,712*

Correlation System for Global Position Receiver

Gorski-Popiel, G.

17 Jan. 1984

4,438,520

System for Regenerating a Data Word on a Communications Ring

Saltzer, J.H.

20 Mar. 1984

4,442,166*

Cermet Film Selective-Black Absorber

Fan, J.C.C.

10 Apr. 1984

4,444,992*

Photovoltaic-Thermal Collectors

Cox, C.H. III

24 Apr. 1984

4,447,149*

Pulsed Laser Radar Apparatus

Marcus, S.; Quist, T.M.

8 May 1984

4,454,371

Solar Energy Concentrator System

Folino, F.A.

12 June 1984

4,458,324*

Charge Domain Multiplying Device

Burke, B.E.; Chiang, A.M.;
Lindley, W.T.

3 July 1984

4,464,726*

Charge Domain Parallel Processing Network

Chiang, A.M.

7 Aug. 1984

4,468,850*

GaInAsP/InP Double-Heterostructure Lasers

Liau, Z.-L.; Walpole, J.N.

4 Sep. 1984

4,473,805

Phase Lock Loss Detector

Guhn, D.K.

25 Sep. 1984

4,479,224*

Fiber-Coupled External Cavity Semiconductor Laser

Rediker, R.H.

23 Oct. 1984

4,479,846

Method of Entraining Dislocations and Other Crystalline Defects in Heated Film Contacting Patterned Region

Smith, H.I.; Geis, M.W.

30 Oct. 1984

4,489,390*

Spatial Filter System

Parenti, R.R.;
Keicher, W.E.

18 Dec. 1984

4,490,445

Solid Oxide Electrochemical Energy Converter

Hsu, M.S.

25 Dec. 1984

4,499,441*

Superconducting Signal-Processing Circuits

Lynch, J.T.; Anderson,
A.C.; Withers, R.S.;
Wright, P.V.

12 Feb. 1985

4,501,966*

Infrared Microscope Inspection Apparatus

Forman, S.E.; Caunt, J.W.

26 Feb. 1985

4,508,431*

Photorefractive Laser Beamsteering Device

Henshaw, P.D.

2 Apr. 1985

4,511,216*

High-Power Laser Dump

Hsu, M.S.; Hsu, J.P.

16 Apr. 1985

4,514,581*

Solar Cells Having Ultrathin Active Layers

Fan, J.C.C.; Bozler, C.O.

30 Apr. 1985

4,518,219*

Optical Guided Wave Devices Employing Semiconductor-Insulator Structures

Leonberger, F.J.; Melngailis,
I.; Bozler, C.O.;
McClelland, R.W.

21 May 1985

4,525,871*

High-Speed Optoelectronic Mixer

Foyt, A.G.; Leonberger,
F.J.; Williamson, R.C.

25 June 1985

4,547,622*

Solar Cells and Photodetectors

Fan, J.C.C.; Gale, R.P.
15 Oct. 1985

4,553,265*

Monolithic Single and Double Sideband Mixer Apparatus

Clifton, B.J.; Alley, G.D.
12 Nov. 1985

4,555,770*

Charge-Coupled Device Gaussian Convolution Method

Sage, J.P.
26 Nov. 1985

4,556,277*

Transparent Heat-Mirror

Fan, J.C.C.; Bachner, F.J.
3 Dec. 1985

4,558,290*

Compact Broadband Rectangular to Coaxial Waveguide Junction

Lee, J.C.
10 Dec. 1985

4,563,765*

Intra-Cavity Loss-Modulated Diode Laser

Tsang, D.Z.; Walpole, J.N.
7 Jan. 1986

4,565,599*

Graphoepitaxy by Encapsulation

Geis, M.W.; Smith, H.I.;
Antoniadis, D.A.;
Flanders, D.C.
21 Jan. 1986

4,567,110*

High-Temperature Brazed Ceramic Joints

Jarvinen, P.O.
28 Jan. 1986

4,576,676

Thick Crystalline Films on Foreign Substrates

Smith, H.I.; Arwater, H.A.;
Geis, M.W.
18 Mar. 1986

4,585,490*

Method of Making a Conductive Path in Multi-Layer Metal Structures by Low Power Laser Beam

Raffel, J.I.; Yasaitis, J.A.;
Chapman, G.H.;
Naiman, M.L.
29 Apr. 1986

4,608,117*

Maskless Growth of Patterned Films

Ehrlich, D.J.; Deutsch,
T.F.; Osgood, R.M., Jr.;
Schlossberg, H.
26 Aug. 1986

4,609,890*

Bulk Acoustic Wave Signal Processing Devices

Oates, D.E.; Wright, P.V.
2 Sep. 1986

4,614,628*

Solid Electrolyte Structure and Method for Forming

Hsu, M.S.; Wilson, C.F.
30 Sep. 1986

4,615,904*

Method for Maskless Growth of Patterned Films

Ehrlich, D.J.; Deutsch,
T.F.; Osgood, R.M., Jr.;
Schlossberg, H.
7 Oct. 1986

4,618,261*

Optical Gap Measuring

Flanders, D.C.;
Lyszczarz, T.M.
21 Oct. 1986

4,619,894*

Solid-Transformation Thermal Resist

Bozler, C.O.; Ehrlich, D.J.;
Tsao, J.Y.
28 Oct. 1986

4,632,712*

Reducing Dislocations in Semiconductors Utilizing Repeated Thermal Cycling During Multistage Epitaxial Growth

Fan, J.C.C.; Tsaur, B-Y.;
Gale, R.P.; Davis, F.M.
30 Dec. 1986

4,632,723

Orientation Filtering for Crystalline Films

Smith, H.I.; Arwater, H.A.;
Thompson, C.V.;
Geis, M.W.
30 Dec. 1986

4,636,404*

Method and Apparatus for Forming Low-Resistance Lateral Links in a Semiconductor Device

Raffel, J.I.; Yasaitis, J.A.;
Chapman, G.H.
13 Jan. 1987

4,642,142*

Process for Making Mercury Cadmium Telluride

Harman, T.C.
10 Feb. 1987

4,644,751*

Integrated Fuel-Cell/Steam Plant for Electrical Generation

Hsu, M.S.
24 Feb. 1987

4,649,351

Apparatus and Method for Coherently Adding Laser Beams

Veldkamp, W.B.; Leger,
J.R.; Swanson, G.J.
10 Mar. 1987

4,652,926

Solid State Imaging Technique

Withers, R.S.; Ralston,
R.W.; Stern, E.
24 Mar. 1987

4,662,860*

Telescoping Low Vibration Pulling Mechanism for Czochralski Crystal Growth

Iseler, G.W.; Ahern, B.S.
5 May 1987

4,668,528*

Method and Apparatus for Photodeposition of Films on Surfaces

Ehrlich, D.J.; Arnone, C.;
Rothschild, M.
26 May 1987

4,670,088*

Lateral Epitaxial Growth by Seeded Solidification

Tsaur, B.-Y.; Fan, J.C.C.; Geis, M.W.

2 June 1987

4,672,254*

Surface Acoustic Wave Devices and Method of Manufacture Thereof

Dolat, V.S.; Ehrlich, D.J.; Tsao, J.Y.

9 June 1987

4,690,551*

Laser Radar Utilizing Pulse-Tone Waveform

Edwards, B.E.; Biron, D.G.

1 Sep. 1987

4,696,533*

Spatial Light Modulator

Kingston, R.H.; Leonberger, F.J.

29 Sep. 1987

4,700,461*

Process for Making Junction Field-Effect Transistors

Choi, H.-K.; Tsaur, B.-Y.

20 Oct. 1987

4,710,959*

Voice Encoder and Synthesizer

Feldman, J.A.; Hofstetter, E.M.

1 Dec. 1987

4,718,070*

Surface-Emitting Diode Laser

Liau, Z.-L.; Walpole, J.N.

5 Jan. 1988

4,721,349*

Transparent Heat-Mirror

Fan, J.C.C.; Bachner, F.J.

26 Jan. 1988

4,722,092*

GaInAsP/InP Distributed Feedback Laser

Liau, Z.-L.; Flanders, D.C.; Walpole, J.N.

26 Jan. 1988

4,727,047*

Method of Producing Sheets of Crystalline Material

Bozler, C.O.; Fan, J.C.C.; McClelland, R.W.

23 Feb. 1989

4,734,152

Dry Etching Patterning of Electrical and Optical Materials

Geis, M.W.; Efreimow, N., Jr.; Pang, S.W.

29 Mar. 1988

4,742,510*

Near and Far Echo Canceller for Data Communications

Quatieri, T.F.; O'Leary, G.C.

3 May 1988

4,745,452*

Tunneling Transfer Devices

Sollner, T.C.L.G.

17 May 1988

4,746,620*

Lateral P-I-N Photodetector

Diadiuk, V.; Groves, S.H.

24 May 1988

4,748,045*

Method and Apparatus for Photodeposition of Films on Surfaces

Ehrlich, D.J.; Rothschild, M.

31 May 1988

4,750,148*

Optical Gaussian Convolvers

Sage, J.P.

7 June 1988

4,756,927*

Method and Apparatus for Refractory Metal Deposition

Black, J.G.; Ehrlich, D.J.

12 July 1988

4,774,205*

Monolithic Integration of Silicon and Gallium Arsenide Devices

Choi, H.-K.; Tsaur, B.-Y.; Turner, G.W.

27 Sep. 1988

4,777,148*

Process for Making a Mesa GaInAsP/InP Distributed Feedback Laser

Liau, Z.-L.; Flanders, D.C.; Walpole, J.N.

11 Oct. 1988

4,777,426*

Axial-Flow Aerodynamic Window for High-Energy Laser

Stephens, T.

11 Oct. 1988

4,784,722*

Method Forming Surface-Emitting Diode Laser

Liau, Z.-L.; Walpole, J.N.

15 Nov. 1988

4,791,490*

Detector for Three-Dimensional Optical Imaging

Knight, F.K.; Kalata, K.

13 Dec. 1988

4,794,556*

Method and Apparatus for Sampling In-Phase and Quadrature Components

Rader, C.M.

27 Dec. 1988

4,798,437*

Method and Apparatus for Processing Analog Optical Wave Signals

Rediker, R.H.; Leonberger, F.J.; Greenwood, D.P.

17 Jan. 1989

4,810,663*

Method of Forming Conductive Path by Low-Power Laser Pulse

Raffel, J.I.; Yasaitis, J.A.; Chapman, G.H.; Naiman, M.L.; Burns, J.A.

7 Mar. 1989

4,813,762*

Coherent Beam Combining of Lasers Using Microlenses and Diffractive Couplings

Leger, J.R.; Veldkamp, W.B.; Scott, M.L.

21 Mar. 1989

4,816,420*

Method of Producing Tandem Solar Cell Devices from Sheets of Crystalline Material

Bozler, C.O.; Fan, J.C.C.; McClelland, R.W.

28 Mar. 1989

4,822,120*

Transparent Heat-Mirror

Fan, J.C.C.; Bachner, F.J.

18 Apr. 1989

4,831,340*

Harmonic Multiplier Using Resonant Tunneling Device

Sollner, T.C.L.G.

16 May 1989

4,834,834*

Laser Photochemical Etching Using Surface Halogenation

Ehrlich, D.J.; Rothschild, M.

30 May 1989

4,837,182*

Method of Producing Sheets of Crystalline Material

Bozler, C.O.; Fan, J.C.C.; McClelland, R.W.

6 June 1989

4,838,685

Methods and Apparatus for Motion Estimation in Motion Picture Processing

Martinez, D.M.; Lim, J.S.

13 June 1989

4,839,145*

Chemical Vapor Deposition Reactor

Gale, R.P.; Fan, J.C.C.

13 June 1989

4,839,310*

High Mobility Transistor with Opposed-Gates

Hollis, M.A.; Goodhue, W.D.; Nichols, K.B.; Bergeron, N.J.

13 June 1989

4,843,034*

Fabrication of Interlayer Conductive Paths in Integrated Circuits

Herndon, T.O.; Chapman, G.H.

27 June 1989

4,846,552*

Method of Fabricating High-Efficiency Binary Planar Optical Elements

Veldkamp, W.B.; Swanson, G.J.

11 July 1989

4,848,880*

Spatial Light Modulator

Aull, B.F.; Goodhue, W.D.

18 July 1989

4,853,076*

Semiconductor Thin Films

Tsaur, B-Y.; Fan, J.C.C.; Geis, M.W.

1 Aug. 1989

4,855,255*

Tapered Laser or Waveguide Optoelectronic Method

Goodhue, W.D.

8 Aug. 1989

4,856,068*

Audio Pre-Processing Methods and Apparatus

Quatieri, T.F.; McAulay, R.J.

8 Aug. 1989

4,860,304*

Solid State Microlaser

Mooradian, A.

22 Aug. 1989

4,862,467*

One- and Two-Dimensional Optical Wavefront Synthesis in Real Time

Carter, M.J.; Welford, D.

29 Aug. 1989

4,864,378*

Schottky Barrier Infrared Detector

Tsaur, B-Y.

5 Sep. 1989

4,865,427*

Spatial Light Modulator

Kingston, R.H.; Leonberger, F.J.

12 Sep. 1989

4,868,005*

Method and Apparatus for Photodeposition of Films on Surfaces

Ehrlich, D.J.; Rothschild, M.

19 Sep. 1989

4,881,237*

Hybrid Two-Dimensional Surface-Emitting Laser Arrays

Donnelly, J.P.

14 Nov. 1989

4,885,790*

Processing of Acoustic Waveforms

McAulay, R.J.; Quatieri, T.F.

5 Dec. 1989

4,888,203*

Hydrolysis-Induced Vapor Deposition of Oxide Films

Rothschild, M.; Black, J.G.; Ehrlich, D.J.

19 Dec. 1989

4,889,583*

Capping Technique for Zone-Melting Recrystallization of Insulated Semiconductor Films

Chen, C.K.; Tsaur, B-Y.

26 Dec. 1989

4,893,352*

Optical Transmitter of Modulated Signals

Welford, D.

9 Jan. 1990

4,894,709*

Forced-Convection, Liquid-Cooled, Microchannel Heat Sinks

Phillips, R.J.; Glicksman, L.R.; Larson, R.

16 Jan. 1990

4,894,840*

Surface-Emitting Laser

Liau, Z-L.; Walpole, J.N.

16 Jan. 1990

4,895,790*

High-Efficiency, Multilevel, Diffractive Optical Elements

Swanson, G.J.; Veldkamp, W.B.

23 Jan. 1990

4,903,089*

Vertical Transistor Device Fabricated with Semiconductor Regrowth

Hollis, M.A.; Bozler, C.O.; Nichols, K.B.; Bergeron, N.J.

20 Feb. 1990

*Patent has been licensed.

4,910,741*

Laser Diode Source Assembly

Pillsbury, A.D.;
Richardson, M.F.;
Welford, D.

20 Mar. 1990

4,918,049

*Microwave/Far Infrared
Cavities and Waveguides
Using High-Temperature
Superconductors*

Cohn, D.R.; Bromberg, L.;
Lax, B.; Halverson, W.D.;
Woskov, P.P.

17 Apr. 1990

4,933,649*

*Coherent Aperture Filling of
an Array of Lasers*

Swanson, G.J.; Leger, J.R.;
Holz, M.K.O.

12 June 1990

4,935,939*

*Surface Emitting Laser with
Monolithic Integrated Lens*

Liau, Z.-L.; Walpole, J.N.

19 June 1990

4,937,475*

*Laser Programmable
Integrated Circuit*

Rhodes, F.M.; Raffel, J.I.

26 June 1990

4,937,873*

*Computationally Efficient
Sine Wave Synthesis for
Acoustic Waveform Processing*

McAulay, R.J.;
Quatieri, T.F.

26 June 1990

4,939,368

*Polychromatic Optical Strain
Gauge*

Brown, S.B.

3 July 1990

4,946,280*

*Wavefront Analysis for
Segmented Mirror Control*

Horton, R.F.

7 Aug. 1990

4,947,143*

*Multiport Power Divider-
Combiner*

Abouzahra, M.D.;
Gupta, K.C.

7 Aug. 1990

4,952,527*

*Method of Making Buffer
Layers for III-V Devices
Using Solid Phase Epitaxy*

Calawa, A.R.; Smith, F.W.;
Manfra, M.J.; Chen, C.-L.

28 Aug. 1990

4,953,166*

Microchip Laser

Mooradian, A.

28 Aug. 1990

4,956,844*

*Two-Dimensional Surface-
Emitting Laser Array*

Goodhue, W.D.;
Rauschenbach, K.;
Wang, C.A.

11 Sep. 1990

4,957,775*

*Method and Apparatus for
Refractory Metal Deposition*

Black, J.G.; Ehrlich, D.J.

18 Sep. 1990

4,959,653*

Adaptive Sidelobe Blanker

Ganz, M.W.

25 Sep. 1990

4,972,361*

Folded Linear Systolic Array

Rader, C.M.

20 Nov. 1990

4,982,405*

*Coupled-Cavity Q-Switched
Laser*

Zayhowski, J.J.;
Mooradian, A.

1 Jan. 1991

4,985,621*

*Electrooptical Switch with
Separate Detector and
Modulator Modules*

Aull, B.F.; Nichols, K.B.;
Sollner, T.C.L.G.

15 Jan. 1991

4,990,465

*Method of Forming a
Surface-Emitting Laser*

Liau, Z.-L.; Walpole, J.N.

5 Feb. 1991

4,994,664*

*Optically Coupled Focal
Plane Arrays Using Lenslets
and Multiplexers*

Veldkamp, W.B.

19 Feb. 1991

4,997,608*

*Molding
Polytetrafluoroethylene*

Haldeman, C.W.;
Brailove, A.A.

5 Mar. 1991

4,997,677*

*Vapor Phase Reactor for
Making Multilayer Structures*

Wang, C.A.; Brown, R.A.;
Caunt, J.W.

5 Mar. 1991

4,999,316*

*Method for Forming Tapered
Laser or Waveguide
Optoelectronic Structures*

Goodhue, W.D.;
Rediker, R.H.; Bossi, D.E.

12 Mar. 1991

5,002,353*

*Apparatus and Method for
Reducing Modulator
Nonlinearities*

Johnson, L.M.

26 Mar. 1991

5,002,899*

*Electrical Contacts on
Diamond*

Geis, M.W.; Rothschild,
M.; Ehrlich, D.J.

26 Mar. 1991

5,008,758*

*Suppressing Dark Current in
Charge-Coupled Devices*

Burke, B.E.

16 Apr. 1991

5,015,053*

*Reduction of Modulator Non-
Linearities with Independent
Bias Angle Control*

Johnson, L.M.

14 May 1991

5,017,403*

*Process for Forming
Planarized Films*

Pang, S.W.; Horn, M.W.

21 May 1991

5,022,745*

Electrostatically Deformable Single Crystal Dielectrically Coated Mirror

Zayhowski, J.J.;
Mooradian, A.

11 June 1991

5,023,431*

Linearized Thermal Feedback Circuit and Temperature Controller Circuit Utilizing the Same

Roberge, J.K.

11 June 1991

5,027,359*

Miniature Talbot Cavity for Lateral Mode Control of Laser Array

Leger, J.R.; Swanson, G.J.

25 June 1991

5,030,953*

Charge Domain Block Matching Processor

Chiang, A.M.

9 July 1991

5,032,538*

Semiconductor Embedded Layer Technology Utilizing Selective Epitaxial Growth Methods

Bozler, C.O.; Alley, G.D.;
Lindley, W.T.;
Murphy, R.A.

16 July 1991

5,032,543*

Coplanar Packaging Techniques for Multichip Circuits

Black, J.G.; Astolfi, D.K.;
Doran, S.P.; Ehrlich, D.J.

16 July 1991

5,033,060*

Optical Device for Laser Coupling and Coherent Beam Combining

Leger, J.R.; Swanson, G.J.

16 July 1991

5,033,114*

Laser Calibration

Jayaraman, V.; Kintzer, E.S.

16 July 1991

5,038,100*

Microwave Test Fixture

Kushner, L.J.;
Beaudette, R.J.

6 Aug. 1991

5,038,282*

Synchronous Processor with Simultaneous Instruction Processing and Data Transfer

Gilbert, I.H.; Ciccio, N.A.

6 Aug. 1991

5,048,051*

Optically Stabilized Plano-Plano Optical Resonators

Zayhowski, J.J.

10 Sep. 1991

5,050,179*

External Cavity Semiconductor Laser

Mooradian, A.

17 Sep. 1991

5,051,750

Winds Aloft Estimation Through Radar Observation of Aircraft

Hollister, W.M.

24 Sep. 1991

5,052,786*

Broadband Faraday Isolator

Schulz, P.A.

1 Oct. 1991

5,054,027*

Pulsed Laser

Goodberlet, J.; Fujimoto,
J.A.; Schulz, P.A.; Wang, J.

1 Oct. 1991

5,054,072*

Coding of Acoustic Waveforms

McAulay, R.J.;
Quatieri, T.F.

1 Oct. 1991

5,059,763*

Formation of Optical Quality Surfaces in Optical Material

O'Brien, D.R.;
Cox, C.H. III; Hoyt, C.D.

22 Oct. 1991

5,062,150*

Fiber-Based Free-Space Optical System

Swanson, E.A.;
Bondurant, R.S.

29 Oct. 1991

5,066,610*

Capping Technique for Zone-Melting Recrystallization of Insulated Semiconductor Films

Chen, C.K.

19 Nov. 1991

5,081,637*

Multiple-Laser Pump Optical System

Fan, T.Y.; Sanchez, A.;
Walpole, J.N.; Williamson,
R.C.; Melngailis, I.; Leger,
J.R.; Goltsov, W.C.

14 Jan. 1992

5,081,865*

Center of Gravity Locating Method

Schecter, S.E.;
Leyenaar, A.R.

21 Jan. 1992

5,087,589*

Selectively Programmable Interconnections in Multilayer Integrated Circuits

Chapman, G.H.;
Herndon, T.O.

11 Feb. 1992

5,089,023*

Diffraction/Refractive Lens Implant

Swanson, G.J.

18 Feb. 1992

5,089,983

Charge Domain Vector-Matrix Product Processing System

Chiang, A.M.

18 Feb. 1992

5,091,333*

Reducing Dislocations in Semiconductors Utilizing Repeated Thermal Cycling During Multistage Epitaxial Growth

Fan, J.C.C.; Tsaur, B.-Y.;
Gale, R.P.; Davis, F.M.

25 Feb. 1992

5,093,662*

Low-Altitude Wind Shear Detection with Airport Surveillance Radars

Weber, M.

3 Mar. 1992

*Patent has been licensed.

5,093,833*

Optical Pulse Generator

Pang, L.Y.; Kintzer, E.S.;
Fujimoto, J.G.

3 Mar. 1992

5,095,664*

*Optical Surface Polishing
Method*

Zayhowski, J.J.

17 Mar. 1992

5,099,910*

*Microchannel Heat Sink
with Alternating Flow
Directions*

Walpole, J.N.;
Missaggia, L.J.

31 Mar. 1992

5,101,412*

Laser Diode Source Assembly

Pillsbury, A.D.;
Richardson, M.F.;
Welford, D.

31 Mar. 1992

5,104,684

*Ion-Beam-Induced
Deposition of Metals*

Tao, T.; Melngailis, J.

14 Apr. 1992

5,105,248*

*Spatial Light Modulator
Using Charge-Coupled
Device with Quantum Wells*

Burke, B.E.; Goodhue,
W.D.; Nichols, K.B.

14 Apr. 1992

5,106,778*

*Vertical Transistor Device
Fabricated with Semicon-
ductor Regrowth*

Hollis, M.A.; Bozler, C.O.;
Nichols, K.B.;
Bergeron, N.J.

21 Apr. 1992

5,110,195*

*High-Bandwidth Steering
Mirror*

Loney, G.C.

5 May 1992

5,111,065*

*Diode Driver Circuit
Utilizing Discrete-Value DC
Current Source*

Roberge, J.K.

5 May 1992

5,113,365

*Method and Charge-Coupled
Apparatus for Algorithmic
Computations*

Yang, W.

12 May 1992

5,114,247

Multi-Element Bearings

Folino, F.A.

19 May 1992

5,115,445*

Microchip Laser Array

Mooradian, A.

19 May 1992

5,116,464

*Cesium Hydroxide Etch of
Semiconductor Crystal*

Edell, D.J.; Clark, L.D., Jr.

26 May 1992

5,116,771*

*Thick Contacts for Ultra-
Thin Silicon on Insulator
Films*

Karulkar, P.C.

26 May 1992

5,121,498*

*Translator for Translating
Source Code for Selective
Unrolling of Loops in the
Source Code*

Gilbert, I.H.; Ciccio, N.A.

9 June 1992

5,122,222*

*Frequency-Domain Analysis
of RHEED Data*

Turner, G.W.; Nechay,
B.N.; Eglash, S.J.

16 June 1992

5,122,223*

*Graphoepitaxy Using Energy
Beams*

Geis, M.W.; Flanders,
D.C.; Smith, H.I.

16 June 1992

5,123,026*

*Frequency-Doubled, Diode-
Pumped Ytterbium Laser*

Fan, T.Y.; Locovara, P.

16 June 1992

5,123,057*

*Model-Based Pattern
Recognition*

Verly, J.G.; Williams, B.;
Delanoy, R.L.

16 June 1992

5,124,843*

*Array Illuminator Using a
Binary Optics Phase Plate*

Leger, J.R.; Swanson, G.J.

23 June 1992

5,126,962*

*Discrete Cosine Transform
Processing System*

Chiang, A.M.

30 June 1992

5,130,614

*Ribbon Beam Cathode Ray
Tube*

Staelin, D.H.

14 July 1992

5,131,002*

*External Cavity Semicon-
ductor Laser System*

Mooradian, A.

14 July 1992

5,132,656*

*Floating-Gate Charge-
Balance CCD*

Munroe, S.C.

21 July 1992

5,132,977*

*Coupled-Cavity Q-Switched
Laser*

Zayhowski, J.J.;
Mooradian, A.

21 July 1992

5,134,414*

*Radar Duplexer Leakage
Spike Suppressor*

Ditullio, J.G.;
Dolan, P.D. II;
Shively, E.H.;
Romaine, W.R.

28 July 1992

5,136,169

Energy Beam Locating

Smith, H.I.; Anderson,
E.H.; Schattenburg, M.L.

4 Aug. 1992

5,139,606*

Laser Bilayer Etching of GaAs Surfaces

Maki, P.A.

18 Aug. 1992

5,139,925*

Surface Barrier Silylation of Novolac Film Without Photoactive Additive Patterned with 193-nm Excimer Laser

Hartney, M.A.

18 Aug. 1992

5,142,385

Holographic Lithography

Anderson, E.H.; Smith, H.I.; Schattenburg, M.L.

25 Aug. 1992

5,143,894*

Formation and High-Resolution Patterning of Superconductors

Rothschild, M.; Ehrlich, D.J.; Black, J.G.

1 Sep. 1992

5,150,374*

Method of Fabricating a Waveguide Optical Resonant Cavity

Mooradian, A.

22 Sep. 1992

5,155,561*

Permeable Base Transistor Having an Electrode Configuration for Heat Dissipation

Bozler, C.O.; Rabe, S.; Hollis, M.A.; Harris, C.T.; Nichols, K.B.

13 Oct. 1992

5,157,296

Bearing for Use in High-Resolution Precision Control Device

Trumper, D.L.

20 Oct. 1992

5,160,575*

Edge-Heat Sink Technique for Zone Melting Recrystallization of Semiconductor-on-Insulator Films

Chen, C.K.

3 Nov. 1992

5,160,959*

Device and Method for the Alignment of Masks

Everett, P.N.; Delaney, W.F.; Griswold, M.P.

3 Nov. 1992

5,161,059*

High-Efficiency, Multilevel, Diffractive Optical Elements

Swanson, G.J.; Veldkamp, W.B.

3 Nov. 1992

5,164,805

Near-Intrinsic Thin-Film SOI FETs

Lee, C-T.

17 Nov. 1992

5,168,069

Ultra-High-Speed Photoconductive Devices Using Semi-Insulating Layers

Smith, F.W.; Hollis, M.A.; Calawa, A.R.; Diadiuk, V.; Le, H.Q.

1 Dec. 1992

5,172,390*

Pre-Aligned Diode Laser for External Cavity Operation

Mooradian, A.

15 Dec. 1992

5,172,391*

Polarization Controlling System for Lasers

Zayhowski, J.J.

15 Dec. 1992

5,173,271

Enhanced Radiative Zone-Melting Recrystallization Method and Apparatus

Chen, C.K.; Im, J.

22 Dec. 1992

5,174,072

Optical Surface Polishing Method

Zayhowski, J.J.

29 Dec. 1992

5,185,758*

Multiple-Laser Pump Optical System

Fan, T.Y.; Sanchez, A.; Walpole, J.N.; Williamson, R.C.; Melngailis, I.; Leger, J.R.; Goltsov, W.C.

9 Feb. 1993

5,189,376

Method for the Measurement of Capacitance, with Application to Linear Measurement of Distance

Roberge, J.K.; Gray, M.L.

23 Feb. 1993

5,194,837*

Multi-Tap Programming Circuit for Transversal Filters

Smythe, D.L., Jr.; Green, J.B.

16 Mar. 1993

5,196,745

Magnetic Positioning Device

Trumper, D.L.

23 Mar. 1993

5,198,881*

Barrier Layer Device Processing

Huang, J.C.; Rothschild, M.; Burke, B.E.; Ehrlich, D.J.; Kosicki, B.B.

30 Mar. 1993

5,199,086*

Electro-Optic System

Johnson, L.M.; Hutchinson, W.K.; Sonnenschein, A.

30 Mar. 1993

5,216,684

Reliable AllInGaAs/AlGaAs Strained-Layer Diode Lasers

Wang, C.A.; Walpole, J.N.; Donnelly, J.P.

1 June 1993

5,217,564

Method of Producing Sheets of Crystalline Material and Devices Made Therefrom

Bozler, C.O.; Fan, J.C.C.; McClelland, R.W.

8 June 1993

5,218,471

High-Efficiency, Multilevel, Diffractive Optical Elements

Swanson, G.J.; Veldkamp, W.B.

8 June 1993

5,219,773

Method of Making Reoxidized Nitrided Oxide MOSFETs

Dunn, G.J.

15 June 1993

5,222,155*

Computer Apparatus and Method for Fuzzy Template Shape Matching Using a Scoring Function

Delanoy, R.L.; Verly, J.G.
22 June 1993

5,233,459

Electric Display Device

Bozler, C.O.; Rabe, S.
3 Aug. 1993

5,238,525

Analysis of RHEED Data from Rotating Substrates

Turner, G.W.; Isles, A.J.
24 Aug. 1993

5,247,562

Tunable Source of Monochromatic, Highly Directional X-Rays and a Method for Producing Such Radiation

Steinbach, A.L.
21 Sep. 1993

5,248,987

Widebeam Antenna

Lee, J.C.
28 Sep. 1993

5,249,259

Genetic Algorithm Technique for Designing Neural Networks

Harvey, R.L.
28 Sep. 1993

5,251,225

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