

COHERENT INC
Form 10-K/A
May 17, 2005

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

FORM 10-K/A

Amendment No. 4

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES
EXCHANGE ACT OF 1934**

For the Fiscal Year Ended October 2, 2004

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES
EXCHANGE ACT OF 1934**

Commission File Number: 0-5255

COHERENT, INC.

Delaware

94-1622541

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(State or other jurisdiction of
incorporation or organization)

(I.R.S. Employer
Identification No.)

5100 Patrick Henry Drive, Santa Clara, California 95054
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: **(408) 764-4000**

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
None	None

Securities registered pursuant to Section 12(g) of the Act:

Common Stock, \$.01 par value

Common Stock Purchase Rights

(Title of Class)

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☒

Indicate by check mark whether the registrant is an accelerated filer (as defined in Rule 12b-2 of the Act). Yes ☒ No ☐

As of December 1, 2004, 30,554,982 shares of common stock were outstanding. The aggregate market value of the voting shares (based on the closing price reported by the NASDAQ National Market System on April 2, 2004) of Coherent, Inc., held by nonaffiliates was \$617,038,552. For purposes of this disclosure, shares of common stock held by persons who own 5% or more of the outstanding common stock and shares of common stock held by each officer and director have been excluded in that such persons may be deemed to be affiliates as that term is defined under the Rules and Regulations of the Act. This determination of affiliate status is not necessarily conclusive.

EXPLANATORY NOTE

This Annual Report on Form 10-K/A ("Form 10-K/A") is being filed as Amendment No. 4 to our Annual Report on Form 10-K for the fiscal year ended October 2, 2004, which was filed with the Securities and Exchange Commission (SEC) on December 15, 2004 (the "Original Filing"). We are filing this Amendment No. 4 to reflect restatements of our consolidated balance sheets at October 2, 2004 and September 27, 2003, and our consolidated statements of operations, stockholders' equity and cash flows for the fiscal years ended October 2, 2004, September 27, 2003, and September 28, 2002, and the related notes thereto to correct the accounting for our deferred compensation plans (the "Restatement"). For a more detailed description of the Restatement, see Note 20 "Restatement" of the Notes to Consolidated Financial Statements.

Our fiscal year ends on the Saturday closest to September 30. Fiscal years 2004, 2003 and 2002 ended on October 2, September 27 and September 28, respectively. For convenience, we use September 30 as our fiscal year-end dates throughout this Annual Report in order to correspond to the accompanying consolidated financial statements.

This Form 10-K/A amends and restates Item 1. Business of Part I; Item 6. Selected Financial Data, Item 7. Management's Discussion and Analysis of Results of Operations and Financial Condition, and Item 9A. Controls and Procedures of Part II; and Item 15 Financial Statements of Part IV of the Original Filing, as amended, in each case, solely as a result of, and to reflect, the Restatement. Pursuant to the rules of the SEC, Item 15 of Part IV of the Original Filing has been amended to contain the consents of our independent registered public accountants and currently-dated certifications from our principal executive officer and principal financial officer, as required by Sections 302 and 906 of the Sarbanes-Oxley Act of 2002. The consents of our independent registered public accountants are attached to this Form 10-K/A as Exhibits 23.1 and 23.2. The certifications of our principal executive officer and our principal financial officer are attached to this form 10-K/A as Exhibits 31.1, 31.2, 32.1 and 32.2.

Except for the foregoing amended information, this Form 10-K/A continues to describe conditions as of the date of the Original Filing, and we have not updated the disclosures contained herein to reflect events that have occurred subsequent to that date. Other events occurring after the date of the Original Filing or other information necessary to reflect subsequent events have been disclosed in reports filed with the SEC subsequent to the Original Filing.

PART I.

This Annual Report contains forward-looking statements. These forward-looking statements include, without limitation, statements regarding our future:

net sales;

results of operations;

gross profits;

research and development projects and expenses;

selling, general and administrative expenses;

warranty reserves;

legal proceedings;

claims against third parties for infringement of our proprietary rights;

benefits from our acquisition of Positive Light, Inc.;

liquidity and sufficiency of existing cash, cash equivalents and short-term investments for near-term requirements;

development and acquisition of new technology and intellectual property;

write-downs for excess or obsolete inventory;

competitors and competitive pressures;

growth of applications for our products and increase of market share;

obtain components and materials in a timely manner;

identify alternative sources of supply for components;

achieve adequate manufacturing yields;

impact of recent acquisitions;

leverage of power and energy management products into our next generation products;

operating efficiencies and minimization of redundant costs;

compliance with environmental regulations;

participation in the bio-agent detection market;

leveraging of our technology portfolio and application engineering;

optimize our leadership position in existing markets;

collaborative customer and industry relationships;

emphasis on supply chain management;

use of financial market instruments;

simplifications of our foreign legal structure and reduction of our presences in certain countries; and

focus on long-term improvement of return on invested capital.

In addition, we include forward-looking statements under the **Our Strategy** and **Future Trends** sections set forth below in **Business**.

You can identify these and other forward-looking statements by the use of the words such as **may**, **will**, **could**, **would**, **should**, **expects**, **plans**, **anticipates**, **estimates**, **intends**, **potential**, **continue**, or the negative of such terms, or other comparable terminology. Forward-looking statements also include the assumptions underlying or relating to any of the foregoing statements.

Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth below in **Business**, **Management's Discussion and Analysis of Results of Operations and Financial Condition** and under the heading **Risk Factors**. All forward-looking statements included in this document are based on information available to us on the date hereof. We undertake no obligation to update these forward-looking statements as a result of events or circumstances or to reflect the occurrence of unanticipated events.

ITEM 1. BUSINESS

GENERAL

Business Overview

Our fiscal year ends on the Saturday closest to September 30. Fiscal years 2004, 2003 and 2002 ended on October 2, September 27 and September 28, respectively. Fiscal year 2004 includes 53 weeks, whereas fiscal years 2003 and 2002 include 52 weeks. For convenience, we use September 30 as our fiscal year-end dates throughout this Annual Report in order to correspond to the accompanying consolidated financial statements.

We are one of the world's leading suppliers of photonics-based solutions in a broad range of commercial and scientific research applications. We design, manufacture and market lasers, laser-based systems, precision optics and related accessories for a diverse group of customers. Since inception in 1966, we have grown through internal expansion and through strategic acquisitions of complementary businesses, technologies, intellectual property, manufacturing processes and product offerings.

We have two reportable business segments: Electro-Optics and Lambda Physik, both of which work with customers to provide cost-effective photonics-based solutions. Our Electro-Optics segment focuses on markets such as semiconductor and related manufacturing, materials processing, original equipment manufacturer (OEM) laser components and instrumentation, scientific research and government programs and graphic arts and display. Lambda Physik AG (Lambda Physik), our 95.01% owned subsidiary with headquarters located in Göttingen, Germany, focuses on markets using lasers for the production of thin-film transistors (TFT) used in flat panel displays, microlithography applications in the semiconductor industry, ink jet printers, automotive, environmental research, scientific research, medical OEMs, materials processing and micro-machining applications.

We were originally incorporated in California on May 26, 1966 and reincorporated in Delaware on October 1, 1990.

Additional information about Coherent, Inc. (referred to herein as the Company, we, our, or Coherent) is available on our web site at www.coherent.com. We make available, free of charge on our web site, access to our Annual Report on Form 10-K, our quarterly reports on Form 10-Q, our current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, as soon as reasonably practicable after we file them electronically with or furnish them to the Securities and Exchange Commission (SEC). Information contained on our web site is not part of this Annual Report on Form 10-K/A or our other filings with the SEC.

INDUSTRY BACKGROUND

The word "laser" is an acronym for "light amplification by stimulated emission of radiation." A laser works by causing an energy source to excite, or pump, an optical gain medium, converting the energy from the source into an emission of photons, the fundamental particles of light. These

photons stimulate the release of more photons in the gain medium as they are reflected back and forth between the mirrors that make up the laser's resonator. The resulting build-up in the number of photons is usually emitted in the form of a light beam, the laser beam, through a partially reflective mirror at the output end of the laser.

The four types of lasers commonly available today are gas, liquid, semiconductor and solid-state, each of which derives its classification from the lasing material it uses. Laser beams can be emitted in either continuous waves or in pulses with varying repetition rates, can have different operating wavelengths and emission bandwidths, and can emit light in a wide range of energies and powers. Depending on the application, lasers can be designed for a specific power, pulse width, repetition rate and wavelength. In addition, the laser's cost of ownership can dictate its suitability for a particular application.

As lasers become less expensive, smaller and more reliable, they are increasingly replacing conventional tools and enabling technological advances in a variety of applications and industries including microtechnologies and nanotechnologies; semiconductor inspection; microlithography; measurement, test and repair of electronic circuits; medical and biotechnology; consumer electronics; industrial process and quality control; materials processing; imaging and printing; display; and research and development. Ultraviolet (UV) lasers are profiting from the trend towards miniaturization, which is a driver of innovation and growth in many markets. The short wavelength of lasers that emit light in the UV spectral region make it possible to produce extremely small structures with maximum precision consistent with the latest state of the art technology.

OUR STRATEGY

We strive to develop innovative and proprietary products and solutions that meet the needs of our customers and that are based on our core expertise in lasers and optical technologies. In pursuit of our strategy, we intend to:

Leverage our technology portfolio and application engineering to lead the proliferation of photonics into broader markets We will continue to identify opportunities in which our technology portfolio and application engineering can be used to offer innovative solutions and gain access to new markets.

Optimize our leadership position in existing markets There are a number of markets where we have historically been at the forefront of technological development and product deployment and from which we have derived a substantial portion of our revenues. We plan to optimize our financial returns from these markets.

Maintain and develop additional strong collaborative customer and industry relationships We believe that the Coherent brand name and reputation for product quality, technical performance and customer satisfaction will help us to further develop our loyal customer base. We plan to maintain our current customer relationships and develop new ones with customers that are industry leaders and work together with these customers to design and develop innovative product systems and solutions as they develop new technologies.

Develop and acquire new technologies We will continue to enhance our market position through our existing technologies and develop new technologies through our internal research and development efforts, as well as through the acquisition of additional complementary technologies, intellectual property, manufacturing processes and product offerings.

Emphasize supply chain management We will continue to focus on operational efficiency through an emphasis on supply chain management with the explicit intent of improving gross margins and increasing inventory turns.

Focus on long-term improvement of Return on Invested Capital We will continue to focus on long-term improvement of return on invested capital.

APPLICATIONS

Our products address a broad range of applications. Both of our reportable business segments are focused on several areas of the photonics market including: microelectronics, graphic arts and display, materials processing, scientific research and government programs and OEM components and instrumentation.

Microelectronics

The use of semiconductors has expanded beyond computer systems to a wide array of applications such as telecommunications and data communication systems, automotive products, consumer goods, medical products, household appliances, industrial automation and control systems.

Semiconductor manufacturers are continually seeking to improve their process and design technologies to manufacture smaller, more powerful and more reliable devices at a lower cost per function. A major factor in fabricating such devices is the ability to reduce circuit geometries, measured in nanometers (a billionth of a meter), and defined in terms of critical, or smallest, feature size. Reduced circuit geometries permit semiconductor manufacturers to increase the number of integrated components per area of silicon.

Lasers are particularly useful in manufacturing products that require fine precision and small feature sizes such as semiconductor and microelectronic devices where beam shape and delivered power are important. We provide lasers to semiconductor equipment manufacturers for use in lithography, mask writing, wafer inspection, mask repair and packaging processes for their semiconductor manufacturing systems.

Deep ultraviolet (DUV) lithography

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Lithography is one of the most critical and expensive steps in the manufacturing process of complex semiconductor devices fabricated on silicon wafers. This process requires a system that projects light through a photomask containing the master image of a particular circuit layer onto a light sensitive material coated on the wafer. The critical feature size of a semiconductor device depends upon the resolution capability of the lithography system. Resolution capability is a function of the projected wavelength of the light source and the numerical aperture of the lens. A shorter wavelength or higher numerical aperture enables smaller feature sizes.

We currently provide, through our 95.01% owned Lambda Physik subsidiary, *NovaLine* lasers with stable, line-narrowed, 2 kilohertz (kHz) operation at 248 nanometers (nm) (20 W); 4 kHz operation at 193nm (20 W); and we developed the new dual-chamber 193nm *LithoTex* (50 W) at 4kHz with spectral purity less than 0.2 pm, FWHM. In December 2004, our Lambda Physik subsidiary decided to discontinue future product development and investments in the semiconductor lithography market. As a result of this decision, we

anticipate recognizing a charge of between \$3.0 million and \$6.0 million in the quarter ending January 1, 2005, primarily to recognize the write-downs of potentially excessive and obsolete inventories.

Direct writing of photomasks

The photomask used in the lithography process is made by a laser beam that directly writes a circuit pattern of a semiconductor chip onto a piece of chrome-coated quartz glass. The mask, which is conceptually similar to a negative in photography, is used in lithography systems to make numerous copies of the pattern image on semiconductor wafers. Our *Innova Sabre* and *Innova SabreFreD* ion lasers and our *NovaTex* excimer lasers are used in laser systems for these applications.

Semiconductor inspection, metrology, test and repair

As semiconductor device geometries decrease in size, devices become increasingly susceptible to smaller defects during each phase of the manufacturing process. One of the semiconductor industry's responses to the increasing vulnerability of semiconductor devices to smaller defects has been to employ defect detection and inspection that is closely linked to the manufacturing process. Automated inspection systems are used to detect and locate defects as small as 0.1 microns, which may not be observable by conventional optical microscopes. These detection systems use advanced image processing and innovative laser scanning technologies to achieve high sensitivity and speed.

Detecting the presence of defects is only the first step in preventing their recurrence. After detection, defects must be examined in order to identify their size, shape and the process step in which the defect occurred. This examination is called defect classification. Identification of the sources of defects in the lengthy and complex semiconductor manufacturing process has become essential for maintaining high yield production. Semiconductor manufacturing has become an around-the-clock operation and it is important for inspection, measurement and testing products to be reliable and have long lifetimes.

Our *AZURE*, *Compass 315M*, *Compass 415M* and *Verdi* diode-pumped solid-state lasers are used to detect defects in photomasks, semiconductor chips and printed circuit boards. The *Innova iLine* argon ion laser is used to inspect the photomasks and patterned wafers. Our *Vector* laser is used to repair defects that may occur in the photomask or semiconductor device.

The fabrication process typically creates numerous patterned layers on each wafer. Laser-based systems have been developed to measure the characteristics of metal or opaque layers in order to determine the functionality and conformance of these devices. Our *Vitesse* laser generates an ultrafast laser light pulse that produces a localized temperature rise in the materials, which generates a sound wave, a portion of which is reflected back to the surface. By measuring the returning echoes, the laser system can detect layer thickness, adhesion and composition.

Flat panel display manufacturing

The high volume consumer market is driving the production of flat panel displays in applications such as digital cameras, personal digital assistants (PDAs), mobile telephones, car navigation systems, laptop computers and television monitors. The most common type of flat panel

display is the active-matrix crystal display, which uses a matrix of TFT switches to control each pixel of the screen.

The conversion of amorphous silicon to polycrystalline silicon induced by excimer lasers, commonly referred to as excimer laser annealing (ELA), is a pivotal technology for the next generation of TFT devices. In the ELA process, the excimer laser light is absorbed into the amorphous silicon without heating the underlying substrate. As a result, it is possible to use inexpensive glass substrates instead of quartz, which makes the ELA process potentially more economical than previous techniques. Because the ELA technique leaves the substrate virtually unaffected, there are many potential applications for the ELA process including the use of plastic as a substrate material, which would enable flexible high brightness displays. The *Lambda STEEL*, developed and marketed by Lambda Physik, is a high-powered 315 W excimer laser designed for industrial TFT annealing.

Our *Avia* and *Diamond* lasers are also used in the production of flat panel displays for cutting, patterning, marking and yield improvement.

Advanced packaging and interconnects

Lasers are used for via hole drilling of rigid and flexible printed circuit boards. Microvias are essential for enabling high-density circuitry commonly used in mobile handsets and advanced computing systems. Our *Avia*TM solid-state ultraviolet laser, *Diamond*TM carbon dioxide, or CO₂, and *GEM*TM QS CO₂ family of lasers are used for this application. The ability of our pulsed lasers to operate at very high repetition rates translates into faster drilling speeds and increased throughput in such materials processing applications. Lasers also produce smaller, cleaner holes than conventional cutting tools, and laser beams do not wear down from use as do conventional drills.

Lasers are also increasingly being used in scribing, machining and drilling microelectronic materials and components and in microelectronics manufacturing to adjust electronic components. Our *Vector*, *Avia*, *Diamond* and *GEM QS* lasers are used for these applications. Lasers are also being used for direct writing of circuit patterns directly on printed circuit boards. Our *Paladin* laser is used for this application.

Graphic arts and display

The printing industry has traditionally depended upon silver-halide films and chemicals to engrave printing plates. This chemical engraving process is accomplished in several time consuming steps. Working with professionals in the printing industry, we design semiconductor and diode-pumped lasers that are used in complex computer-to-plate printing systems that simplify the engraving process.

Our *Compass 315M* DPSS and semiconductor lasers are widely used for computer-to-plate printing, an environmentally-friendly process that saves production time by writing directly to plates.

Our *Innova* ion lasers and *Paladin* DPSS lasers are used to write data on master disks that are used to mass-produce compact disks and digital video disks for consumer use.

Our *Sapphire™ 460* laser is 90% smaller, consumes 98% less power and dissipates 98% less heat than a comparable air-cooled argon-ion laser. It is used for graphic arts applications, including photo finishing, film writing and the emerging area of laser projection used for cinema and television.

Our diode laser bars, recognized as an industry leader in both high slope efficiency and high temperature performance, have enabled new applications in both the commercial and military markets including imaging in the reprographics market.

Materials processing

Lasers are widely accepted today as part of many important manufacturing applications. While many laser companies have developed high power lasers for the increasingly competitive area of metal processing, we have chosen to concentrate our efforts on developing compact low to medium power lasers specifically for the growing area of nonmetals processing and micromachining. This includes such applications as the cutting and joining of plastics using both our CO₂ and semiconductor lasers; the cutting, perforating and scoring of paper and packaging materials; and various cutting and patterning applications in the textile industry.

Our fiscal 2001 acquisition of DeMaria Electro-Optics Systems, Inc. (DEOS) has also enabled us to play a leading role as an OEM supplier to the laser marking and coding industry. This area is growing as laser marking is starting to seriously compete with ink jet coding due to both aesthetic and environmental pressures. In fiscal 2003, we were successful with lasers used commercially for cutting and fading fabric and for processing leather in the garment industry.

At the end of the size and wavelength spectrum, the *AVIA* UV lasers are now being used extensively in the processing and micromachining of a wide range of materials (and industries) including both silicon and glass. These technically important materials are being laser processed to produce medical devices, microelectromechanical systems (MEMS) and in flat panel display and semiconductor manufacturing.

In 2002, Lambda Physik received its first order for excimer lasers used in the treatment of engine cylinder surfaces in the automotive industry and in 2004, the first excimer laser treated diesel engines were made commercially available.

Our *LPX* excimer laser models are high duty cycle lasers, offering high energy per pulse with modest repetition rates for scientific and industrial applications. They are used for marking surface mounts and medical devices, stripping thin wires in disk drives, cleaning bare semiconductor wafers and writing fiber bragg gratings for optical telecommunications.

Scientific research and government programs

The scientific market has historically provided an ideal test market for leading-edge laser technology, including water-cooled gas lasers, high-energy flash lamp-pumped Yttrium Aluminum Garnet (YAG) lasers and ultrafast systems. Our installed base includes tens of thousands of lasers. Current applications for lasers in the scientific market include pump lasers for ultrafast (UF) and continuous wave (CW) systems, CW tunable systems, UF oscillator and amplifiers, and non-linear generation systems (SHG, THG, and OPO s). Main scientific applications include biology (multiphoton and confocal microscopy), physics (atomic and molecular spectroscopy, atom cooling, non-linear optics, X-ray generation, solid state and semiconductor studies), chemistry (quantum control, time-resolved and Raman spectroscopy) and engineering (material processing, remote sensing, metrology).

Our *Mira* Titanium Sapphire laser and *RegA* regenerative amplifier are examples of ultrafast laser systems used for these applications.

Our *Innova* ion lasers are also sold to instrument manufacturers, the largest component of which is bio-instrumentation, for applications such as cell sorting, DNA and protein sequencing, as well as drug and clinical screening.

Our optically pumped (OPS) laser, the *Sapphire*, is sold for several bio-instrumentation applications including flow cytometry, drug discovery and DNA sequencing.

Our *Chameleon* laser combines a unique blend of features and hands-off performance, making it an ideal tool for Multi-Photon Excitation (MPE) microscopy and a powerful tool for many other fields of ultrafast research such as time-resolved photoluminescence, nonlinear spectroscopy, fluorescence upconversion, quantum optics, materials characterization and terahertz imaging.

Our *MBR* and 899 CW tunable lasers provide unsurpassed resolution and stability for spectroscopy applications.

Our diode-pumped *Verdi* laser has established itself as the benchmark in reliability for any pumping application where Ti:Sapphire lasers like our *Mira*, *RegA* and 899 are used. A number of *Verdi* lasers are currently used as laboratory tools to pump Coherent lasers, as well as lasers from our competitors.

Our DEOS subsidiary provides custom waveguide CO₂ lasers, far-infrared lasers and other systems to a wide variety of commercial and government customers. In some cases, these custom products are only slightly modified versions of our standard commercial and scientific laser products. In other cases, a custom product may incorporate significant modifications while still building on the design expertise acquired in the development of our high-volume commercial laser products. We are also heavily involved in the development of optically pumped far-infrared (FIR) lasers like the *SIFIR-50*, a THz laser system. These designs utilize many aspects of our highly reliable sealed resonator technologies to produce compact and dependable turn-key systems with FIR operation.

The integration of our fiscal 2003 acquisition of Positive Light, Inc. (PLI), a recognized leading designer and manufacturer of advanced solid-state lasers for the scientific and industrial markets, with our scientific business has enabled us to gain access to one of the largest scientific markets, the high-energy UF amplifier systems, which covers energy ranges from 1 mJ and above and peak powers up to 50 Terawatt. PLI products are used for a variety of physics and chemistry applications, inclusive of X-ray generation and non-linear optics.

OEM components and instrumentation

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Our substantial experience with optics, optical coatings, and diode lasers for optical pumping and harmonic generation enable our OEM components business. We provide value-added optical solutions and both directly-coupled and fiber-coupled optical pumping diode laser packages to laser manufacturers participating in other OEM markets such as materials processing, scientific, and medical.

Instrumentation is one of our more mature commercial applications. Representative applications within this segment include flow cytometry, high-throughput screening for pharmaceutical discovery, genomic and proteomic analysis, Raman spectroscopy, forensics, veterinary science, and bio-threat detection. Our OPS laser, the *Sapphire*, is sold for several bio-instrumentation applications including DNA sequencing, flow cytometry and drug discovery. Our *Innova* ion lasers are also sold to bio-instrument manufacturers for applications such as cell sorting, DNA and protein sequencing, as well as drug and clinical screening.

Flow cytometry

Flow cytometry is a laser-based micro fluorescence technique for analyzing single cells or populations of cells in a heterogeneous mixture. Its numerous applications include cell biology, immunology, reproductive biology, oncology, and infectious disease such as Acquired Immune Deficiency Syndrome (AIDS). Flow cytometry is both a powerful research tool and an indispensable mainstream clinical diagnostic and prognostic tool. Commercially available instruments typically measure more than six simultaneous discriminating factors at analysis speeds of thousands of cells per second and many instruments have the capability to selectively sort individual cells for subsequent analysis or cell culture. The recent design trend in flow cytometry is toward more compact, powerful, and reliable instruments. Our *Sapphire* solid-state 488nm laser, *Compass 215M* and *Radius* laser diode modules are the lasers of choice in the current generation of cutting-edge instrumentation replacing the bulkier, inefficient and sometimes unreliable air-cooled argon-ion and helium neon laser systems that were used in the past.

Genomics and Proteomics

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Laser-based fluorescence techniques abound within the study of Genomics and Proteomics (human genome and proteome) and allied fields. As with the flow cytometry application, a challenge to manufacturers of analytical devices is to produce instruments of increasing complexity and capability, while at the same time minimizing their size. This is particularly important in fields such as

these where often times many instruments are deployed in a single location for the purpose of parallel processing. Our *Sapphire*, *Compass 215M* and *Radius* lasers are used in instrument techniques ranging from DNA sequencing to micro array scanners, to lab-on-chip and fluorescence correlation spectroscopy.

Raman spectroscopy

Raman spectroscopy is the spectral measurement of inelastic scattering of monochromatic radiation from molecular species. Depending on the molecular species, physical state thereof, and the experimental paradigm, laser sources for Raman can range from infrared to UV. Raman measurements are useful for process monitoring, environmental monitoring, and biomedical applications to name a few. Our *Innova* and *Compass* product lines are widely deployed in Raman applications, both at the commercial and scientific level. Exciting new research at the university level also suggests that our powerful tunable deep-UV source, the *Indigo*, will prove to be a very useful tool in deciphering protein secondary structure.

Bio-agent detection

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A number of laser-based techniques for point source and standoff detection of pathogens or other bio-toxins are being explored in the government and private sectors. Systems of this type could be deployed to guard military facilities, major sporting events or other large gatherings of citizens, or vital infrastructure components such as subways, airports, or industrial hubs. We have a number of laser systems under evaluation for such systems and are well positioned to actively participate in this segment.

Forensics

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Lasers have been employed in criminal forensics for a number of decades. Applications include latent fingerprint detection and trace evidence illumination and identification. In the past, laser usage was often limited to forensics labs due to the physical size and complexities of the lasers. Portable models seldom generated enough output for use in high ambient light conditions and for large-scale sweeps of the crime scene. Owing to recent advances in optical output versus physical size, forensic scientists now have the capability to bring an unprecedented level of latent fingerprint and trace evidence detection directly to the crime scene. Our *Incriminator*TM 532nm 10 W fiber-coupled laser system directly addresses the needs of large-scale criminal investigation organizations by providing a superior combination of high brightness and portability to bear on the most difficult forensic analysis.

Medical OEM

We sell a variety of components and lasers to medical laser companies in end-user applications such as ophthalmology, aesthetic, surgical, therapeutic and dentistry. *Innova* ion laser tubes and our *GEM* series CO₂ lasers are widely deployed in ophthalmic, aesthetic and surgical markets. Additionally, our *Compass 215M* series and *Sapphire 488* series lasers are deployed in the retinal scanning market in diagnostic imaging systems.

FUTURE TRENDS

Microelectronics

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After several years of process development, lasers are now used in mass production applications and the industry is benefiting in the form of enhanced performance and increased productivity. Having experienced strong recovery across all segments during fiscal 2004, the microelectronics industry has showed some signs of stabilization, however, we anticipate capital spending to recover as the industry sees stronger capacity utilization. We anticipate future demands in the advanced packaging market will shift towards the use of ultraviolet laser-based tools, as they are capable of producing sub-50 micron features that are critical for next generation chip-scale and wafer-level packages. Our recent introduction of the high-power, *Avia Thor* laser will increase the throughput of packaging tools, thereby enhancing productivity and lowering cost-of-ownership.

Graphic arts and display

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The graphic arts and display market experienced a migration in technologies towards the use of direct diode laser systems as these systems have been adopted at a much faster rate during fiscal 2004. If the adoption of newer digital technologies continues beyond fiscal 2004 levels, we anticipate this will have the effect of driving purchases of new printing technology. As we move into fiscal 2005, we anticipate a number of our newer products such as a version of our *Paladin* laser and new diode laser technology will gain traction in the marketplace.

Materials processing

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Anticipated drivers for expansion in the materials processing market include providing aggressive gains in cost-of ownership for products and continuing increased expansion into geographical areas. The market for materials processing in Asian countries drove much of the growth in the first half of fiscal 2004, but has since stabilized, primarily due to foreign policies established to slow economic growth. We anticipate growth to resume once the effects of these policies are felt and active measures to stimulate the economy begin to arise.

Scientific research and government programs

The scientific research market has historically grown at a rate similar to the growth rate experienced in the general U.S. economy, however, demand was up sharply in fiscal 2004, partially due to our acquisition of PLI. We anticipate modest growth rates in fiscal 2005 and that applications in ultrashort pulses and in bio-research will be the drivers of anticipated growth within the scientific research market.

OEM components and instrumentation

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The instrumentation market has seen a migration from the use of mature laser technologies, mainly ion lasers, to new technologies primarily based on solid state and semiconductors. Because of this migration, new markets are expected to surface in areas such as security, including the detection of bio-agents and the monitoring of people and goods. These markets are likely to require an increased number of lasers, however, the majority of these activities are still in the research and development stage and we expect only moderate impacts on the laser industry in fiscal 2005, with increases anticipated in future years. Furthermore, we anticipate future opportunities in microscopy, lab-on chip and DNA sequencing based on our continuous product enhancements.

PRODUCTS

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We design, manufacture and market lasers, laser-based systems, precision optics and related accessories for a diverse group of customers. The following table shows selected products together with their applications, the markets they serve and the technologies upon which they are based.

Market Segment	Application	Products	Technology
Microelectronics	DUV lithography	NovaLine	Excimer
		LithoTex	Excimer
	Photomask writing	SabreFreD	Frequency doubled ion
		Innova	Ion
		NovaTex	Excimer
	Semiconductor inspection and metrology	Vitesse	Ultrafast
		Compass series	DPSS
		Enterprise	Ion, DPSS, OPS
		AZURE, Indigo	DPSS
		Sapphire	OPS
	Marking	Avia	DPSS
	Flat panel display (TFT annealing)	Lambda STEEL series	Excimer
	Advanced packaging and interconnects	Avia	DPSS
		Diamond & Gem Series	CO ₂
		FAP family	Semiconductor
Graphic arts and display	Computer-to-plate printing	Single-stripe diodes	Semiconductor
		Fiber coupled diodes	Semiconductor
		Diode bars	Semiconductor
		Compass series	DPSS