# Process Control


# Metrology



NANOmetrics

ANNUAL REPORT

2003

In 2003, the semiconductor industry finally began to emerge from the longest and most difficult downturn in its history. For the first time in three years, global chip revenues increased during the year, due in large part to a tremendous second half surge that was among the strongest ever recorded. Buoyed by this upswing, semiconductor manufacturers finally began making long-delayed investments in new technology and new equipment. The semiconductor capital equipment outlook for 2004 appears to be positive; most forecasts call for capacity investments and market condition improvements to continue.

Nanometrics emerges from the downturn in a strong product position, thanks largely to aggressive R&D investment and shrewd cost management over the past few years. Entering 2004, Nanometrics' financial position continues to be strong with cash and equivalents and short-term investments of $29.9 million and working capital of $59.6 million.

Nanometrics' R&D investments for 2003 represented about 32 percent of total revenues – a strong figure considering the lingering difficult market conditions that persisted through much of the first half of the year. As a result of this strong investment, Nanometrics was able to respond to evolving customer needs by introducing several new products and added capabilities in 2003.

Our 2003 innovations included a strong emphasis on combining multiple metrology technologies in the same tool, maximizing value to our customers. The best illustration of our commitment to this concept is the Nanometrics FLX™ (flexible metrology system), a metrology platform that utilizes up to four modules to provide users with the benefits of integrated metrology in a standalone tool. The FLX also provides an entry point for companies not yet employing integrated metrology, allowing them to evaluate its benefits without the need for full integration in a manufacturing module.

Other evidence of our commitment to metrology capability combination was demonstrated in 2003 by the introduction of the first dual-technology integrated metrology tool, the NanoOCD®/DUV 9010, which combines optical critical dimension (OCD) and deep ultraviolet (DUV) spectral capability.

This trend should continue in 2004. Already this year we have introduced to the market the Atlas Advanced Metrology System, a standalone tool that combines five metrology technologies: OCD, DBO, spectroscopic reflectometry, spectroscopic ellipsometry and wafer stress.

Another 2003 milestone was our introduction of the first OCD metrology tool designed for photomasks and reticles. This was viewed as a major breakthrough by photomask and reticle suppliers, because OCD technology enables non-destructive, real-time measurement and profiling of critical features without the limitations and drawbacks associated with the current standard, CD-SEM metrology.

We are extremely proud of the new products, enhancements and innovations that we announced during 2003. Fresh, innovative technology is one reason that we feel Nanometrics is poised to reap the benefits of an increasing market upswing. There are other reasons for optimism, as well.

A convergence of factors, including the accelerated adoption of large, 300 mm wafers and the move toward sub-90 nm critical dimensions, is driving the semiconductor industry toward the adoption of tighter advanced process control (APC). This trend fits nicely with Nanometrics' new product offerings. Information generated during measurement is a key enabler of APC. Integrated metrology, with its ability to provide real-time, in-line visibility of the process line, is highly coveted for its value to APC.

Standalone metrology is also useful for APC, because it provides off-line recipe development and other functions that can be networked with other metrology tools within a fab. Nanometrics' robust integrated and standalone metrology products are well positioned to enable our customers to better control costs.

Flat panel display (FPD) metrology, where Nanometrics is a major supplier, is expected to grow in 2004. The display market reached an important point in 2003, when FPD manufacturing costs dropped to the level where they were no longer a barrier. As a result, explosive growth has been forecast through 2004 and beyond. With nearly half of the marketshare for FPD metrology, Nanometrics is in a good position to benefit as producers ramp up to meet demand increases.

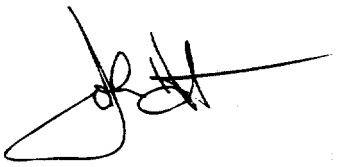
Internally, the value of Nanometrics' vertically integrated manufacturing model becomes more apparent as the tide in the industry changes favorably. Companies in our industry have to be prepared to deal with very sudden changes in customer demand. While many of our fellow semiconductor equipment suppliers are faced with the immediate problem of ramping up to meet the anticipated demand for products, Nanometrics' philosophy of keeping key manufacturing in-house has the company nimble and ready to keep pace with our customers' needs.

Additionally, by maintaining judicious control measures throughout the downturn, Nanometrics was able to minimize the necessary layoffs that have plagued semiconductor equipment suppliers over the past few years. As a result, we retained the key talent and experienced employees necessary to maintain Nanometrics' technical lead over our competitors.

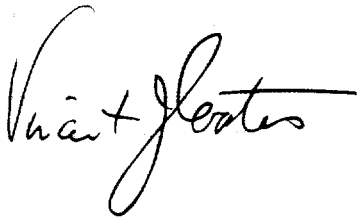
In conclusion, our industry began to rebound during 2003. This year is shaping up to be a good year with an improved semiconductor market, the increasing need for tight process control, and expected growth in flat panel display metrology. Nanometrics remains optimistic about the prospects for our business in 2004.

**Financial notes:** For the year ended December 31, 2003, Nanometrics' revenues increased 20 percent to $41.6 million compared to revenues of $34.7 million in 2002. The net loss for the year ended December 31, 2003 was $17.5 million or a loss of $1.45 per diluted share, compared to a net loss of $8.3 million or a loss of $0.70 per diluted share in 2002. The net loss in 2003 includes a $6 million charge to record a valuation allowance against deferred income tax assets, as previously reported in the first quarter of 2003. The Company's financial position continues to be strong with cash and equivalents and short-term investments of $29.9 million and working capital of $59.6 million.

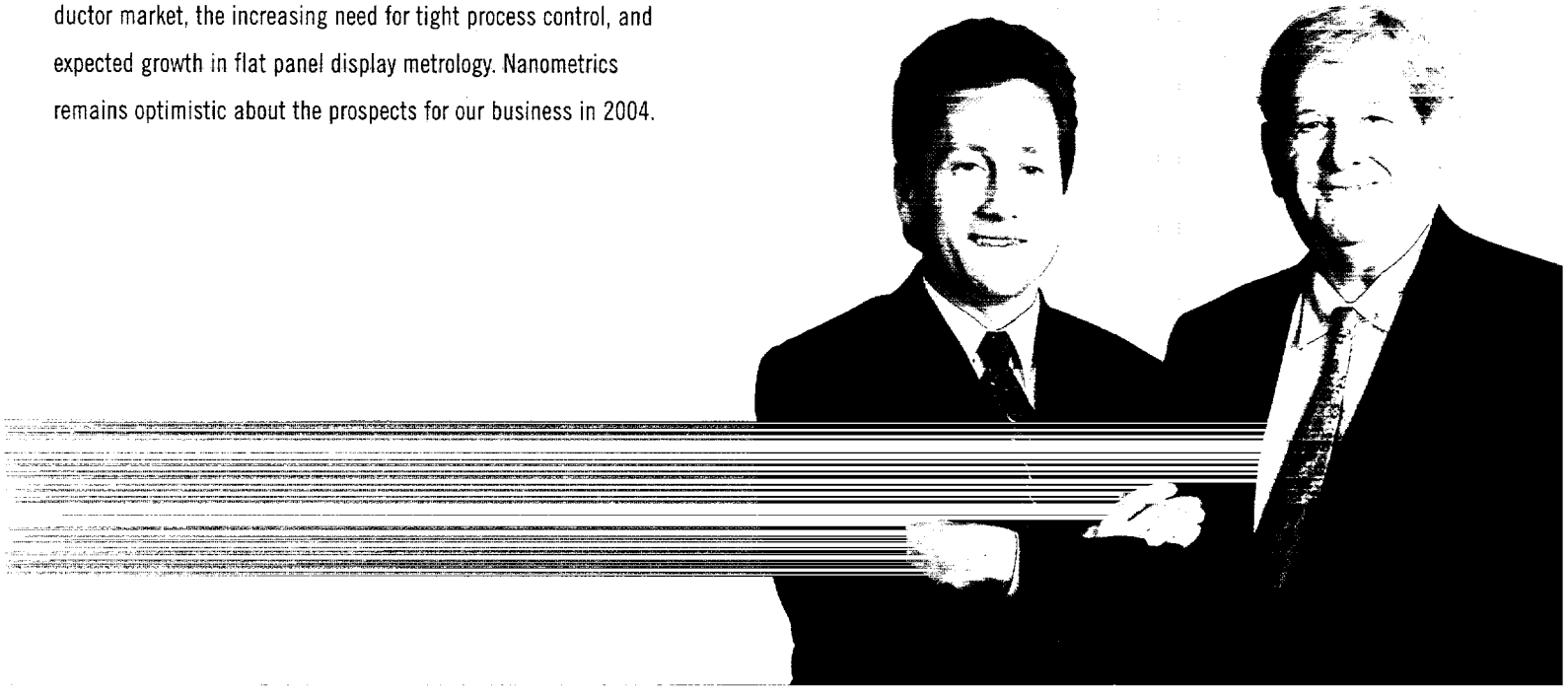
Sincerely,



**John D. Heaton**
ceo



**Vincent J. Coates**
chairman



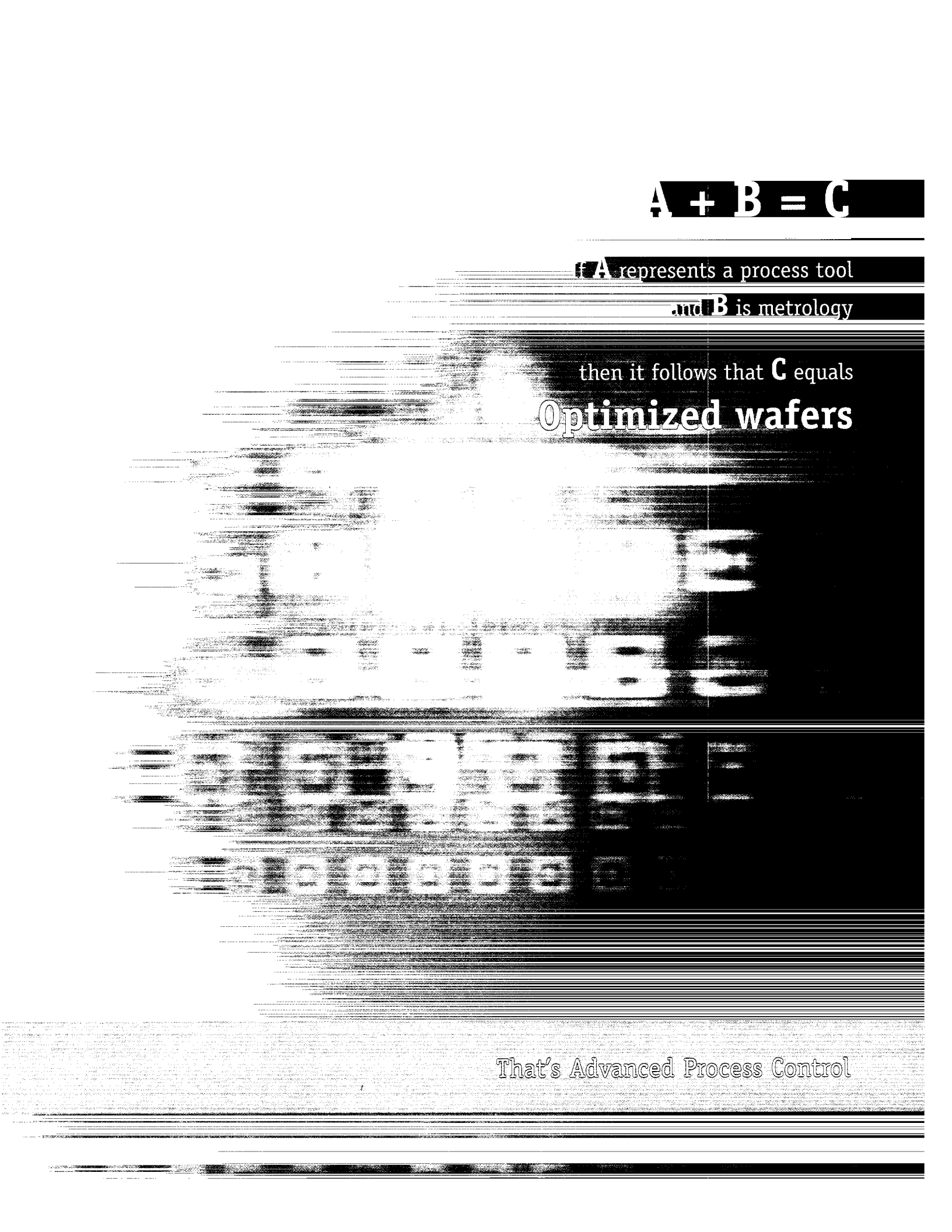
# A + B = C

If **A** represents a process tool

and **B** is metrology

then it follows that **C** equals

## Optimized wafers



That's Advanced Process Control

# The Era of Advanced Process Control

Advanced process control (APC) is an evolving ideology that, as the name suggests, emphasizes maximum control of the manufacturing process. The philosophy behind it is that exercising greater control of the manufacturing process generates improved efficiency, higher yields, reduced resource consumption and shorter equipment downtimes.

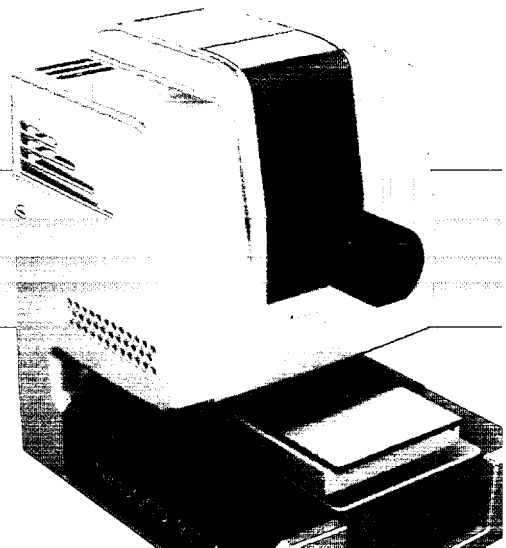
Within the semiconductor industry, APC means that data generated during the various manufacturing steps is collected and applied in real-time to optimize and fine-tune elements of the process, leading to optimal process tool performance and increased product yield. APC is becoming more and more important to semiconductor manufacturers as IC devices continue to shrink and competitive economic pressures increase. To realize the full benefits of APC, semiconductor manufacturers must have access to the most timely, accurate and relevant information throughout the manufacturing process.

Nanometrics' tools provide the critical metrology information that chipmakers need for comprehensive, successful APC. The company's diverse product line provides a breadth of metrology capabilities that are used across the major semiconductor manufacturing process steps, including lithography/etch, chemical vapor deposition (CVD) and chemical mechanical planarization (CMP).

**Lithography/Etch** Nanometrics' suite of integrated and standalone tools for lithography and etch processes enables semiconductor manufacturers to perform several key process control functions. Our new NanoOCD 9010M provides customers with non-destructive, real-time measurement and profiling of critical features on photomasks and reticles. The new NanoOCD/DUV 9010 combines deep ultra violet (DUV) reflectometry with OCD spectroscopic ellipsometry to enable complete film characterization and closed-loop control within the lithographic process without having to move the wafer to a standalone metrology tool, saving transport time and eliminating potential handling contamination and damage. The integration of our process control metrology capability directly into the lithography/etch cluster has already been demonstrated to dramatically improve final etched CD control.

**CMP** Using Nanometrics tools to measure the film thickness and uniformity of a layer being polished, and factoring this information in closed loop against the condition of the consumables being used (polishing pad, slurry) and the past performance record of the CMP tool, allows users to determine the length of time to polish a wafer and the amount of pressure to place on the polishing head – two critical factors in successful CMP. Nanometrics provides copper laser profiling (CLP) capability and optical critical dimension (OCD) technology to measure metal and oxide removal during the CMP process.

Backside wafer contamination that can negatively impact a number of semiconductor manufacturing process steps is of particular concern with CMP. Particles and defects transferred to the backside of a wafer during polishing can raise a wafer off the chuck during processing, impacting the yield of subsequent processing steps. Our integrated universal defect inspection (UDI) metrology has successfully identified backside particles and defects, which have been directly linked to yield loss at subsequent lithography steps.



**NanoOCD® 9010M**
**Integrated Optical CD measurement system for non-contact CD measurements on masks and reticles**

**Real-time measurement**

means real-time reaction

That means fewer wasted wafers

And that means

**more profit**

That's Advanced Process Control

**CVD** CVD is being confronted by a number of emerging process challenges. Films and stacks used in semiconductor manufacturing are getting thinner and incorporating more exotic materials.

Nanometrics continually advances its tools to help customers keep pace with these evolving requirements. In 2003, Nanometrics added DUV reflectometry capability to the NanoOCD/DUV 9010 to address thinner films and characterize the optical properties of newer, more exotic materials being used in CVD.

## Flexible, Cost-effective Metrology

The standalone Nanometrics FLX flexible metrology system and Atlas advanced metrology systems have been introduced to offer our customers multiple metrologies (up to four in the case of FLX, up to five in the case of Atlas) on a single platform. Providing the customers with standardized, cost-effective process control metrology solutions means they can focus on the process tool uniformity and matching requirements that are necessary to meet next generation's shrinking process windows.

## Multiple Metrology Combinations

| PROCESS MODULE | OCD/DUV | CLP | DBO | UDI |
|---|---|---|---|---|
| DIFFUSION | ⊙ | | | ⊙ |
| CVD | ⊙ | | | ⊙ |
| CMP | ⊙ | ⊙ | | ⊙ |
| LITHO | ⊙ | | ⊙ | ⊙ |
| ETCH | ⊙ | | | ⊙ |

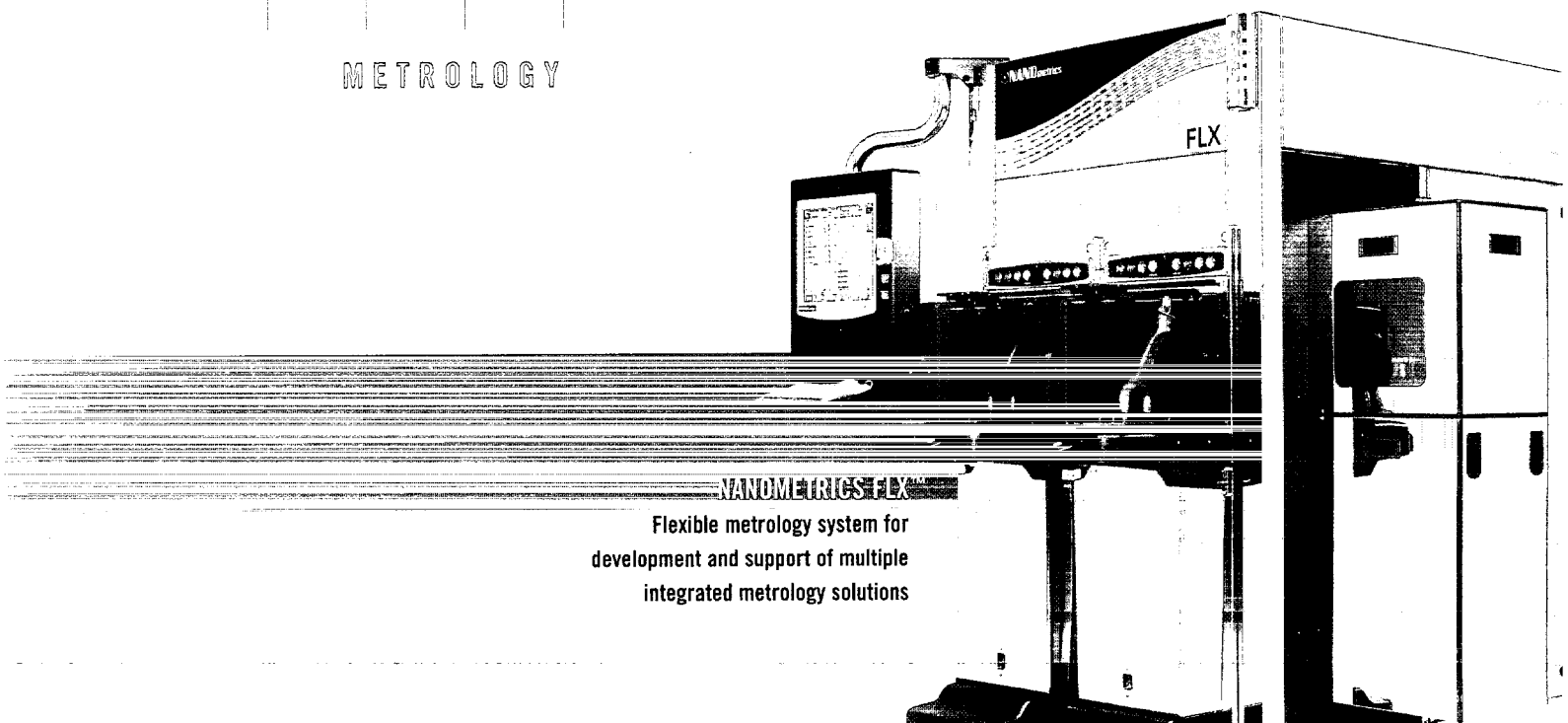
METROLOGY

## Integrated metrology: The key to APC

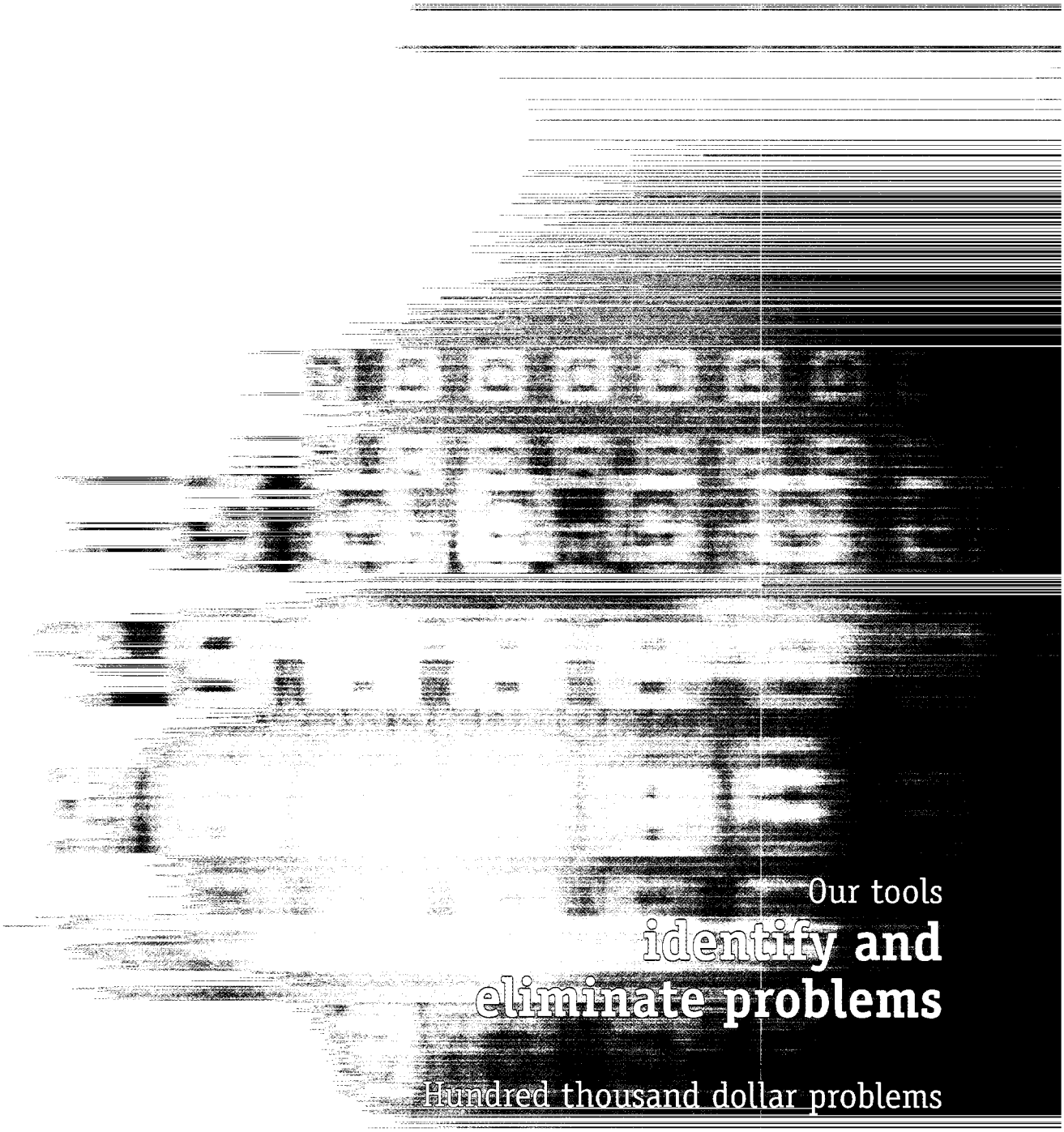
Nanometrics' strong position in the field of integrated metrology gives the company an inherent advantage in providing the valuable metrology information that semiconductor manufacturers need for APC. Integrated process control metrology provides the immediate, closed-loop capability that APC demands. With integrated metrology tools that provide precise, real-time measurement data without impacting the process itself, Nanometrics gives customers production line visibility on an individual wafer, lot-by-lot and factory-wide basis.

## Tying it all together

While integrated metrology's benefits to APC are well known, true APC cannot be achieved without accompanying standalone metrology for recipe development. Nanometrics' advanced metrology systems fill this need. And Nanometrics N2000 and NanoNet® software packages provide the link that enables quick file exchange and management across the entire manufacturing line. This combination of integrated, standalone and software tools provides a consummate solution that empowers manufacturers with the information they need to implement true APC within a fab.




NANOMETRICS FLX™
**Flexible metrology system for development and support of multiple integrated metrology solutions**



Our tools
**identify and eliminate problems**

Hundred thousand dollar problems

Those are good problems to eliminate

That's Advanced Process Control

# Positioned For The Upturn

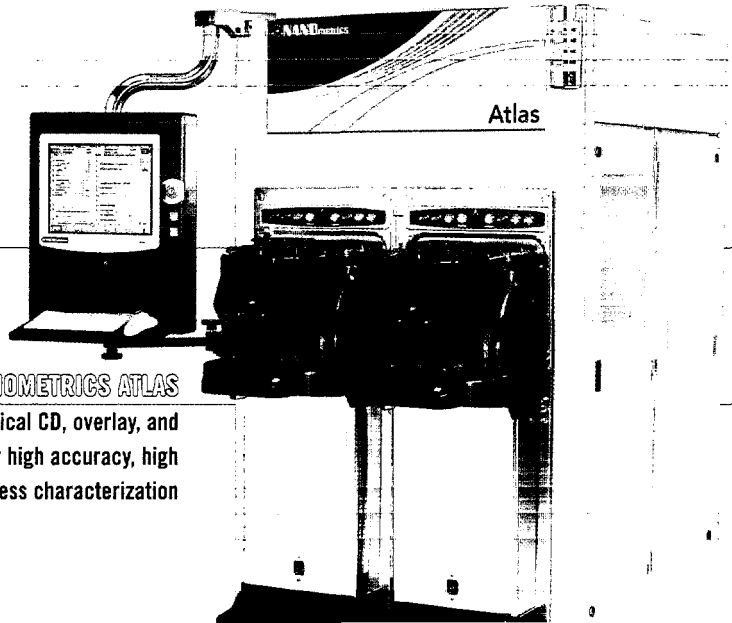
Economic indicators and market research forecasts point to a long-awaited upturn for the semiconductor equipment industry. Nanometrics is well positioned for this upturn for a number of reasons:

**NEW TECHNOLOGIES** Throughout tthe downturn, Nanometrics maintained its vigorous commitment to research and development for both integrated and standalone metrology. In 2003, Nanometrics invested roughly $13.4 million in R&D, which translates into 32 percent of total revenues. As a result, Nanometrics was able to continue offering new products and enhancements to meet and anticipate the market's needs throughout the downturn. In 2003, Nanometrics introduced:

- **A diffraction-based overlay (DBO) technology option for the Nanometrics' advanced standalone 300 mm wafer metrology platforms.**
- **The NanoOCD/DUV 9010, the first integrated metrology tool to combine two measurement technologies – ultra violet optical critical dimension (OCD) spectroscopic ellipsometry and deep ultra violet (DUV) spectroscopic reflectometry.**
- **OCD metrology capability for our advanced metrology platforms, which now contain up to five metrology technologies: spectroscopic reflectometry, spectroscopic ellipsometry, OCD, diffraction based overlay and wafer stress/bow.**
- **The NanoOCD 9010M, the industry's first OCD metrology tool for photomasks and reticles.**
- **The Nanometrics FLX™ (flexible metrology system), a standalone metrology platform that utilizes up to four integrated modules to provide users with the benefits of integrated metrology without the need for full integration.**

**LEADER IN FPD** As a leading supplier of metrology to flat panel display (FPD) manufacturers, Nanometrics is also well positioned to capitalize on what is expected to be a year of explosive growth for the FPD market. Decreasing manufacturing costs are paving the way for FPDs to enter an abundance of new consumer and industrial applications. As a result, we believe that this market will continue to grow very rapidly through 2006. In 2003, Nanometrics accentuated its competitive advantage in this market by enhancing its NanoSpec® 6500 FPD metrology tools with spectroscopic ellipsometry (SE) capability to provide multi-layer stack metrology capability and more accurate overall measurement and analysis.

**VERTICALLY INTEGRATED CORE TECHNOLOGY** Nanometrics remains committed to its proven strategy of manufacturing core technology and components in-house. Nanometrics outsources many non-critical tool components, such as robotics and load-ports, through companies with manufacturing and design expertise in those areas. All critical elements of Nanometrics tools, however, are manufactured and assembled within the company's headquarters in Milpitas, California. Past experience has demonstrated that this balanced approach provides maximum control over equipment design and manufacturing processes while enabling the company to respond quickly to fluctuations in market demand. We believe that a balanced manufacturing model that maintains this commitment to vertical integration of core technologies is the key to building a successful OEM business model.




**NANOMETRICS ATLAS**
**Advanced 300mm Optical CD, overlay, and film analysis system for high accuracy, high precision process characterization**

Without

**real-time metrology**

fabs are powerless to

make critical adjustments

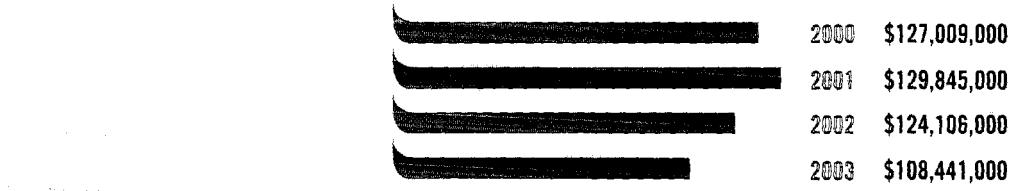
We provide the

**informational power**

they need

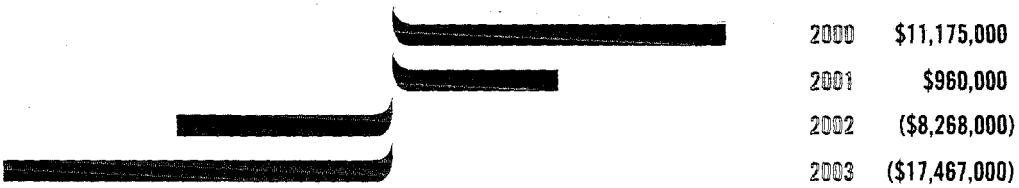
That's Advanced Process Control

# The Numbers



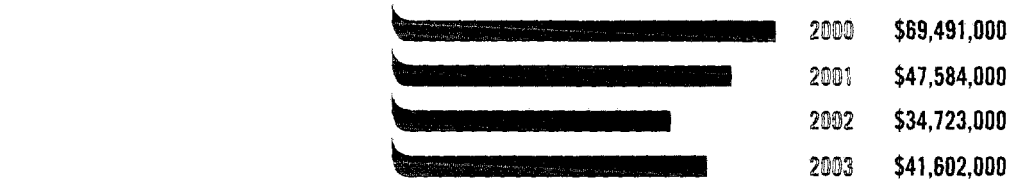
| | |
|---|---|
| 2000 | $127,009,000 |
| 2001 | $129,845,000 |
| 2002 | $124,106,000 |
| 2003 | $108,441,000 |

**shareholders' equity**



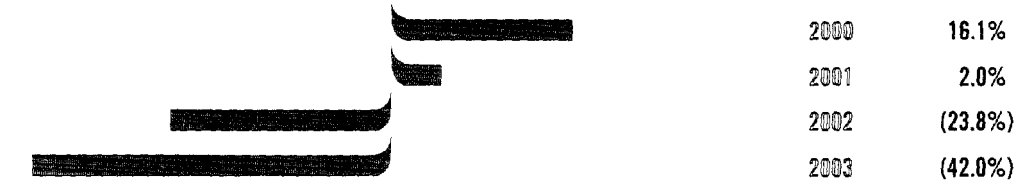
| | |
|---|---|
| 2000 | $11,175,000 |
| 2001 | $960,000 |
| 2002 | ($8,268,000) |
| 2003 | ($17,467,000) |

**net income (loss)**



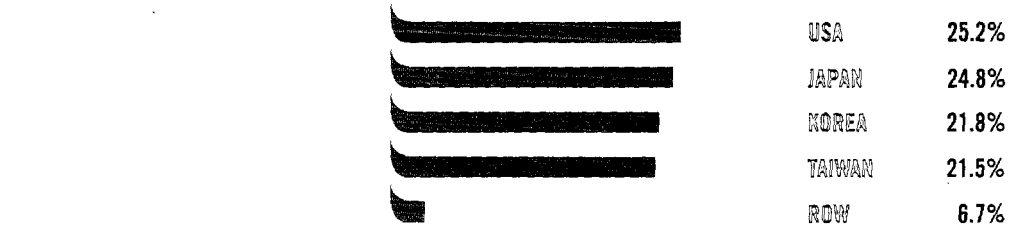
| | |
|---|---|
| 2000 | $69,491,000 |
| 2001 | $47,584,000 |
| 2002 | $34,723,000 |
| 2003 | $41,602,000 |

**revenue**



| | |
|---|---|
| 2000 | 16.1% |
| 2001 | 2.0% |
| 2002 | (23.8%) |
| 2003 | (42.0%) |

**income(loss)/revenue**



| | |
|---|---|
| USA | 25.2% |
| JAPAN | 24.8% |
| KOREA | 21.8% |
| TAIWAN | 21.5% |
| ROW | 6.7% |

**revenue by region in 2003**

UNITED STATES

# SECURITIES AND EXCHANGE COMMISSION

**Washington, D.C. 20549**

# FORM 10-K

**(Mark One)**

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

For the fiscal year ended January 3, 2004

OR

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

For the transition period from _____ to _____

**Commission file number: 0-13470**

# NANOMETRICS INCORPORATED

**(Exact name of registrant as specified in its charter)**

| **California** | **94-2276314** |
|---|---|
| **(State or other jurisdiction of incorporation or organization)** | **(I.R.S. Employer Identification Number)** |
| **1550 Buckeye Drive<br>Milpitas, California** | **95035** |
| **(Address of principal executive offices)** | **(Zip Code)** |

**Registrant's telephone number, including area code: (408) 435-9600**

**Securities registered pursuant to Section 12(b) of the Act:**
None

**Securities registered pursuant to Section 12(g) of the Act:**
Common Stock, no par value

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 the 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 June 30, 2003, the last business day of our most recently completed second fiscal quarter, the aggregate market value of the Common Stock of the registrant held by non-affiliates was approximately $32,624,826. Shares of voting stock held by each officer and director and by each person who owns 5% or more of the outstanding voting stock have been excluded because such persons may be deemed to be "affiliates" as that term is defined under the rules and regulations of the Securities Exchange Act of 1934, as amended. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of March 24, 2004, 12,199,611 shares of the registrant's Common Stock were outstanding.

## DOCUMENTS INCORPORATED BY REFERENCE

Certain portions of the registrant's definitive proxy statement, to be filed with the Securities and Exchange Commission pursuant to Regulation 14A of the Securities Exchange Act of 1934 in connection with the registrant's annual meeting of shareholders to be held on May 26, 2004, are incorporated by reference in Part III of this Form 10-K.

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NANOMETRICS INCORPORATED

FORM 10-K

YEAR ENDED JANUARY 3, 2004

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PART I



PART II



PART III



PART IV

**Forward-Looking Statements**

This Annual Report on Form 10-K contains forward-looking statements that involve risks and uncertainties. These forward-looking statements include, but are not limited to, statements regarding trends in demand in our industry, the increased use of metrology in manufacturing, the drive toward integrated metrology and the broadening of our technology portfolio. Words such as "believe," "expect," "anticipate" or similar expressions, are indicative of forward-looking statements.

Our actual results may differ materially from the results discussed in the forward-looking statements. Factors that might cause such a difference include, but are not limited to, those outlined in Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations--Risks Related to Our Business," below. The forward-looking statements contained herein are made as of the date hereof, and we assume no obligation to update such forward-looking statements or to update reasons actual results could differ materially from those anticipated in such forward-looking statements.

**Trademarks**

We have registered the following trademarks with the U.S. Patent and Trademark Office: Nanometrics®, NanoSpec®, Integrated Metrology®, NanoOCD®, Metra®, NanoNet®, OCD® and others. Additionally, we use a variety of other trademarks and trade names such as Atlas, NanoCLP and the Nanometrics logo. All other brand names, trade names and trademarks mentioned herein are the property of their respective holders.

## PART I

## ITEM 1. BUSINESS

### Overview

We are a leader in the design, manufacture, and marketing of high-performance process control metrology systems used in the manufacture of semiconductors/integrated circuits and flat panel displays. Our metrology systems (i) measure various thin film properties, critical circuit dimensions and layer-to-layer circuit alignment (overlay) and (ii) inspect for surface defects during various steps of the manufacturing process, enabling semiconductor and integrated circuit manufacturers to improve yields, increase productivity and lower their manufacturing costs. The relative alignment of sequentially patterned thin film layers is critical to device production.

We believe that process control metrology is growing at a greater rate than other segments of the process equipment market. As films become thinner, film materials more exotic, and circuit dimensions and overlay requirements more demanding, metrology continues to grow in importance, especially as wafers become larger and more expensive to manufacture. We expect these factors will drive the demand for our high-end, standalone metrology products.

Additional demands on process tool manufacturers for better film uniformity, tighter dimensional control, tool-to-tool matching and within-tool chamber uniformity is driving the need for integrated process control metrology. These new tool requirements will drive the need to place metrology inside the process tool for real-time, integrated, process control metrology, using both feed forward and feedback of the collected metrology data to control the process equipment.

We have made several strategic changes in our business model to enable us to further address these metrology trends. These changes include:

- The formation of three separate departmentalized groups to focus specifically on our standalone, integrated and flat panel display (FPD) metrology markets.
- An emphasis on becoming the leading supplier of metrology systems that are integrated into various types of semiconductor processing equipment;
- The development of new 300 millimeter wafer platforms for advanced standalone and integrated metrology;
- The outsourcing of certain system components, such as robotics, enabling us to leverage our technical resources;
- The implementation of an in-house manufacturing strategy for our products; and
- The development of new measurement technologies for advanced lithography and film deposition.

Demand for our products is driven by the increasing use of multiple thin film technology by manufacturers of electronic products and, more recently, by the increased adoption of both integrated metrology and advanced process control (APC) by semiconductor manufacturers. With feature sizes shrinking below 100 nanometers, well below the wavelength of light, the need for very tight process tolerances as well as productivity improvements in semiconductor fabrication, or fabs, are driving the need for integrated metrology and APC. Our innovative Optical Critical Dimension ("OCD®") measurement system is being increasingly viewed not only as an enabling technology for APC, but also as a solution for critical dimension measurement.

We recently combined our deep ultraviolet ("DUV") reflectometry technology with the OCD technology in a single, integrated metrology module, the NanoOCD/DUV 9010. The compact size and speed of this new OCD/DUV technology enables the measurement system to be fully integrated into the customer's process tool, thus providing a complete, feed forward and feedback APC solution for wafer-to-wafer closed loop control. By measuring the critical dimensions of developed photoresist and then adjusting the final etched dimensions of a silicon gate-etch process by feeding this information back into the process and trimming the resist, the device manufacturer is able to achieve the maximum possible microprocessor speed. In addition, new semiconductor process technologies, such as copper interconnects, require that new measurement technologies be developed in order to keep pace with the latest metrology demands. Our new, combined integrated metrology module represents a unique solution to the problem of measuring the remaining oxide film thickness as well as the loss of material over arrays of copper lines during the chemical mechanical planarization ("CMP") process.

Our OCD technology has also proven to be applicable to the emerging requirements for advanced lithography measurements such as the characterization of critical dimensions and film thicknesses on masks and reticles which are comprised of square glass substrates. We introduced the NanoOCD 9010M, the first integrated metrology system for these square glass substrates.

Our integrated Copper Laser Profiler (CLP) also represents a unique approach to the problem of determining the amount of copper material removed during the CMP process. The very small footprint and high throughput of our CLP systems were achieved with several new enabling technologies for integrated metrology, including an edge-gripping wafer handling stage with integral pre-aligner. We developed the enabling technologies to meet the needs of our customers. A version of our edge-gripping wafer handling stage was also developed for operation within a process tool's vacuum chamber, eliminating the need to expose the wafer's sensitive films to ambient air. This innovation improves the throughput of the tool during measurement and eliminates the potential for damage due to excessive wafer handling and exposure to outside sources of contamination.

We successfully beta tested the new Universal Defect Inspection (UDI) system at an integrated device manufacturer (IDM). The NanoUDI technology can be configured as either a standalone, fully automated 300-millimeter system or an integrated module for defect and contamination detection on a wide variety of films and surfaces. The system combines high efficiency illumination and high-resolution optics with sophisticated image processing to detect and classify particles and defects in the sub-micron range.

Many types of thin films are used in the manufacture of products, such as semiconductor integrated circuits and flat panel displays. These products require the precise electronic, optical and surface properties enabled by thin film metrology. The growth in the sale and use of these products and the need for tighter process control and improved productivity has created increased demand for our advanced standalone and integrated metrology systems.

We offer a complete line of systems to address the metrology requirements of our customers. Each of our systems is equipped with computerized mapping capability for measurement, visualization and control of film uniformity, layer-to-layer circuit alignment and critical dimensions. Our metrology systems can be categorized as follows:

- Stand-alone, fully automated systems for high-volume manufacturing operations;
- Integrated systems for integration into semiconductor processing equipment that provide real-time measurements and feedback to improve process control and increase throughput; and
- Tabletop systems used to provide manual or semi-automatic measurements for engineering and low-volume production environments.

We also provide systems that are used to measure the overlay accuracy of successive layers of semiconductor patterns on wafers in the photolithography process. The accurate alignment, or overlay, of successive film layers, relative to each other, across the wafer is critical for device performance and favorable production yields.

We have been a pioneer and innovator in the field of metrology for over two decades. We have been selling metrology systems since 1977 and have an extensive installed base with industry leading customers worldwide, including Applied Materials Inc., Samsung, Hynix Semiconductor Inc., IBM, Intel Corporation, Micron Technology, Inc., TSMC Ltd., Renesas, Chi Mei, AU Optronics and Hannstar.

**Industry Characteristics**

**Growth**

Moore's Law which, simply stated, predicts a doubling of integrated circuit performance with a 50% reduction in manufacturing costs every 18 months, is an important factor in determining factory investment in the semiconductor industry. Two important industry drivers are: (i) the increasing complexity of chip designs as users of semiconductor chips demand increasingly higher performance and require more complicated manufacturing processes and (ii) the market pressure for lower cost chips. The semiconductor equipment industry has experienced cyclical growth with a compounded annual growth rate of approximately 15-17% over the past 20 years. Recently, the semiconductor industry experienced an exceptionally long, cyclical downturn, which began in 2000 and continued through the better part of 2003. We believe that the convergence of 300-millimeter wafer size, copper interconnects and fast, sub-100 nanometer architecture will drive the demand for new metrology solutions, such as those that we offer.

In the past, demand for Internet access, personal computers, telecommunications, and new consumer electronic products and services has fueled growth of the semiconductor, data storage and flat panel display industries. New display technologies, consumer electronics, automotive electronics and personal computers will likely continue as the primary drivers in the near-term for the semiconductor industry. We believe that consumer desire for high performance electronics drives technology advancement in semiconductor design and manufacturing and, in turn, promotes the purchasing of capital equipment featuring the latest advances in technology.

The two significant factors affecting demand for our measurement systems are: (i) new construction or refurbishment of manufacturing facilities, which, in turn, depends on the current and anticipated market demand for semiconductors, disk drives, flat panel displays, and products that use such components, and (ii) the increasing complexity of the manufacturing process as a result of the demand for higher performance semiconductors and flat panel displays.

**Semiconductor Manufacturing Process**

Semiconductors are fabricated by a series of process steps on a wafer substrate made of silicon or other material. Our thin film, critical dimension, overlay metrology and defect inspection systems can be used at many points during the fabrication process to monitor and measure circuit dimensions, layer-to-layer registration and film uniformity as well as material properties in order to maximize the yield of acceptable semiconductors. Each wafer typically goes through a series of 100 to 500 process and metrology steps in generally repetitive cycles.

The four primary wafer film processing steps are:

- Deposition;
- Chemical Mechanical Planarization, known in our industry as CMP;
- Photolithography imaging and overlay; and
- Etching of circuit elements.

**Deposition**. Deposition refers to placing layers of insulating or conducting materials on a wafer surface in thin films that make up the circuit elements of semiconductor devices. Common methods of deposition include chemical vapor deposition (CVD), plasma-enhanced chemical vapor deposition (PECVD) and physical vapor deposition (PVD). Diffusion and oxidation are also used to create or define thin films. The control of uniformity and thickness during the formation of these films is critical to the performance of the semiconductor circuit.

**Chemical Mechanical Planarization**. CMP flattens, or planarizes, the topography of the film surface to permit the multiple patterns of small features on the resulting smoothed surface by the photolithography process. The CMP process is a combination of chemical etching and mechanical polishing and commonly uses an abrasive liquid and polishing pad. Semiconductor manufacturers need metrology systems to control the CMP process by measuring the thin film layer to determine precisely when the appropriate thickness has been correctly polished and achieved.

**Photolithography**. Photolithography is the process step that projects the patterns of the circuits on the chip. A wafer is pre-coated with photoresist, a light sensitive film, that must have an accurate thickness and uniformity for exposure. Photolithography involves the optical projection of integrated circuit patterns onto the photoresist after which, the photoresist is developed, leaving unexposed areas available for etching. In order to precisely control the photolithography process, it is necessary to verify reflectivity, film thickness, critical dimensions and overlay registration.

**Etch**. Etch is a dry or wet process for selectively removing unwanted areas that have been deposited on the surface of a wafer. A film of developed photoresist protects material that needs to be left untouched by the etch to make up the circuits. Thin film metrology systems are required to verify precision of material removal and critical dimension achievement.

Before and after deposition, CMP, photolithography and etch, the wafer surface is measured to determine the quality of the film or pattern and to find defects. Measurements taken to ensure process uniformity include thickness, width, height, roughness and other characteristics. Process control helps avoid costly rework or misprocessing and results in higher yields for semiconductor manufacturers.

These processing steps are typically repeated multiple times during the fabrication process, with alternating layers of insulating and conducting films. Depending on the specific design of a given integrated circuit, a variety of film types and thicknesses and a number of layers can be used to achieve desired electronic performance characteristics. The semiconductors are then tested, separated into individual circuits, assembled and packaged into an integrated circuit.

**Flat Panel Display Manufacturing Processes**

Flat panel displays are manufactured in clean rooms using thin film processes that are similar to those used in semiconductor manufacturing. Most flat panel displays are constructed on large glass substrates that currently range in size up to 1,200 x 1,300 millimeters and should increase to up to 1,870 x 2,200 millimeters by the end of 2004.

**Increased Use of Metrology in Manufacturing**

We believe that continually rising wafer costs are forcing semiconductor manufacturers to re-evaluate their manufacturing strategies at all levels, from individual process steps to fabwide process optimization. Many major semiconductor manufacturers are adopting feed-forward and feedback of film thickness and critical dimensions, or CDs, based on real-time data from metrology systems. Major benefits of these new metrology strategies are higher manufacturing efficiencies from reduced rework, reduced headcount to perform at the same quality level and increased device performance. Additional benefits include device speed matching and more precise control of the overall manufacturing process.

**Drive Toward Integrated Metrology**

For many years, semiconductor manufacturers have sought to improve fab efficiency by choosing systems that integrate more than one process step into a single tool. Integrated metrology solutions increase productivity with higher throughput, smaller overall product footprints, reduced wafer handling and faster process development. This trend began in the mid-1980s, as leading manufacturers introduced a "cluster process tool" architecture that combined multiple processes in separate chambers around a central wafer-handling platform.

Today, the same focus on increased productivity is driving the adoption of integrated metrology for many processes, such as planarization, deposition, lithography and etch. Until recently, semiconductor manufacturers were required to physically transport wafers from a process tool to a separate metrology system in order to make critical measurements such as film thickness and uniformity. Manufacturers of process equipment are increasingly seeking to offer their customers integrated metrology in their tools to lower costs and improve overall fab efficiency. These tools can have one or two metrology chambers that are integrated onto a process system, which utilize the common automation platform, so that measurements can be taken without removing the wafers from the tool. Integrated metrology provides semiconductor manufacturers with several benefits, including a reduction in the number of test wafers, increased overall process throughput, faster detection of process excursions and faults, reduced wafer handling, faster process development and ultimately an improvement in overall equipment effectiveness.

**Nanometrics Offerings**

We offer a complete line of metrology systems to address the broad range of metrology requirements of our customers.

Our metrology systems can be categorized as:

- ***Stand-alone, fully automated systems*** used for the characterization and measurement of thin films in high-volume manufacturing operations. We offer a broad line of fully automated thin film thickness, critical dimension, defect inspection and overlay measurement systems. These systems remove the dependence on human operators by incorporating reliable wafer handling robots and are designed to meet the speed, measurement, performance and reliability requirements that are essential for today's semiconductor and flat panel display manufacturing facilities. Each of these measurement systems is non-contact and uses non-destructive techniques to analyze and measure films. Our fully automated metrology product line also includes systems that are used to measure the critical dimensions and overlay registration accuracy of successive layers of semiconductor patterns on wafers in the photolithography process.
- ***Integrated systems*** used to measure in-process wafers automatically and quickly without having to leave the enclosed wafer processing system. In 1998, we introduced our high-speed integrated metrology system. Our integrated metrology systems are compact and monitor a multitude of small test points on the wafer using sophisticated pattern recognition. Our integrated systems can be attached to film deposition, planarization, lithography, etch and other process tools to provide rapid monitoring of films on each wafer immediately before or after processing. Integrated systems can offer customers significantly increased operating efficiency and equipment utilization, lower manufacturing costs and higher throughput. We anticipate continuing to ship integrated systems to many original equipment manufacturers for installation on their planarization, deposition, litho and etch tools.
- ***Tabletop systems*** used to manually or semi-automatically measure thin films in engineering and low-volume production environments. We have been a pioneer in and believe that we are the leading supplier of tabletop thin film thickness measurement systems, which are mainly used in low-volume production environments and failure analysis and engineering labs. Our tabletop models have unique capabilities and several available configurations, depending on wafer handling, range of films to be measured, uniformity mapping and other customer needs.

Each of our measurement systems is equipped with computerized readout capability for measurement, visualization and control of film uniformity and thickness, critical dimensions and overlay. In addition, we have developed new automated systems and tabletop products for emerging technologies using larger substrates such as 300-millimeter wafers and larger flat panel displays. We were one of the first companies to ship fully automated thin film thickness measurement systems for 300-millimeter wafers. We have also introduced new technology for the precise thin film measurements that are dictated by sub-100nm design rules and have developed products with mini-environments that meet the latest standards for clean, particle-free manufacturing.

**Strategy**

Our strategy is to offer and support, on a worldwide basis, technologically advanced metrology solutions that meet the changing manufacturing requirements of the semiconductor and flat panel display industries, as well as other industries that use metrology systems. Key elements of our strategy include:

**Continuing to Offer Advanced Integrated Metrology Systems**. We were one of the first suppliers to offer products that integrate process metrology systems into wafer processing equipment. We supply integrated metrology systems for Applied Materials' Mirra Mesa™ and 300mm Reflexion™ CMP systems and the Producer QA and SE ™ CVD systems. Our optical critical dimension (OCD) metrology system is incorporated in the Applied Materials' Transforma™ 300mm etch system for controlling critical dimensions. The introduction of the first combined OCD/DUV integrated metrology product has allowed us to penetrate additional OEM suppliers of etch processing and CMP equipment, including Hitachi High Tech (HHT), Dainippon Screen (DNS) and Ebara. Our integrated metrology sales group continues to focus on sales of integrated metrology products to both OEMs and end-users.

**Maintaining Technology Leadership**. We are committed to developing advanced metrology systems that meet the requirements of advanced semiconductor, magnetic head and flat panel display manufacturing technology. We have an extensive array of proprietary technology and expertise in optics, software and systems integration. We have chosen to reduce our dependence on outside suppliers by taking control of the manufacturing of the critical components of our metrology systems. Key enabling technologies, such as our recently developed edge-gripping wafer handling stages, allow us to provide unique products with exceptionally high quality and low manufacturing costs to our OEM customers.

**Broadening Our Technology Portfolio**. We intend to continue to add a wide range of new measurement technologies to our expanding base of intellectual property. We recently introduced a single integrated module combining OCD and DUV technologies, which has enabled us to perform critical erosion and film thickness/array measurements for the oxide and copper metal CMP processes. In addition, our copper/metal profiler for CMP process control combines optical profile measurement or profilometry with our highly successful reflectometry technology to monitor metal removal during the chemical mechanical planarization process. These metrologies are key requirements for the copper damascene process, which replaces the current subtractive aluminum process on newer semiconductor devices.

We also participate in the particle and defect inspection market with our Universal Defect Inspection (UDI) technology. This technology has applications not only for inspection of semiconductor wafers but also for flat panel displays for the purpose of detecting killer defects early in the process before they cause catastrophic yield loss.

Our OCD technology has also been applied to advanced photolithography processes with the introduction of the OCD 9010M for mask and reticle measurement and characterization. This new product has already successfully correlated the interrelationships between film thickness and critical dimension parameters. The OCD technology has also been successfully extended to perform overlay/registration measurements. Our new diffraction-based overlay (DBO) technology will provide lithographers with wafer overlay control well beyond the requirements of the 65-nanometer node of the International Technology Roadmap for Semiconductors (ITRS) through the year 2010.

**Leveraging Existing Customer and Industry Relationships**. We expect to continue to strengthen our existing customer relationships and foster working partnerships with semiconductor equipment manufacturers by providing technologically superior systems and high levels of customer support. Our strong industry relationships have allowed close customer collaboration which, in return, facilitates our ability to introduce new products and applications in response to customer needs. We believe that our large customer base will continue to be an important source of new product development ideas. Our large customer base also provides us with the opportunity for increased sales of additional metrology systems to our current customers.

**Providing Worldwide Distribution and Support**. We believe that a direct sales and support capability is beneficial for developing and maintaining close customer relationships and for rapidly responding to changing customer requirements. Because a majority of our sales come from sources outside of the United States, we have expanded our direct sales force

in Europe, South Korea, Taiwan and China, and will continue to expand into additional territories as customer requirements dictate. We use selected sales representatives and distributors in other countries in Southeast Asia and the Middle East. We intend to monitor our distribution network by evaluating our existing and new offices, as well as forming additional distribution relationships as needed. We believe that growing our international distribution network as well as our increased focus on direct sales domestically can enhance our competitive position.

**Addressing Multiple Markets**. There are broad applications of our technology beyond the semiconductor industry. We currently offer a comprehensive family of metrology systems that accurately measure thin films, critical dimensions and overlay registration used in manufacturing process. Newer products inspect for particles and defects and monitor critical metal loss during the copper removal process. We intend to continue developing and marketing products to address metrology requirements in the manufacture of flat panel displays and any other industries that might apply our technology in the future. We believe that diversification of our technology through applications across multiple industries increases the total available market for our products and reduces, to an extent, our exposure to the cyclicality of any particular market.

**Broadening of our OEM Customer Base**. We believe that our OEM customer base will become an increasingly important aspect of our business. We recently added Ebara, Hitachi and Dainippon Screen to our list of OEM design wins which, together with our strong OEM position with Applied Materials, will allow us to capitalize on this rapidly growing market segment. The creation of our new, OEM integrated metrology sales group will provide additional focus on this market opportunity and is expected to result in increasing acceptance of our products in this sector.

**Technology**

We believe that our engineering expertise, technology acquisitions, supplier alliances and short-cycle production strategies enable us to develop and offer advanced solutions that address industry trends. By offering common metrology platforms that can be configured with a variety of measurement technologies, our customers can (i) specify high performance systems not easily offered by other suppliers and (ii) narrowly configure a system for a specific application as a cost saving measure.

**Spectroscopic Reflectometry**. We pioneered the use of micro-spot spectroscopic reflectometry for semiconductor film metrology in the late 1970s. Spectroscopic reflectometry uses multiple wavelengths (colors) of light to obtain an array of data for analysis of film thickness and other film parameters. Today's semiconductor manufacturers still depend on spectroscopic reflectometry for most film metrology applications. Reflectometry is the measurement of reflected light. For film metrology, a wavelength spectrum in the visible region is commonly used. Light reflected from the surfaces of the film and the substrate is analyzed using computers and measurement algorithms. The analysis yields thickness information and other parameters without contacting or destroying the film.

In the mid-1980s, we introduced a DUV reflectometer for material analysis. In 1991, we were awarded a patent for the determination of absolute reflectance in the ultraviolet region. This technology provides enhanced measurement performance for thinner films and for films stacked on top of one another.

**Spectroscopic Ellipsometry**. Like reflectometry, ellipsometry is a non-contact and non-destructive technique used to analyze and measure films. An ellipsometer analyzes the change in a polarized beam of light after reflection from a film's surface and interface. Our systems are spectroscopic, providing ellipsometric data at many different wavelengths. Spectroscopic ellipsometry provides a wealth of information about a film, yielding very accurate and reliable measurements. In general, ellipsometers are used for thin films and complex film stacks, whereas reflectometers are used for thicker films and stacks.

**Optical Critical Dimension Technology**. Our OCD technology is a critical dimension measurement technology that is used to precisely determine the dimensions on the semiconductor wafer that directly control the resulting performance of the integrated circuit devices. Our non-destructive, OCD measurement technology is compatible with the current 130nm manufacturing technology and can be extended below 100nm for future requirements in both photo-lithography and etch applications. OCD combines non-contact optical technology with extremely powerful data analysis software to provide highly accurate measurement results for line width, height and sidewall angles. This technology is available in both standalone and integrated platforms.

**Overlay Registration**. Overlay registration refers to the relative alignment of two layers in the thin film photolithographic process. Our microscope-based, measurement technology utilizes a high magnification, low distortion imaging system combined with proprietary software algorithms to numerically quantify the alignment.

**Diffraction-Based Overlay Registration**. We introduced diffraction-based overlay metrology at the prestigious SPIE Conference on Microlithography in February 2003, as an alternative solution for overlay technology nodes below 90 nanometers. This novel technique extracts overlay alignment error from our broadband OCD technology using specially designed diffraction targets in real-time. The technique is based on spectroscopy rather than imaging, is much more robust than aerial imaging methods, and the total measurement uncertainty is about six times smaller than traditional techniques. This new technology is capable of meeting the advanced design requirements of the 45nm process. A major advantage of the diffraction technique is that the measurement targets can be produced that match the dimensions of the circuits being manufactured, thus providing the immediate benefit of looking at the overlay performance of features that closely resemble the circuit features.

**Optical Profilometry**. We developed the optical profiler for the measurement of copper metal loss during the chemical mechanical planarization process. This technology uses the combination of an optical interferometer and our reflectometer technology to accurately determine metal loss, even over multiple layers during the final steps of metallization. Our technology is a unique method for precisely and accurately controlling this semiconductor manufacturing process step.

**Extreme Dark Field (EDF) Imaging Technology**. Our new, dark field inspection technology is used to detect and accurately locate particles and defects on the front and back sides of wafer surfaces, which could potentially lead to device failures and critical yield loss during the semiconductor manufacturing process. The technology combines a high efficiency, broadband light source with a high-resolution detection system and proprietary digital image processing for defect and contamination detection on a wide variety of films and surfaces. We believe that this technology can be readily extended to other manufacturing processes.

**Products**

Our thin film thickness measurement systems use microscope-based, non-contact spectroscopic reflectometry (SR). Some of our systems provide complementary spectroscopic ellipsometry (SE) to measure the thickness and optical characteristics of films on a variety of substrates. In addition, we offer both integrated and standalone optical critical metrology systems to measure critical dimensions of patterns on semiconductor wafers. We also manufacture a line of optical overlay registration systems that are used to determine the alignment accuracy of successive layers of semiconductor patterns on wafers in the photolithography process. Our products can be divided into three groups: automated stand-alone systems, integrated systems and tabletop systems.

| Platform | Market | Substrate Size | Applications | Technology |
|---|---|---|---|---|
| **Automated/Stand Alone** | | | | |
| 9100 | Semiconductor, Magnetic Head | 75-200mm | CVD, CMP, Etch, Litho, Film Thickness | SR, SE |
| 9200 | Semiconductor | 150mm<br>200mm | CVD, CMP, Etch, Litho, Film Thickness | SR |
| 9300 | Semiconductor | 200mm<br>300mm | CVD, CMP, Etch, Litho, Film Thickness | SR, SE, OCD/SE, UDI, CLP |
| 6500 | Flat Panel Display | 550 x 650mm<br>1100 x 1250mm<br>1200 x 1300mm | Film Thickness | SR, SE |
| 7210 | Semiconductor | 200mm | Overlay | Imaging |
| **Integrated** | | | | |
| 9000 | Semiconductor | 200mm | CVD, CMP, Film Thickness | SR |
| 9000i | Semiconductor | 200mm<br>300mm | CVD, CMP, Etch, Film Thickness, CD | SR, OCD |
| 9000b | Semiconductor | 300mm | CVD, CMP, Etch, Film Thickness | SR |
| 9010 | Semiconductor | 300mm | CMP, CVD, Etch, Litho Film Thickness, CD | OCD/SR, CLP, UDI |
| 9020 | Semiconductor | 200mm | Etch, Vacuum CD | OCD |

| Platform | Market | Substrate Size | Applications | Technology |
|---|---|---|---|---|
| **Table Top** | | | | |
| 3000 | Semiconductor, Magnetic Head | 75mm<br>150mm | Film Thickness | SR |
| 6100 | Semiconductor | 75mm<br>150mm<br>200mm | Film Thickness | SR |

We have recently introduced several new standalone and integrated products to the market. These products include the following:

- Nanometrics Atlas Advanced Metrology System combining multiple metrology technologies in a standalone device
- Nanometrics 9300 combined standalone OCD/SE film characterization system
- Nanometrics FLX standalone flexible metrology system for development and support of all integrated technologies
- NanoOCD/DUV 9010 integrated metrology platform for both optical critical dimension and film thickness metrology
- NanoOCD 9010M integrated metrology platform for mask and reticle measurement

Additionally, our subsidiaries in Japan and Korea unveiled a new flat panel display product and a 300-millimeter aerial imaging overlay product.

**Automated/Stand-Alone Systems**

Our stand-alone, fully automated metrology systems are employed in high-volume production environments. These systems incorporate automated material handling interface options for a variety of fab automation environments and implement multiple measurement technologies for a broad range of substrate sizes. Our automated systems range in price from approximately $200,000 to $900,000, depending on substrate sizes, measurement technologies, material handling interfaces and software options.

*Nanometrics Atlas*

The new Nanometrics Atlas high-performance metrology system combines up to five metrology technologies on a single platform, providing increased measurement capabilities in a small footprint design for reduced cost of ownership. The system is capable of housing up to five metrology technologies including polarized, normal incidence spectroscopic ellipsometry for linewidth profile and critical dimensions, spectroscopic reflectometry for films and film stacks, UV and deep UV spectroscopic ellipsometry for ultra-thin films and film characterization, diffraction-based overlay technology for layer-to-layer registration measurement, and film stress/wafer bow measurements. The Atlas offers high accuracy, high precision metrology for wafer characterization and can be configured for 200mm and 300mm wafer sizes. The system is also compatible with NanoNet, an optional software package that enables users to synchronize standalone and integrated metrology systems for remote process setup and monitoring.

*NanoSpec 9100*

The NanoSpec 9100 stand-alone, automated thin film measurement system is capable of handling wafers ranging in size from 75 to 200 millimeters in diameter. The 9100 can be configured with a deep ultraviolet (DUV) to near infrared (NIR) spectroscopic ellipsometer for ultra-thin, multiple film stack and DUV lithography measurement applications. Other 9100 options include a standard mechanical interface with mini-environment enclosures for use in ultra-clean manufacturing facilities. The system also features a Windows NT software platform that conforms to the newly establish SEMI user interface standard. The 9100 can also be configured to handle the substrates. We developed the 9100 using technologies from the integrated film thickness systems to allow easy transfer of measurement recipes between the integrated and stand-alone film metrology systems.

*NanoSpec 9200*

The NanoSpec 9200 stand-alone, automated thin film measurement system is capable of handling wafers of 150 and 200 millimeters in diameter. We developed this system, using technologies from the NanoSpec 9000 integrated film thickness system, to be compact and to provide high wafer throughput.

*9300 Standalone Automation Platforms*

The 9300 stand-alone wafer automation platform serves as a common, universal building block and forms the basis for several fully automated metrology systems.

*Nanometrics 9300*

The enhanced Nanometrics 9300 advanced metrology system combines two metrology technologies on a single metrology platform. This enhanced platform now includes optical critical dimension (OCD) measurement capability. Using the spectroscopic ellipsometer (SE), customers can determine optical film properties and then feed them directly to the OCD measurement recipes to optimize sensitivity for all line width and profile measurements. Having these two technologies on the same tool also reduces the time and potential error loss associated with having to determine the film optical properties on a separate tool.

*NanoSpec 9300*

The NanoSpec 9300 stand-alone, automated thin film measurement system is capable of handling both 200 and 300-millimeter diameter wafers. The NanoSpec 9300 can be configured with a DUV to NIR spectroscopic ellipsometer for ultra-thin, multiple film stack and DUV lithography measurement applications. This system can also include a mini-environment enclosure and wafer load ports compatible with industry standards. The NanoSpec 9300 conforms to the new industry standards for 300-millimeter wafer handling automation and features a Windows NT software platform that conforms to the SEMI user interface standard. We developed the NanoSpec 9300 using technologies from the integrated film thickness systems to allow easy transfer of measurement recipes between the integrated and stand-alone film metrology systems.

*NanoUDI 9300*

The NanoUDI 9300 stand-alone, high throughput, full-wafer defect inspection system detects and measures particles and defects as small as 0.05 microns on 300-millimeter diameter semiconductor wafers. The NanoUDI 9300 was first introduced at SEMICON West in July 2002 and is built on the common 9300 wafer automation platform that conforms to the new industry standards for 300 millimeter wafer handling. The NanoUDI 9300 also features a Windows NT software platform that conforms to the SEMI user interface standard.

*NanoOCD 9300*

The NanoOCD 9300 stand-alone, automated metrology system is an optical critical dimension measurement system that enables direct recipe transfer between our integrated metrology and standalone systems using our NanoNet networking software. This system can also include a mini-environment enclosure and wafer load ports compatible with industry standards. The NanoOCD 9300 also conforms to the new industry standards for 300 millimeter wafer handling automation and features a Windows NT software platform that conforms to the newly established SEMI user interface standard. We developed the NanoOCD 9300 using the same measurement technology from the integrated OCD system to allow direct transfer of measurement recipes between the integrated and stand-alone OCD metrology systems.

*Nanometrics FLX*

The newest standalone metrology platform, the Nanometrics FLX flexible metrology system, is designed to support up to four integrated metrology modules simultaneously - the tool can mix-and-match any combination of modules to form a complete metrology solution for lithography, planarization, etch and deposition processes. This capability accelerates process development through parallel development of integrated metrology solutions. The Nanometrics FLX is a flexible, cost-efficient, high-throughput 300-mm standalone metrology system based on Nanometrics' proven integrated metrology solutions. The system offers industry-leading throughput of 250-500 wafers per hour fueled by dual multi-axis wafer-handling robots.

*NanoSpec 5500 and 6500*

The NanoSpec 5500 and 6500 measure optically transparent films that are used in the manufacture of flat panel displays. The model 5500 is fully automated and handles substrates up to 550 by 650 millimeters. This model is also capable of measuring at any site on the substrate and generating film thickness maps, which show film thickness uniformity across

the panel. The NanoSpec 6500 is an advanced version of the NanoSpec 5500 with additional proprietary software and hardware enhancements and is capable of handling generation 5 substrates up to 1,200 by 1,300 millimeters. Recent product enhancements include the integration of ultra-violet (UV) spectroscopic reflectometry for the measurement of low temperature, deposited poly-silicon films and UV to near infra-red (NIR) spectroscopic ellipsometry (SE) for the measurement of multilayer film stacks and improved measurement precision. Product development is also well underway for handling generation 6 (1,500 x 1,800 millimeter) and generation 7 (1,870 x 2,200 millimeter) substrates.

*NanoOCS 7200 Series*

In 1998, we completed an acquisition of the Metra product line from Optical Specialties. The Metra is a stand-alone system used to measure the overlay accuracy of successive layers of semiconductor patterns on wafers in the photolithography process. We shipped our first automated overlay registration system, the Metra 7000, in June 1998. The recently introduced NanoOCS 7210 provides enhanced measurement performance and higher wafer throughput and replaces the Metra line of products.

**Integrated Systems**

Our integrated metrology systems are installed inside wafer processing equipment to provide near real-time measurements for improving process control and increasing throughput. Our integrated systems are available for wafer sizes up to 300 millimeters and offer DUV measurement technology, in addition to spectroscopic reflectometry and optical critical dimension measurement technologies. Our integrated metrology systems range in price from approximately $80,000 to $300,000 depending on features and technology.

*NanoSpec 9000*

The NanoSpec 9000 is an ultra-compact measurement system designed for integration into semiconductor wafer processing equipment. The system can be used in several wafer film process steps, including metal deposition, planarization, chemical vapor photolithography and etch. In its basic configuration, the NanoSpec 9000 is equipped with visible wavelength spectroscopic reflectometry.

*NanoSpec 9000i*

The NanoSpec 9000i is a 300mm version of the NanoSpec 9000. This metrology platform can be integrated into multiple wafer film process steps including metal deposition, planarization, chemical vapor deposition, photolithography and etch. The NanoSpec 9000i is also equipped with visible wavelength spectroscopic reflectometry and can be extended into deep ultraviolet wavelengths. The NanoSpec 9000i will also support the newly developed optical critical dimension (OCD) technology for the measurement of critical dimensions on semiconductor wafers. The system is designed for integration into semiconductor wafer processing equipment and used in several critical processing steps including photolithography and etch.

*NanoSpec 9000b*

The NanoSpec 9000b is a SEMI BOLTS compatible, 300 millimeter based system that incorporates all the features of the NanoSpec 9000. By conforming to the industry standard BOLTS mounting system, the NanoSpec 9000b is interchangeable with industry conforming load ports for simplified mechanical integration.

*9010 Integrated Metrology Platform*

The 9010 integrated metrology platform is an advanced 300 -millimeter product that supports multiple measurement technologies. The first product offered on this platform was the NanoCLP 9010 is a laser-based, optical profiling and reflectance measurement system that incorporates the newly developed Copper Laser Profiler (CLP) technology for the measurement of copper metal loss during planarization on semiconductor wafers and is designed for integration into semiconductor wafer processing equipment. The second product offered on this platform was the NanoUDI, Universal Defect Inspection system. The NanoUDI 9010 is an integrated metrology, full-wafer defect inspection system that detects and measures particles and defects as small as 0.1 microns on 300-millimeter diameter semiconductor wafers. The 9010 integrated metrology platform also incorporates our unique 300-millimeter edge-gripping wafer stage with an integral pre-aligner.

*NanoOCD 9010M*

The NanoOCD 9010M was introduced in the third quarter of 2003, and is the first optical critical dimension (OCD) integrated metrology tool for masks and reticles. The NanoOCD 9010M utilizes our production-proven OCD metrology, and enables non-destructive, real-time measurement and profiling of critical features on photomasks and reticles without the limitations and drawbacks associated with CD-SEM metrology. Current CD-SEM technology appears to be reaching its theoretical limits for making critical dimension measurements on these substrates. Photoresist-on-chrome-on-glass features found on reticles and masks suffer severe charging during CD-SEM metrology making critical dimension measurements impossible. OCD is a non-destructive technology that provides information not available from CD-SEM measurements.

*NanoOCD/DUV 9010*

The NanoOCD/DUV 9010 was also introduced in the third quarter of 2003, and is the first integrated metrology tool to combine two measurement technologies on a single platform. The NanoOCD/DUV 9010 incorporates both ultra violet optical critical dimension (OCD) spectroscopic ellipsometry and deep ultra violet (DUV) spectroscopic reflectometry. The NanoOCD/DUV 9010 provides thin film and film stack thickness measurements on pads as well as oxide, nitride and trench profile measurements on arrays in a single tool. The combined technologies provide a complete measurement solution over the entire range of measurement requirements for each process step. This complete metrology capability can be utilized across a number of lithography, deposition, copper planarization, dielectric planarization, poly-Si etch and dielectric etch applications.

*NanoOCD 9020 Integrated Metrology Platform*

The 9020 integrated metrology platform is an advanced, vacuum based metrology product that supports multiple measurement technologies. The NanoOCD 9020 is a 200 millimeter-based system that incorporates our newly developed edge-gripping vacuum wafer stage and OCD technology for the measurement of critical dimensions on semiconductor wafers. The system is designed for integration into the vacuum chamber of semiconductor wafer etch processing equipment.

**Tabletop Systems**

Our tabletop systems are used primarily in low-volume production environments and in engineering labs for which automated handling and high throughput are not required. Our tabletop product line encompasses both manual and semi automated models and includes systems for both film thickness and critical dimension measurements. Our tabletop system prices range from approximately $50,000 to $200,000, depending primarily on the degree of automation and software options purchased.

*NanoSpec 3000 and 6100*

The NanoSpec tabletop systems provide a broad range of thin film measurement solutions at a lower entry price point. The NanoSpec 3000 is a basic, manual system while the 6100 models feature semiautomatic wafer handling or staging.

**Customers**

We sell our metrology systems worldwide to many of the major semiconductor and flat panel display manufacturers and equipment suppliers, as well as to producers of silicon wafers and photomasks. The majority of our systems are sold to customers located in the United States, Asia and Europe. One customer, Applied Materials represented 17.6% of our total net revenues in 2001. Two customers, Applied Materials, and TSMC represented 13.8% and 10.9% of our total net revenues in 2002. Two customers, Applied Materials and Hynix Semiconductor, represented 15.4% and 12.0% of our total net revenues in 2003, respectively.

The following is a list of our top ten customers, based on revenues, during 2003:

| | |
|---|---|
| Applied Materials | Tricenti Technology Inc. (TTI) |
| Hynix Semiconductor | AU Optronics |
| Samsung | Hannstar |
| Powerchip | Semiconductor Manufacturing International Corporation (SMIC) |
| ChiMei | Wacker |

**Sales and Marketing**

We believe that the capability for direct sales and support is beneficial for developing and maintaining close customer relationships and for rapidly responding to changing customer requirements. We provide direct sales and support from our corporate office in California. We also have a direct sales presence in South Korea, Taiwan, China, Europe and Japan. We use selected sales representatives and distributors in the United States and other countries in Asia and the Middle East. We intend to continue to monitor our distribution network, our existing and new offices as well as forming additional distribution relationships when needed. We believe that growing our international distribution network can enhance our competitive position. We maintain a direct sales force of highly trained, technically sophisticated sales engineers who are knowledgeable in the use of metrology systems generally and with the features and advantages of our specific products. We believe that our sales and application engineers are skilled in working with our customers to solve complex measurement and process problems.

Sales to customers in foreign countries constituted approximately 64.8%, 69.0% and 74.8% of total net revenues for 2001, 2002 and 2003, respectively. Direct exports of our metrology systems to our foreign customers and shipments to our subsidiaries require general export licenses. See Note 12 of the Notes to Consolidated Financial Statements for information regarding total net revenues and long-lived assets of our foreign operations. See Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations-Risks Related to Our Business for information regarding risks related to our foreign operations.

Sales to customers located in Japan, Taiwan and Korea, as a percentage of total net revenues, were as follows:

| | 2001 | 2002 | 2003 |
|---|---|---|---|
| Japan | 28.8% | 23.9% | 24.8% |
| Taiwan | 14.1% | 22.7% | 21.5% |
| Korea | 9.9% | 10.5% | 21.8% |

In order to raise market awareness of our products, we advertise in trade publications, distribute promotional materials, publish technical articles, conduct marketing programs, issue press releases regarding new products, work with a public relations firm and participate in industry trade shows and conferences. We also maintain a website at www.nanometrics.com.

**Customer Service and Support**

We believe that customer service and technical support are important factors to distinguish us from our competitors and are essential to building and maintaining close, long-term relationships with our customers. We provide support to our customers with telephonic technical support access, direct training programs and operating manuals and other technical support information. We use our demonstration equipment for training programs, as well as for our sales and marketing efforts. Our Technical Training department has a complete set of metrology systems that are dedicated to customer training. We provide warranty and post-warranty service from our corporate office in Milpitas, California. We also have service operations based in Pennsylvania, Vermont, Arizona, and Texas. Local service and spare parts are provided in the United Kingdom by our operations in Scotland. Service, applications, and sales support for the European continent are provided through our operations in Italy and Germany. In Asia, service is provided by direct offices in Japan, Korea, Taiwan, Singapore and by a new office that we opened in 2002 in Shanghai, China. Our distributors and representatives also provide service in other countries in Asia.

We provide a one-year warranty on parts and labor for products sold domestically and in foreign markets. Service revenue, including sales of replacement parts, represented approximately 10.4%, 17.4% and 16.9% of total net revenues in 2001, 2002 and 2003, respectively.

**Backlog**

As of December 31, 2003 our backlog was approximately $9.1 million. As of December 31, 2002, our backlog was approximately $8.3 million. Backlog includes orders for products that we expect to ship within 12 months. Orders from our customers are subject to cancellation or delay by the customer without penalty. Historically, order cancellations and order rescheduling have not been significant. However, orders presently in backlog could be canceled or rescheduled. As only a portion of our revenues for any fiscal quarter represent systems in backlog, we do not believe that backlog is a meaningful or accurate indication of our future revenues and performance.

**Competition**

The market for our metrology systems is intensely competitive and characterized by rapidly evolving technology. We compete on a global basis with both larger and smaller companies in the United States, Japan, Israel and Europe. Our products compete primarily with: stand-alone thin film measurement products from KLA-Tencor Corporation, Therma-Wave, Inc. and Rudolph Technologies; integrated thin film measurement products from Nova Measuring Instruments Ltd., KLA-Tencor and Therma-Wave; and overlay measurement products from KLA-Tencor and Accent Optical Technologies. Many of our competitors have substantially greater financial, engineering, manufacturing and marketing resources than we do. Significant competitive factors in our industry include: performance of proprietary measurement technology; system performance, including automation and software capability; ease of use; reliability; established customer bases; cost of ownership; price; and global customer service. We believe that we compete favorably with respect to these factors, but we must continue to develop and design new and improved products in order to maintain our competitive position.

**Manufacturing**

We manufacture our products in the United States, Japan and Korea. We combine proprietary measurement technology produced in our facilities with components and subassemblies obtained from outside suppliers. Our manufacturing operations do not require us to make any additional major investments in capital equipment.

Certain components, subassemblies and services necessary for the manufacture of our systems are obtained from a sole supplier or limited group of suppliers. We do not maintain long-term supply agreements with any of our suppliers.

**Research and Development**

Our research and development is directed towards enhancing existing products and developing and introducing new products to maintain technological leadership and to meet current and evolving customer needs. Our process, engineering, marketing, operations and management personnel have developed close collaborative relationships with many of our customers and have used these relationships to identify market demands and target our research and development to meet those demands. We are working to develop potential applications of new and emerging technologies, including improved metrology methods. We conduct research and development at our facilities in California, Korea and Japan. We have extensive proprietary technology and expertise in such areas as spectroscopic reflectometry using our patented absolute reflectivity, robust pattern recognition and complex measurement software algorithms. We continue to add to our intellectual property portfolio, most recently in the areas of critical dimension measurement and integrated metrology. We also have extensive experience in systems integration engineering required to design compact, highly automated systems for advanced clean room environments. Expenditures for research and development during 2001, 2002 and 2003 were $10.8 million, $13.8 million and $13.4 million, and represented 22.6%, 39.6% and 32.2% of total net revenues, respectively.

**Intellectual Property**

Our success depends in large part on the technical innovation of our products. We actively pursue a program of filing patent applications to seek protection of technologically sensitive features of our metrology systems. As of December 31, 2003, we held 24 United States patents with 38 patent applications pending, 10 of which were filed during 2003. The United States patents, issued during the period 1987 to 2003, will expire between 2004 and 2022. While we attempt to protect our intellectual property rights through patents and non-disclosure agreements, we believe that our success will depend to a greater degree upon innovation, technological expertise and our ability to adapt our products to new technology. We may not be able to protect our technology and competitors may be able to develop similar technology independently. In addition, the laws of certain foreign countries may not protect our intellectual property to the same extent as do the laws of the United States.

From time to time we receive communications from third parties asserting that our metrology systems may contain design features that are claimed to infringe their proprietary rights. We typically refer such matters to our legal counsel.

**Employees**

At December 31, 2003, we employed approximately 310 persons worldwide, including 97 in research and development, 54 in manufacturing and manufacturing support, 134 in marketing, sales and field service and 25 in general administration and finance. None of these employees is represented by a union and we have never experienced a work stoppage as a result of union actions. Many of our employees have specialized skills that are of value to us. Our future success will depend in large part upon our ability to attract and retain highly skilled scientific, technical, managerial, financial and marketing personnel, who are in great demand in the industry. We consider our employee relations to be good.

**Executive Officers of the Registrant**

The following are our current executive officers and their ages as of December 31, 2003:

| Name | Age | Position |
|---|---|---|
| Vincent J. Coates | 78 | Chairman of the Board, Secretary |
| John D. Heaton | 43 | President, Chief Executive Officer and Director |
| Paul B. Nolan | 48 | Vice President and Chief Financial Officer |
| Roger Ingalls Jr. | 42 | Vice President of Sales |

Mr. Vincent J. Coates has been Chairman of the Board since Nanometrics was founded in 1975. He has been our Secretary since February 1989. He has also served as our Chief Executive Officer through April 1998 and President from our founding through May 1996, except for the period January 1986 through February 1987 when he served exclusively as Chief Executive Officer. Mr. Coates has also served as Chairman of the Board of Nanometrics Japan Ltd., a subsidiary of the Company, since June 1998. Prior to his employment at Nanometrics, Mr. Coates co-founded Coates and Welter Instrument Corporation, a designer of electron microscopes, which company was subsequently acquired by Nanometrics. Mr. Coates also spent over twenty years working in engineering, sales and international operations for the Perkin-Elmer Corporation, a manufacturer of analytical instruments. In 1995, he received an award that recognized his contribution to the industry from Semiconductor and Equipment and Materials International, an industry trade organization.

Mr. John D. Heaton has served as a director of Nanometrics since July 1995. Since May 1996, he has served as our President. Since April 1998, he has also served as our Chief Executive Officer. From May 1996 to April 1998, he served as our Chief Operating Officer. Mr. Heaton has also served as President of Nanometrics Japan Ltd., a subsidiary of the Company, since January 1998. Beginning in 1978, Mr. Heaton served in various technical positions at National Semiconductor, a semiconductor manufacturer, prior to joining the Company in 1990.

Mr. Paul B. Nolan has served as Vice President and Chief Financial Officer of Nanometrics since March 1994. Mr. Nolan joined us as a Financial Analyst in March 1989, and served as Director of Finance from March 1993 to March 1994. Mr. Nolan served as Financial Analyst at Harris Corporation, a communications equipment company, prior to joining the Company.

Mr. Roger Ingalls Jr. has served as our Vice President of Sales since January 2002. Mr. Ingalls joined Nanometrics in March 1995, serving as Vice President and Director of Sales and Marketing from October 1997 to February 1998, and as Vice President and Director of Marketing from February 1998 to January 2002. Prior to joining Nanometrics, he served as a sales engineer for Nikon Inc., a precision optical company, from March 1993 to March 1995.

## ITEM 2. PROPERTIES

Our principal manufacturing and administrative facility is located in Milpitas, California in a 133,000 square foot building owned by the Company. We purchased the Milpitas facility in July 2000 and moved into the facility in November 2000. We also lease and rent locations in Texas, China, Singapore and Taiwan as sales and service offices. Rent expense for our facilities was approximately $270,000 for 2003.

Through our Japanese subsidiary, we own a 50,000 square foot facility in Narita, Japan. This facility is utilized by our Japanese subsidiary for sales, service, engineering and manufacturing. Our Japanese subsidiary also leases three sales and service offices in Japan.

Through our Korean subsidiary, we own a 39,000 square foot facility in Pyungtaek, Korea. This facility is utilized by our Korean subsidiary for sales, service, engineering and manufacturing.

We believe that our existing facilities, which are currently utilized at or near capacity, are suitable and adequate for our current needs and anticipated growth.

## ITEM 3. LEGAL PROCEEDINGS

There are no material legal proceedings pending against us.

## ITEM 4. SUBMISSION OF MATTERS TO A VOTE OF SECURITY HOLDERS

No matters were submitted to a vote of security holders during the quarter ended January 3, 2004.

## PART II

### ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY AND RELATED SHAREHOLDER MATTERS

Our common stock is quoted on the Nasdaq National Market under the symbol "NANO." The following table sets forth, for the periods indicated, the high and low bid prices per share of our common stock as reported on the Nasdaq National Market. These quotations represent prices between dealers and do not include retail markups, markdowns or commissions and may not necessarily represent actual transactions.

| | High | Low |
|---|---|---|
| 2002 | | |
| First Quarter | $23.10 | $14.90 |
| Second Quarter | $20.35 | $13.16 |
| Third Quarter | $16.33 | $2.60 |
| Fourth Quarter | $6.30 | $1.82 |
| 2003 | | |
| First Quarter | $6.11 | $2.85 |
| Second Quarter | $7.49 | $3.88 |
| Third Quarter | $15.89 | $6.15 |
| Fourth Quarter | $17.41 | $10.63 |

On March 24, 2004, the last reported sale price of our common stock on the Nasdaq National Market was $14.56 per share, and there were approximately 123 shareholders of record.

**Dividend Policy**

We have never declared or paid any cash dividends on our capital stock. We currently expect to retain future earnings, if any, for use in the operation and expansion of our business and do not anticipate paying any cash dividends in the foreseeable future.

**Equity Compensation Plan Information**

The following table gives information about the common stock that may be issued under all of our existing equity compensation plans as of December 31, 2003.

| Plan category | Number of securities to be issued upon exercise of outstanding options, warrants and rights (a) | Weighted-average exercise price of outstanding options, warrants and rights (b) | Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c) |
|---|---|---|---|
| Equity compensation plans approved by security holders | 1,773,711 | $ 11.62 | 608,089 |
| Equity compensation plans not approved by security holders | 1,141,485 | $ 7.13 | 58,515 |
| Total | 2,915,196 | $ 9.86 | 666,604 |

Under the 2002 Nonstatutory Stock Option Plan, which was approved by our board of directors, we may grant options to acquire up to 1,200,000 shares of common stock to employees and consultants at prices determined by the Plan administrator at the date of grant. These options generally expire seven years from the date of grant, or a shorter term as provided by the stock option agreement and become exercisable as they vest as set forth in the stock option agreements.

**Stock Option Exchange Program**

On November 12, 2002, we announced a voluntary stock option exchange program for certain eligible employees. Under the exchange program, we offered to exchange certain stock options to purchase an aggregate of 1,962,020 shares of our common stock in exchange for a promise to grant new stock options, subject to certain conditions, at a future date that is at least six months and one day after December 16, 2002, the date of cancellation. The stock options subject to the offer to exchange had been granted under either our 1991 stock option plan or our 2000 employee stock option plan with exercise prices equal to or greater than $10.00 per share. Eligible employees who elected to participate in the exchange program were required to exchange all other stock options, regardless of their exercise price, that were granted to them after May 12, 2002 and before replacement options were granted. The number of shares of common stock subject to the new options equaled 90% of the number subject to the exchanged options. Under the exchange program, options to purchase 1,569,020 shares of our common stock were tendered and cancelled. On June 17, 2003, we granted 1,398,621 replacement options to eligible employees. There were no compensation charges or variable plan accounting resulting from the grant of the replacement options. Non-employee members of our Board of Directors were not eligible to participate in this program.

## ITEM 6. SELECTED CONSOLIDATED FINANCIAL DATA

The selected consolidated financial data set forth below should be read in conjunction with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and the consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K.

| | Years Ended December 31, | | | | |
|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 |
| | (in thousands, except per share data) | | | | |
| Consolidated Statement of Operations Data: | | | | | |
| Net revenues: | | | | | |
| Product sales | $ 32,162 | $ 63,468 | $ 42,653 | $ 28,669 | $ 34,592 |
| Service | 4,246 | 6,023 | 4,931 | 6,054 | 7,010 |
| Total net revenues | 36,408 | 69,491 | 47,584 | 34,723 | 41,602 |
| Costs and expenses: | | | | | |
| Cost of product sales | 14,606 | 25,082 | 17,949 | 13,237 | 17,691 |
| Cost of service | 4,560 | 6,022 | 5,406 | 5,765 | 6,620 |
| Research and development | 4,658 | 9,238 | 10,760 | 13,765 | 13,399 |
| Selling | 5,871 | 10,313 | 9,523 | 10,862 | 11,496 |
| General and administrative | 2,973 | 4,258 | 4,177 | 5,104 | 4,689 |
| Goodwill impairment | — | — | — | 1,077 | — |
| Total costs and expenses | 32,668 | 54,913 | 47,815 | 49,810 | 53,895 |
| Income (loss) from operations | 3,740 | 14,578 | (231) | (15,087) | (12,293) |
| Other income (expense): | | | | | |
| Interest income | 662 | 4,129 | 2,576 | 583 | 397 |
| Interest expense | (180) | (76) | (86) | (94) | (96) |
| Other, net | 94 | (150) | (517) | 100 | 385 |
| Total other income, net | 576 | 3,903 | 1,973 | 589 | 686 |
| Income (loss) before provision (benefit) for income taxes | 4,316 | 18,481 | 1,742 | (14,498) | (11,607) |
| Provision (benefit) for income taxes | 1,682 | 5,942 | 782 | (6,230) | 5,860 |
| Income (loss) before cumulative effect of change in accounting principle | $ 2,634 | $ 12,539 | $ 960 | $ (8,268) | $ (17,467) |
| Cumulative effect of change in revenue recognition principle (SAB 101) | — | (1,364) | — | — | — |
| Net income (loss) | $ 2,634 | $ 11,175 | $ 960 | $ (8,268) | $ (17,467) |
| Basic net income (loss) per share: | | | | | |
| Income (loss) before cumulative effect of change in accounting principle | $ 0.30 | $ 1.14 | $ 0.08 | $ (0.70) | $ (1.45) |
| Cumulative effect of change in revenue recognition principle (SAB 101) | — | (0.12) | — | — | — |
| Net income (loss) | $ 0.30 | $ 1.02 | $ 0.08 | $ (0.70) | $ (1.45) |
| Diluted net income (loss) per share: | | | | | |
| Income (loss) before cumulative effect of change in accounting principle | $ 0.28 | $ 1.06 | $ 0.08 | $ (0.70) | $ (1.45) |
| Cumulative effect of change in revenue recognition principle (SAB 101) | — | (0.12) | — | — | — |
| Net income (loss) | $ 0.28 | $ 0.94 | $ 0.08 | $ (0.70) | $ (1.45) |
| Shares used in per share computation: | | | | | |
| Basic | 8,829 | 10,986 | 11,691 | 11,878 | 12,043 |
| Diluted | 9,393 | 11,845 | 12,161 | 11,878 | 12,043 |

| | December 31, | | | | |
|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 |
| | | | (in thousands) | | |
| Consolidated Balance Sheet Data: | | | | | |
| Cash, cash equivalents and short-term investments | $ 18,140 | $ 69,788 | $ 47,227 | $ 36,866 | $ 29,892 |
| Working capital | 36,021 | 92,420 | 80,171 | 74,776 | 59,587 |
| Total assets | 46,410 | 144,796 | 142,355 | 134,688 | 121,740 |
| Debt obligations, less current portion | 2,288 | 4,236 | 3,314 | 3,123 | 2,648 |
| Total shareholders' equity | 38,155 | 127,009 | 129,845 | 124,106 | 108,441 |

## ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following Management's Discussion and Analysis of Financial Condition and Results of Operations should be read in conjunction with our consolidated financial statements and the notes thereto included elsewhere in this Annual Report on Form 10-K. Our discussion contains forward-looking statements based upon current expectations that involve risks and uncertainties, such as our plans, objectives and intentions. In some cases, forward-looking statements can be identified by words such as "believe," "expect," "anticipate," "plan," "potential," "continue" or similar expressions. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of certain risk factors, including those set forth in "Factors That May Affect Future Operating Results" and elsewhere in this Annual Report on Form 10-K. We believe it is important to communicate our expectations to our investors. However, there may be events in the future that we are not able to predict accurately or over which we have no control. You should be aware that the occurrence of the events described in these risk factors and elsewhere in this Annual Report on Form 10-K could materially and adversely affect our business, operating results and financial condition. We disclaim any obligation to update information contained in any forward-looking statement.

We use a 52/53 week fiscal year ending on the Saturday nearest to December 31. Accordingly, fiscal years 2001 and 2002 consisted of 52 weeks and ended on December 29, 2001 and December 28, 2002, respectively and 2003 consisted of 53 weeks and ended on January 3, 2004. For convenience, our year end is denoted as December 31 in the following discussion.

### Overview

We are a pioneer in the field of metrology systems for the semiconductor and flat panel display manufacturing industries. Our systems are designed to precisely measure a wide range of film types deposited on substrates during manufacturing in order to control manufacturing processes and increase production yields.

Capital expenditures by manufacturers of semiconductors and flat panel displays and their suppliers are critical to our success. The demand by these manufacturers and suppliers for products is driven by the current and expected market demand for (i) semiconductors and products utilizing semiconductors; disk drives and computers that utilize disk drives; and (ii) flat panel displays for use in laptop computers, pagers, cell phones and a variety of other applications. The increasing complexity of the manufacturing processes for semiconductors and flat panel displays is also an important factor in the demand for our innovative metrology systems. We anticipate that increased demand for devices incorporating smaller components along with some of our recent product innovations will result in increased demand for our products.

We derive our revenues from product sales and services, which include sales of accessories and service to the installed base of our products. For the year ended December 31, 2003, we derived 83.1% of our total net revenues from product sales and 16.9% of our total net revenues from services.

### Current Trends

Changing trends in the semiconductor and flat panel display manufacturing industries are increasing the need for metrology as a major component of manufacturing systems. These trends include:

- **Adoption of Chemical Mechanical Planarization**. Manufacturers now use chemical mechanical planarization or CMP to flatten, or planarize, thin films to obtain the ultra-flat surfaces required for advanced photolithography. In addition, the introduction of new copper interconnect techniques has increased the need for CMP processes. Accordingly, semiconductor manufacturers are seeking metrology solutions that can help control the CMP process by precisely measuring thin film layers to determine exactly when the appropriate thickness has been achieved.

- **Dynamic Etch Time Adjustment**. Semiconductor manufacturers are adjusting etch time on-the-fly to compensate for measured, incoming CD variation and using feedback to control the lithography step for the next wafer. If not properly controlled, variations in the transistor's critical gate dimension in high-end microprocessors can cause some chips to run at slower speeds, affecting their ability to command premium pricing.
- **Adoption of New Types of Thin Film Materials**. Manufacturers are adopting new processes and technologies that increase the importance and utilization of thin film metrology systems. To achieve greater semiconductor device speed, manufacturers are utilizing copper and new, low dielectric constant (low k) insulating materials. Enhanced metrology solutions in the manufacturing process are required to characterize these materials.
- **Copper Interconnect Technology**. The need for ever increasing device circuit speed coupled with lower power consumption has pushed semiconductor device manufacturers to begin the replacement of the subtractive aluminum interconnect process with copper damascene technology. This new copper processing technology has driven the need for new metrology techniques such as non-destructive laser profiling and the use of optical critical dimension (OCD) technology for control of the copper process.
- **Increasing Complexity of Semiconductors**. Semiconductors are becoming more complex. They operate at faster speeds; have smaller feature sizes, employ larger dies that contain more transistors and utilize increasing numbers of manufacturing process steps. The value of processed wafers and the cost of rework is significantly higher for the more complex semiconductors and therefore, manufacturers are seeking to use metrology solutions to increase production yields and limit the amount of rework required on complex chips.
- **Need for Rapid Ramp of Production Efficiencies**. Competitive forces influencing semiconductor device manufacturers, such as price-cutting and shorter product life cycles, place pressure on manufacturers to rapidly achieve production efficiency. Device manufacturers are using metrology systems throughout the fab to ensure that manufacturing processes scale rapidly, are accurate and can be repeated on a consistent basis.

**Critical Accounting Policies**

The preparation of our financial statements conforms with accounting principles generally accepted in the United States of America, which requires management to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue, expenses and related disclosures at the date of our financial statements. On an on-going basis, management evaluates its estimates including those related to bad debts, inventory valuations, warranty obligations, income taxes and intangible assets. Management bases its estimates and judgments on historical experience and on various other factors that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from management's estimates. Our critical accounting policies include revenue recognition, allowance for doubtful accounts, inventory valuation, warranty accrual, income tax assets and liabilities including the deferred tax asset valuation allowance, goodwill and stock based compensation due to the estimates and judgments involved with each of these items.

*Revenue Recognition* – We recognize revenue when persuasive evidence of an arrangement exits, delivery has occurred or services have been rendered, the sales price is fixed or determinable, and collectibility is reasonably assured. For product sales, this occurs at the time of shipment if we have met defined customer acceptance experience levels with both the customer and the specific type of equipment. All other product sales are recognized upon customer acceptance. In certain geographical regions, where risk of loss and title transfers upon customer acceptance, revenue is also recognized upon customer acceptance. Revenue related to spare part sales is recognized on shipment and is included as part of service revenue. Revenue related service contracts are recognized ratably over the period under contract. Unearned maintenance and service contract revenue is not significant and is included in deferred revenue.

*Allowance for Doubtful Accounts* – Our allowance for doubtful accounts is based primarily on the magnitude and age of outstanding customer invoices in general, as well as on the status of collections issues with specific customers. Customer accounts are reviewed on a continuous basis.

*Inventory Valuation* – Inventories are stated at the lower of cost (first-in, first-out) or market. We track the age of our unused inventory on a monthly basis and if management determines that inventory has become obsolete or is considered to be excess inventory, it will be written-down to its estimated market value. Management's determination to write down inventory is generally based on such factors as economic conditions, expected demand and obsolescence based on engineering redesigns.

*Warranty Accrual* – We sell the majority of our products with a one-year repair or replacement warranty and record a provision for estimated claims at the time of sale. The warranty accrual is generally based on our historical warranty repair cost patterns, including the cost of parts and labor. The warranty accrual is reviewed and updated on a quarterly basis.

*Income Tax Assets and Liabilities* – We account for income taxes based on Statement of Financial Accounting Standards (SFAS) No. 109 *Accounting for Income Taxes*, whereby deferred tax assets and liabilities must be recognized using enacted tax rates for the effect of temporary differences between the book and tax accounting for assets and liabilities. Also, deferred tax assets must be reduced by a valuation allowance if it is more likely than not that a portion of the deferred tax asset will not be realized in the future. We evaluate the deferred tax assets on a quarterly basis to determine whether or not a valuation allowance is appropriate. Factors used in this determination include future expected income and the underlying asset or liability which generated the temporary tax difference.

Our income tax provision is based on estimates of our effective income tax rate for the year. The effective tax rate is generally estimated based on the geographic distribution of profits, the tax rates in different regions and the availability of tax credits.

*Goodwill* – On January 1, 2002, we adopted SFAS No. 142, *Goodwill and Other Intangible Assets*. Upon implementation of this Statement, the transition impairment test was performed as of January 1, 2002, and no impairment loss was recorded. SFAS No. 142 requires that goodwill be reviewed at least annually for impairment. We elected to test our goodwill for possible impairment in the fourth quarter of 2002. Based upon the results of the annual impairment test, we recognized a goodwill impairment loss of $1,077,000 in the fourth quarter of 2002. The fair value of the segment was estimated using the discounted cash flows method. As of December 31, 2003, we had no goodwill on our balance sheet.

*Stock-Based Compensation* – We account for stock-based compensation issued to employees using the intrinsic value method in accordance with the provisions of Accounting Principles Board Opinion No. 25, *Accounting for Stock Issued to Employees*, as allowed by SFAS No. 123, *Accounting for Stock Based Compensation* as amended by SFAS No. 148, *Accounting for Stock Based Compensation - Transition and Disclosures, an Amendment of FASB Statement No. 123*. Under the intrinsic value method, we do not recognize any compensation expense, as the exercise price of all stock options is equal to the fair market value at the time the options are granted. We disclose the pro forma effect of recognizing compensation expense on stock options granted to employees in the footnotes to the consolidated financial statements.

**Results of Operations**

The following table presents our consolidated statements of operations data as a percentage of total net revenues for the years ended December 31, 2001, 2002 and 2003:

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Net revenues: | | | |
| Product sales | 89.6% | 82.6% | 83.1% |
| Service | 10.4 | 17.4 | 16.9 |
| Total net revenues | 100.0 | 100.0 | 100.0 |
| Cost and expenses: | | | |
| Cost of product sales | 37.7 | 38.1 | 42.5 |
| Cost of service | 11.4 | 16.6 | 15.9 |
| Research and development | 22.6 | 39.6 | 32.2 |
| Selling | 20.0 | 31.3 | 27.6 |
| General and administrative | 8.8 | 14.7 | 11.3 |
| Goodwill impairment | — | 3.1 | — |
| Total cost and expenses | 100.5 | 143.4 | 129.5 |
| Loss from operations | (0.5) | (43.4) | (29.5) |
| Other income (expense): | | | |
| Interest income | 5.4 | 1.6 | 1.0 |
| Interest expense | (0.2) | (0.2) | (0.2) |
| Other, net | (1.1) | 0.3 | 0.9 |
| Total other income, net | 4.1 | 1.7 | 1.6 |
| Income (loss) before provision (benefit) for income taxes | 3.6 | (41.7) | (27.9) |
| Provision (benefit) for income taxes | 1.6 | (17.9) | 14.1 |
| Net income (loss) | 2.0% | (23.8)% | (42.0)% |

**Total net revenues**. Total net revenues increased 19.8% from $34.7 million in 2002 to $41.6 million in 2003. Product sales increased 20.7% from $28.7 million in 2002 to $34.6 million in 2003. Unit sales of existing automated and integrated systems increased from their 2002 levels. Additionally, our new products, such as the NanoOCD 9010 integrated product also contributed to our revenues. The increase in product sales resulted from greater demand for semiconductor process control metrology equipment and flat panel display equipment, particularly in Asia. We believe that this increased demand was attributable primarily to customers adding capacity in semiconductor production facilities as demand for semiconductors increased as a result of the economic recoveries in the U.S. and Japan in 2003. Service revenue increased 15.8% from $6.1 million in 2002 to $7.0 million in 2003. The increase in service revenue is primarily attributable to higher sales of parts and services in the U.S. and Asia in 2003, which we believe is due in part to recently increased demand for semiconductors at a time when capital expenditures by equipment manufacturers have been reduced, resulting in increased utilization of older systems by customers.

Total net revenues decreased 27.0% from $47.6 million in 2001 to $34.7 million in 2002. Product sales decreased 32.8% from $42.7 million in 2001 to $28.7 million in 2002. Unit sales of automated, integrated and tabletop systems were each down from their 2001 levels. The decrease in product sales resulted from reduced demand for semiconductor process control metrology equipment in 2002, particularly in the U.S. and Asia. We believe that this reduced demand was attributable primarily to continued overcapacity and price pressures, particularly for DRAM products, in the semiconductor industry as well as the continued economic slowdown in the U.S. and Japan in 2002. Service revenue increased 22.8% from $4.9 million in 2001 to $6.1 million in 2002. The increase in service revenue is primarily attributable to higher sales of parts and services in the U.S. and Asia in 2002, which is partly due to a larger installed base of systems that have passed their warranty periods. International revenues, which include sales by our foreign subsidiaries, constituted approximately 64.8%, 69.0% and 74.8% of total net revenues for 2001, 2002 and 2003, respectively.

**Cost of product sales**. Cost of product sales as a percentage of product sales increased from 46.2% in 2002 to 51.1% in 2003 due in part to lower sales prices on older products and higher costs associated with an increase in manufacturing capacity added to our U.S. facility. The increased manufacturing capacity is part of a continuing strategic plan to internalize the production of key parts and components, allowing us to have greater control over their development, delivery, quality and cost. Cost of product sales as a percentage of product sales increased from 42.1% in 2001 to 46.2% in 2002 primarily due to lower sales volumes in 2002 resulting in higher per unit manufacturing costs, along with increased manufacturing capacity added to our U.S. facility in 2002.

**Cost of service**. Cost of service as a percentage of service revenue decreased from 95.2% in 2002 to 94.4% in 2003 primarily as a result of higher service sales that exceeded the increase in the associated variable cost of service sales in 2003 while our fixed costs remained relatively stable. Cost of service as a percentage of service revenue decreased from 109.6% in 2001 to 95.2% in 2002 primarily as a result of higher service sales, which exceeded our costs of service in the United States and Asia.

**Research and development**. Research and development expenses decreased 2.7% from $13.8 million in 2002 to $13.4 million in 2003 as a result of lower expenses associated with lower usage of materials used in the development of new products in 2003. Research and development expenses increased 27.9% from $10.8 million in 2001 to $13.8 million in 2002 as a result of increased headcount and higher expenses for materials used in the development of new products in 2002, such as the NanoUDI 9300, the NanoCLP 9010, the NanoOCD 9020 and other products. We are committed to the development of new and enhanced products and believe that new product introductions are required for us to maintain our competitive position.

**Selling**. Selling expenses increased 5.8% from $10.9 million in 2002 to $11.5 million in 2003 primarily due to increased headcount of sales and support employees and related expenses particularly in the Far East in an effort to fully participate in the growth opportunities in that region. Selling expenses increased 14.1% from $9.5 million in 2001 to $10.9 million in 2002 primarily due to increased headcount of sales and support employees and an increase in related expenses for the purpose of promoting our products to existing and potential customers.

**General and administrative**. General and administrative expenses decreased 8.1% from $5.1 million in 2002 to $4.7 million in 2003. This decrease resulted primarily from lower accounting software implementation costs in 2003. General and administrative expenses increased 22.2% from $4.2 million in 2001 to $5.1 million in 2002. This increase resulted primarily from higher legal, patent, audit, tax and accounting software implementation costs in 2002.

**Goodwill impairment**. On January 1, 2002, we adopted SFAS No. 142, *Goodwill and Other Intangible Assets*. Upon implementation of this Statement, the transition impairment test was performed as of January 1, 2002, and no impairment

loss was recorded. SFAS No. 142 requires that goodwill be reviewed at least annually for impairment. We elected to test our goodwill for possible impairment in the fourth quarter of 2002. Based upon the results of the annual impairment test, we recognized a goodwill impairment loss of $1,077,000 in the fourth quarter of 2002. The fair value of the segment was estimated using a discounted cash flow methodology.

**Total other income, net.** Total other income, net decreased 70.1% from $2.0 million in 2001 to $589,000 in 2002 primarily due to lower interest income in 2002, resulting from lower investment balances and lower interest rates.

**Provision for income taxes.** Our effective tax rate was an expense of 50.5% in 2003, versus a benefit of 43.0% in 2002. The tax expense in 2003 resulted primarily from a provision for income taxes of approximately $6.0 million which primarily represents a charge to record a valuation allowance against deferred income tax assets. The charge was taken as a result of pretax losses incurred over the past several quarters coupled with uncertainty about future expected income, making it more likely than not that the deferred tax asset would not be realized. Our effective income tax benefit rate was 43.0% in 2002, which exceeded the domestic statutory rate due primarily to state income tax benefits and the utilization of tax credits. Our effective income tax rate decreased from 44.9% in 2001 to 43.0% in 2002 primarily due to profits earned by our Japanese subsidiary that could not be offset against losses from our other subsidiaries in 2001. The effective income tax rate in 2001 exceeded the domestic statutory rate due primarily to a foreign tax provision higher than rates in the United States and changes in the valuation allowance partially offset by the realization of foreign sales corporation benefit.

**Liquidity and Capital Resources**

At December 31, 2003, our cash and cash equivalents and short-term investments totaled $29.9 million compared to $36.9 million at December 31, 2002. These funds are invested primarily in U.S. Treasury Bills. Our working capital of $59.6 million at December 31, 2003 decreased from $74.8 million at December 31, 2002. We believe that our working capital, including cash, cash equivalents and short-term investments, will be sufficient to meet our needs at least through the next twelve months.

Operating activities used $7.1 million in cash in 2001, $8.3 million in 2002 and $6.2 million in 2003. The cash usage in 2002 and 2003 resulted primarily from the net loss in those years offset by the effect of non-cash expenses. We also experienced higher levels of accounts receivables in 2003 resulting from increased sales towards the end of 2003. The use of cash from operating activities in 2001 resulted primarily from net income offset by lower accounts receivable attributable to lower sales levels during the previous year.

Investing activities provided $36.3 million of cash in 2001, used $31.7 million of cash in 2002 and provided $6.0 million of cash in 2003. The timing of the purchase and initial maturities of U.S. Treasury Bills in 2002 resulted in their classification as cash and cash equivalents instead of as short-term investments. Our capital expenditures, net of retirements, were $13.2 million in 2001, $2.8 million in 2002 and $990,000 in 2003. These expenditures were used primarily to continue the process of internalizing our manufacturing capacity in the United States through, for example, the purchase of a machine shop, machining equipment and improvements to our building. This internalization process is nearing completion. When our internalization process is completed, the amount of cash needed for capital expenditures should decrease.

Financing activities provided cash of $501,000 in 2001, $998,000 in 2002 and $655,000 in 2003 primarily resulting from the sale of shares under our stock option plans, offset to some extent by the net repayment of debt obligations by our Japanese subsidiary.

We have evaluated and will continue to evaluate the acquisition of products, technologies or businesses that are complementary to our business. These activities may result in product and business investments, which may affect our cash position and working capital balances.

The following table summarizes our contractual cash obligations as of December 31, 2003, and the effect such obligations are expected to have on liquidity and cash flow in future periods.

| | Total | Less than 1 Year | 1-3 Years | 3-5 Years | More than 5 Years |
|---|---|---|---|---|---|
| Debt obligations | $ 3,805 | $ 1,157 | $ 1,107 | $ 778 | $ 763 |
| Operating leases | 240 | 136 | 85 | 17 | 2 |
| Other long-term liabilities | 133 | -- | 133 | -- | -- |

We have no off-balance sheet financing arrangements.

**Recent Accounting Pronouncements**

We operate in multiple locations domestically and internationally. As such, certain facilities are leased under operating lease agreements.

In April 2003, the Financial Accounting Standards Board (FASB) issued SFAS 149, Amendment of Statement 133 on Derivative Instruments and Hedging Activities, which amends and clarifies accounting for derivative instruments, including certain derivative instruments embedded in other contracts, and for hedging activities under SFAS 133, Accounting for Derivative Instruments and Hedging Activities.

SFAS 149 was effective for contracts entered into or modified after June 30, 2003, except as noted below, and for hedging relationships designated after June 30, 2003. The guidance was to be applied prospectively. The provisions of SFAS 149 that relate to SFAS 133 Implementation Issues that were effective for fiscal quarters that began prior to June 15, 2003 continue to be applied in accordance with their respective effective dates. The adoption of SFAS 149 did not have a material effect on our consolidated financial position, results of operations or cash flows.

In December 2002, the FASB issued SFAS No. 148, *Accounting for Stock-Based Compensation - Transition and Disclosures, an Amendment of FASB Statement No. 123*. This Statement provides alternative methods of transition for companies who voluntarily change to the fair value-based method of accounting for stock-based employee compensation in accordance to SFAS No. 123, *Accounting for Stock-Based Compensation* and enhances the disclosure requirements. This statement was effective upon its issuance.

We continue to account for stock-based compensation using the intrinsic value method in accordance with the provisions of Accounting Principles Board Opinion No. 25, *Accounting for Stock Issued to Employees*, elected under SFAS No. 123, as amended. As a result, the adoption of this Statement did not have any impact on our consolidated financial statements. See additional information on stock-based compensation in Note 1 of the Notes to Consolidated Financial Statements.

In November 2002, the FASB issued Interpretation No. 45, *Guarantor's Accounting and Disclosure Requirements for Guarantees, Including Indirect Guarantees of Indebtedness of Others* (FIN 45). FIN 45 requires a guarantor to include disclosures of certain obligations, and if applicable, at the inception of the guarantee, recognize a liability for the fair value of other obligations undertaken in issuing a guarantee. The initial recognition and initial measurement provisions apply on a prospective basis to guarantees issued or modified after December 31, 2002 and did not have a material impact on our consolidated financial statements. The applicable disclosures have been made.

We adopted Emerging Issues Task Force ("EITF") Issue No. 00-21, "Revenue arrangements with Multiple Deliverables", which requires companies to determine whether an arrangement involving multiple deliverables contains more than one unit of accounting. In applying EITF Issue No. 00-21, revenue arrangements with multiple deliverables should be divided into separate units of accounts, if the deliverables in the arrangement meet certain criteria. Arrangement consideration should be allocated among the separate units of accounting based on their relative fair values. This issue was effective for revenue arrangements entered into in fiscal periods beginning after June 15, 2003. There was no impact on our results of operations or financial position as a result of adopting EITF Issue No. 00-21.

The FASB issued Interpretation No. 46 ("FIN 46"), "*Consolidation of Variable Interest Entities*," in January 2003, and a revised interpretation of FIN 46 ("FIN 46-R") in December 2003. FIN 46 requires certain variable interest entities ("VIEs") to be consolidated by the primary beneficiary of the entity if the equity investors in the entity do not have the characteristics of a controlling financial interest or do not have sufficient equity at risk for the entity to finance its activities without additional subordinated financial support from other parties. The provisions of FIN 46 are effective immediately for all arrangements entered into after January 31, 2003. Since January 31, 2003, we have not invested in any entities we believe are variable interest entities for which Nanometrics is the primary beneficiary. We are required to adopt the provisions of FIN 46-R for those arrangements in the second quarter of fiscal 2004. For arrangements entered into prior to February 1, 2003, we are required to adopt the provisions of FIN 46-R in the first quarter of fiscal 2004. We do not expect the adoption of FIN 46-R to have an impact on our financial position, results of operations or cash flows.

In May 2003, the FASB issued SFAS No. 150, *Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity*, which requires that certain financial instruments be presented as liabilities that were previously presented as equity or as temporary equity. Such instruments include mandatory redeemable preferred and common stock, and certain options and warrants. SFAS No. 150 is effective for financial instruments entered into or modified after May 31, 2003 and was effective at the beginning of the first interim period beginning after June 15, 2003. In November 2003, the FASB issued FASB Staff Position ("FSP") No. 150-3, *Effective Date, Disclosures, and Transition for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling*

*Interests under SFAS No. 150*, which defers the effective date for various provisions of SFAS No. 150. We believe that we have properly classified and measured in our balance sheets and disclosed in our consolidated financial statements financial instruments with characteristics of both liabilities and equity.

**Factors That May Affect Future Operating Results**

You should carefully consider the risks described below together with all of the other information included in this Annual Report on Form 10-K before making an investment decision. The risks and uncertainties described below are not the only ones that we face. If any of the following risks actually occurs, our business, financial condition or operating results could be harmed. In such case, the trading price of our common stock could decline, and you could lose all or part of your investment.

**Risks Related to Our Business**

***Cyclicality in the semiconductor and flat panel display industries has led to substantial decreases in demand for our systems and may from time to time continue to do so.***

Our operating results have varied significantly for period to period due to the cyclical nature of the semiconductor and flat panel display industries. The majority of our business depends upon the capital expenditures of semiconductor device and equipment manufacturers. These manufacturers' capital expenditures, in turn, depend upon the current and anticipated market demand for semiconductors and products using semiconductors. The semiconductor industry is cyclical and has historically experienced periodic downturns. These downturns have often resulted in substantial decreases in the demand for semiconductor manufacturing equipment, including metrology systems. We have found that the resulting decrease in capital expenditures has typically been more pronounced than the downturn in semiconductor device industry revenues. We expect the cyclical nature of the semiconductor industry, and therefore, our business, to continue in the foreseeable future. Currently, the semiconductor industry may be emerging from a downturn, which has existed for the past few years. Should this trend reverse and the downturn resume, our business and results of operations would suffer.

***Because we derive a significant portion of our revenues from sales in Asia, our sales and results of operations could be adversely affected by the instability of Asian economies.***

Our sales to customers in Asian markets represented approximately 63.3% and 72.7% of our total net revenues in 2002 and 2003, respectively. Countries in the Asia Pacific region, including Japan, Korea and Taiwan, each of which accounted for a significant portion of our business in that region, have experienced general economic weaknesses over the past year, which has adversely affected our sales to semiconductor manufacturers located in these regions and could harm our sales in future periods.

***We depend on Applied Materials and other OEM suppliers for sales of our integrated metrology systems, and the loss of Applied Materials or any of our other OEM suppliers as a customer could harm our business.***

We believe that sales of integrated metrology systems will be an important source of future revenues. Sales of our integrated metrology systems depend upon the ability of Applied Materials to sell semiconductor equipment products that include our metrology systems as components. If Applied Materials is unable to sell such products, or if Applied Materials chooses to focus its attention on products that do not integrate our systems, our business could suffer. If we were to lose Applied Materials as a customer for any reason, our ability to realize sales from integrated metrology systems would be significantly diminished, which would harm our business.

***Our largest customers account for a substantial portion of our revenue, and our revenue would materially decline if one or more of these customers were to purchase significantly fewer of our systems or if they delayed or cancelled a large order.***

Historically, a significant portion of our revenues in each quarter and each year has been derived from sales to a relatively few number of customers, and we expect this trend to continue. There are only a limited number of large companies operating in the semiconductor and flat panel display industries. Accordingly, we expect that we will continue to depend on a small number of large customers for a significant portion of our revenues for at least the next several years. If any of our key customers were to purchase significantly fewer systems, or if a large order were delayed or cancelled, our revenues would significantly decline. In 2003, sales to Applied Materials accounted for 15.4% and sales to Hynix accounted for 12.0% of our total net revenues, respectively. In 2002, sales to Applied Materials accounted for 13.8% and sales to TSMC accounted for 10.9% of our total net revenues, respectively.

The success of our product development efforts depends on our ability to anticipate market trends and the price, performance and functionality requirements of semiconductor device manufacturers. In order to anticipate these trends and ensure that critical development projects proceed in a coordinated manner, we must continue to collaborate closely with our customers. Our relationships with our customers provide us with access to valuable information regarding industry trends, which enables us to better plan our product development activities. If our current relationships with our large customers are impaired, or if we are unable to develop similar collaborative relationships with important customers in the future, our long-term ability to produce commercially successful systems could be adversely affected.

***We are highly dependent on international sales and operations, which exposes us to foreign political and economic risks.***

Sales to customers in foreign countries accounted for approximately 69.0% and 74.8% of our total net revenues in 2002 and 2003, respectively. We maintain facilities in Japan and Korea. We anticipate that international sales will continue to account for a significant portion of our revenues. International sales and operations carry inherent risks such as: regulatory limitations imposed by foreign governments, obstacles to the protection of our intellectual property, fluctuations in currency exchange rates, political, military and terrorism risks, disruptions or delays in shipments caused by customs brokers or other government agencies, unexpected changes in regulatory requirements, tariffs, customs, duties and other trade barriers, difficulties in staffing and managing foreign operations, and potentially adverse tax consequences resulting from changes in tax laws.

If any of these risks materialize and we are unable to manage them, our international sales and operations would suffer.

***Our quarterly operating results have varied in the past and probably will continue to vary significantly in the future, which will cause volatility in our stock price.***

Our quarterly operating results have varied significantly in the past and are likely to vary in the future, which volatility could cause our stock price to decline. Some of the factors that may influence our operating results and subject our stock to extreme price and volume fluctuations include:

- changes in customer demand for our systems;
- economic conditions in the semiconductor and flat panel display industries;
- the timing, cancellation or delay of customer orders and shipments;
- market acceptance of our products and our customers' products;
- competitive pressures on product prices and changes in pricing by our customers or suppliers;
- the timing of new product announcements and product releases by us or our competitors and our ability to design, introduce and manufacture new products on a timely and cost-effective basis;
- the timing of acquisitions of businesses, products or technologies;
- the levels of our fixed expenses, including research and development costs associated with product development, relative to our revenue levels; and
- fluctuations in foreign currency exchange rates, particularly the Japanese yen.

If our operating results in any period fall below the expectations of securities analysts and investors, the market price of our common stock would likely decline.

***We obtain some of the components and subassemblies included in our systems from a single source or a limited group of suppliers, and the partial or complete loss of one of these suppliers could cause production delays and significant loss of revenue.***

We rely on outside vendors to manufacture many components and subassemblies. Certain components, subassemblies and services necessary for the manufacture of our systems are obtained from a sole supplier or limited group of suppliers. We do not maintain any long-term supply agreements with any of our suppliers. We have entered into arrangements with J.A. Woollam Company for the purchase of the spectroscopic ellipsometer component incorporated in our advanced measurement systems. Our reliance on a sole or a limited group of suppliers involves several risks, including the following:

- we may be unable to obtain an adequate supply of required components;
- we have reduced control over pricing and the timely delivery of components and subassemblies; and
- our suppliers may be unable to develop technologically advanced products to support our growth and development of new systems.

Some of our suppliers have relatively limited financial and other resources. Because the manufacturing of certain of these components and subassemblies involves extremely complex processes and requires long lead times, we may experience delays or shortages caused by our suppliers. If we were forced to seek alternative sources of supply or to manufacture such components or subassemblies internally, we could be forced to redesign our systems, which could cause production delays and prevent us from shipping our systems to customers on a timely basis. Any inability to obtain adequate deliveries from our suppliers, or any other circumstance that would restrict our ability to ship our products, could damage relationships with current and prospective customers, harm our business and result in significant loss of revenue.

***Our current and potential competitors have significantly greater resources than we do, and increased competition could impair sales of our products.***

We operate in the highly competitive semiconductor and flat panel display industries and face competition from a number of companies, many of which have greater financial, engineering, manufacturing, marketing and customer support resources than we do. As a result, our competitors may be able to respond more quickly to new or emerging technologies or market developments by devoting greater resources to the development, promotion and sale of products, which could impair sales of our products. Moreover, there has been merger and acquisition activity among our competitors and potential competitors. These transactions by our competitors and potential competitors may provide them with a competitive advantage over us by enabling them to rapidly expand their product offerings and service capabilities to meet a broader range of customer needs. Many of our customers and potential customers in the semiconductor and flat panel display industries are large companies that require global support and service for their metrology systems. Some of our larger or more geographically diverse competitors might be better equipped to provide this global support.

***Variations in the amount of time it takes for us to sell our systems may cause fluctuations in our operating results, which could adversely affect our stock price.***

Variations in the length of our sales cycles could cause our revenues to fluctuate widely from period to period. Our customers generally take long periods of time to evaluate our metrology systems. We expend significant resources educating and providing information to our prospective customers regarding the uses and benefits of our systems. The length of time that it takes for us to complete a sale depends upon many factors, including:

- the efforts of our sales force and our independent sales representatives and distributors;
- the complexity of the customer's metrology needs;
- the internal technical capabilities and sophistication of the customer;
- the customer's budgetary constraints; and
- the quality and sophistication of the customer's current processing equipment.

Because of the number of factors influencing the sales process, the period between our initial contact with a customer and the time at which we recognize revenue from that customer, if at all, varies widely. Our sales cycles, including the time it takes for us to build a product to customer specifications after receiving an order, typically range from three to six months. Occasionally our sales cycles can be much longer, particularly with customers in Asia who may require longer evaluation periods. During the sales cycles, we commit substantial resources to our sales efforts in advance of receiving any revenue, and we may never receive any revenue from a customer despite our sales efforts.

If we do complete a sale, customers often purchase only one of our systems and then evaluate its performance for a lengthy period of time before purchasing additional systems. The purchases are generally made through purchase orders rather than through long-term contracts. The number of additional products that a customer purchases, if any, depends on many factors, including a customer's capacity requirements. The period between a customer's initial purchase and any subsequent purchases is unpredictable and can vary from three months to a year or longer. Variations in the length of this period could cause fluctuations in our operating results, which could adversely affect our stock price.

***Relatively small fluctuations in our system prices may cause our operating results to vary significantly each quarter.***

During any quarter, a significant portion of our revenue is derived from the sale of a relatively small number of systems. Our automated metrology systems range in price from approximately $200,000 to $900,000 per system, our integrated metrology systems range in price from approximately $80,000 to $300,000 per system and our tabletop metrology systems range in price from approximately $50,000 to $200,000 per system. Accordingly, a small change in the number or types of systems that we sell could cause significant changes in our operating results.

***We depend on orders that are received and shipped in the same quarter, and therefore our results of operations may be subject to significant variability from quarter to quarter.***

Our net sales in any given quarter depend upon a combination of orders received in that quarter for shipment in that quarter and shipments from backlog. Our backlog at the beginning of each quarter does not include all systems sales needed to achieve expected revenues for that quarter. Consequently, we are dependent on obtaining orders for systems to be shipped in the same quarter that the order is received. Moreover, customers may reschedule shipments, and production difficulties could delay shipments. Accordingly, we have limited visibility into future product shipments, and our results of operations may be subject to significant variability from quarter to quarter.

***Because of the high cost of switching equipment vendors in our markets, it is sometimes difficult for us to attract customers from our competitors even if our metrology systems are superior to theirs.***

We believe that once a semiconductor or flat panel display customer has selected one vendor's metrology system, the customer generally relies upon that system and, to the extent possible, subsequent generations of the same vendor's system, for the life of the application. Once a vendor's metrology system has been installed, a customer must often make substantial technical modifications and may experience downtime in order to switch to another vendor's metrology system. Accordingly, unless our systems offer performance or cost advantages that outweigh a customer's expense of switching to our systems, it will be difficult for us to achieve significant sales from that customer once it has selected another vendor's system for an application.

***If we deliver systems with defects, our credibility will be harmed, the sales and market acceptance of our systems will decrease and we could expend significant capital and resources as a result of such defects.***

Our systems are complex and have occasionally contained errors, defects and bugs when introduced. If we deliver systems with errors, defects or bugs, our credibility and the market acceptance and sales of our systems would be harmed. Further, if our systems contain errors, defects or bugs, we may be required to expend significant capital and resources to alleviate such problems. Defects could also lead to product liability as a result of product liability lawsuits against us or against our customers. We have agreed to indemnify our customers in some circumstances against liability arising from defects in our systems. In the event of a successful product liability claim, we could be obligated to pay damages significantly in excess of our product liability insurance limits.

***If we are not successful in developing new and enhanced metrology systems we will likely lose market share to our competitors.***

We operate in an industry that is subject to technological changes, changes in customer demands and the introduction of new, higher performance systems with short product life cycles. To be competitive, we must continually design, develop and introduce in a timely manner new metrology systems that meet the performance and price demands of semiconductor and flat panel display manufacturers and suppliers. We must also continue to refine our current systems so that they remain competitive. We may experience difficulties or delays in our development efforts with respect to new systems, and we may not ultimately be successful in developing them. Any significant delay in releasing new systems could adversely affect our reputation, give a competitor a first-to-market advantage or cause a competitor to achieve greater market share.

***Lack of market acceptance for our new products may affect our ability to generate revenue and may harm our business.***

We have recently introduced several new products to market including the Nano OCD/DUV 9010, the Nanometrics 9300 and the Nano OCD 9010M. We have invested substantial time and resources into the development of the products. However, we cannot accurately predict the future level of acceptance of our new products by our customers. As a result, we may not be able to generate anticipated revenue from sales of these products. While we anticipate that our new

products will become an increasingly larger component of our business, their failure to gain acceptance with our customers could materially harm our business. Additionally, if our new products do gain market acceptance, our ability to sell our existing products may be impeded. As a result, there can be no assurance that the introduction of these products will be commercially successful or that these products will result in significant additional revenues or improved operating margins in future periods.

***Successful infringement claims by third parties could result in substantial damages, lost product sales and the loss of important intellectual property rights by us.***

Our commercial success depends in part on our ability to avoid infringing or misappropriating patents or other proprietary rights owned by third parties. From time to time we may receive communications from third parties asserting that our metrology systems may contain design features, which are claimed to infringe on their proprietary rights. There can be no assurance that our new or current products do not infringe any valid intellectual property rights.

***Our intellectual property may be infringed upon by third parties despite our efforts to protect it, which could threaten our future success and competitive position and adversely affect our operating results.***

Our future success and competitive position depend in part upon our ability to obtain and maintain proprietary technology for our principal product families, and we rely, in part, on patent, trade secret and trademark law to protect that technology. If we fail to adequately protect our intellectual property, it will be easier for our competitors to sell competing products. We own or have licensed a number of patents relating to our metrology systems, and have filed applications for additional patents. Any of our pending patent applications may be rejected, and we may not in the future be able to develop additional proprietary technology that is patentable. In addition, the patents we do own or that have been issued or licensed to us may not provide us with competitive advantages and may be challenged by third parties. Third parties may also design around these patents.

In addition to patent protection, we rely upon trade secret protection for our confidential and proprietary information and technology. We routinely enter into confidentiality agreements with our employees. However, in the event that these agreements may be breached, we may not have adequate remedies. Our confidential and proprietary information and technology might also be independently developed by or become otherwise known to third parties. We may be required to initiate litigation in order to enforce any patents issued to or licensed by us, or to determine the scope or validity of a third party's patent or other proprietary rights. Any such litigation, regardless of outcome, could be expensive and time consuming, and could subject us to significant liabilities or require us to re-engineer our product or obtain expensive licenses from third parties, any of which would adversely affect our business and operating results.

***We must attract and retain key personnel with relevant industry knowledge to help support our future growth.***

Our success depends to a significant degree upon the continued contributions of our key management, engineering, sales and marketing, customer support, finance and manufacturing personnel. We do not enter into employment contracts with any of our key personnel. The loss of any of these key personnel, who would be difficult to replace, could harm our business and operating results. To support our future growth, we will need to attract and retain additional qualified employees. Competition for such personnel in our industry is ongoing, and we may not be successful in attracting and retaining qualified employees.

***We manufacture all of our systems at a limited number of facilities, and any prolonged disruption in the operations of those facilities could reduce our revenues.***

We produce all of our systems in our manufacturing facilities located in Milpitas, California and through our subsidiaries in Japan and Korea. Our manufacturing processes are highly complex and require sophisticated, costly equipment and specially designed facilities. As a result, any prolonged disruption in the operations of our manufacturing facilities could seriously harm our ability to satisfy our customer order deadlines. A significant portion of our operations is located in Japan and Korea, which may be subject to regional political and economic instability.

***If we choose to acquire new and complementary businesses, products or technologies instead of developing them ourselves, we may be unable to complete these acquisitions or may not be able to successfully integrate an acquired business in a cost-effective and non-disruptive manner.***

Our success depends on our ability to continually enhance and broaden our product offerings in response to changing technologies, customer demands and competitive pressures. To achieve this, from time to time we have acquired

complementary businesses, products, or technologies instead of developing them ourselves and may choose to do so in the future. We do not know if we will be able to complete any acquisitions, or whether we will be able to successfully integrate any acquired business, operate it profitably or retain its key employees. Integrating any business, product or technology that we acquire could be expensive and time consuming, disrupt our ongoing business and distract our management. In addition, in order to finance any acquisitions, we may be required to raise additional funds through public or private equity or debt financings. In that event, we could be forced to obtain financing on terms that are not favorable to us and, in the case of an equity financing, that result in dilution to our shareholders. If we are unable to integrate any acquired entities, products or technologies effectively, our business will suffer.

***Our efforts to protect our intellectual property may be less effective in some foreign countries where intellectual property rights are not as well protected as in the United States.***

In 2002 and 2003, 69.0% and 74.8%, respectively, of our total net revenues were derived from sales to customers in foreign countries, including certain countries in Asia, such as Taiwan, Korea and Japan. The laws of some foreign countries do not protect our proprietary rights to as great an extent as do the laws of the United States, and many U.S. companies have encountered substantial problems in protecting their proprietary rights against infringement in such countries. If we fail to adequately protect our intellectual property in these countries, it would be easier for our competitors to sell competing products in those countries.

***Continuing economic and political instability could affect our business and results of operations.***

The ongoing threat of terrorism targeted at the United States or other regions where we conduct business increases the uncertainty in our markets and the economy in general. This uncertainty is likely to result in continued economic stagnation, which would harm our business. In addition, increased international political instability may hinder our ability to do business by increasing our costs of operations. For example, our transportation costs, insurance costs and sales efforts may become more expensive as a result of geopolitical tension. These tensions may also negatively affect our suppliers and customers. If this international economic and political instability continues or increases, our business and results of operations could be harmed.

## ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to financial market risks, which include changes in foreign currency exchange rates and interest rates. We do not use derivative financial instruments. Instead, we actively manage the balances of current assets and liabilities denominated in foreign currencies to minimize currency fluctuation risk. As a result, a hypothetical 10% change in the foreign currency exchange rates at December 31, 2002 and 2003 would not have a material impact on our results of operations. Our investments in marketable securities are subject to interest rate risk. However, due to the short-term nature of these investments, interest rate changes would not have a material impact on their value at December 31, 2002 and 2003. We also have fixed rate yen denominated debt obligations in Japan that have no interest rate risk. At December 31, 2002 and 2003, our total debt obligation was $3.9 million and $3.8 million, respectively, with a long-term portion of $3.1 million and $2.6 million, respectively. A hypothetical 10% change in interest rates at December 31, 2003 would not have a material impact on our results of operations.

## ITEM 8. CONSOLIDATED FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The information required by Item 8 of Form 10-K is presented here in the following order:

## INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

## INDEPENDENT AUDITORS' REPORT

To the Board of Directors and Shareholders
of Nanometrics Incorporated:

We have audited the accompanying consolidated balance sheets of Nanometrics Incorporated and subsidiaries (the "Company") as of December 31, 2002 and 2003, and the related consolidated statements of operations, shareholders' equity and comprehensive income (loss), and cash flows for each of the three years in the period ended December 31, 2003. Our audits also included the financial statement schedule listed in Item 15(a)(2). These financial statements and financial statement schedule are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements and financial statement schedule based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, such consolidated financial statements present fairly, in all material respects, the financial position of Nanometrics Incorporated and subsidiaries as of December 31, 2002 and 2003, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2003 in conformity with accounting principles generally accepted in the United States of America. Also, in our opinion, such financial statement schedule, when considered in relation to the basic consolidated financial statements taken as a whole, presents fairly in all material respects the information set forth therein.

As discussed in Note 1 to the financial statements, in 2002 the Company changed its method of accounting for goodwill and other intangible assets to conform to Statement of Financial Accounting Standards No. 142, "Goodwill and Other Intangible Assets."

Deloitte & Touche LLP

San Jose, California
March 29, 2004

**NANOMETRICS INCORPORATED**
**CONSOLIDATED BALANCE SHEETS**
**(In thousands, except share amounts)**

| | December 31, 2002 | December 31, 2003 |
|---|---|---|
| **ASSETS** | | |
| Current assets: | | |
| Cash and cash equivalents | $ 7,967 | $ 7,949 |
| Short-term investments | 28,899 | 21,943 |
| Accounts receivable, net of allowances of $566 and $576 in 2002 and 2003, respectively | 9,021 | 14,522 |
| Inventories | 25,847 | 24,264 |
| Deferred income taxes | 6,840 | — |
| Prepaid expenses and other | 2,803 | 1,015 |
| Total current assets | 81,377 | 69,693 |
| Property, plant and equipment, net | 50,050 | 49,738 |
| Intangible assets | 1,748 | 1,322 |
| Other assets | 1,513 | 987 |
| Total assets | $ 134,688 | $ 121,740 |
| **LIABILITIES AND SHAREHOLDERS' EQUITY** | | |
| Current liabilities: | | |
| Accounts payable | $ 1,708 | $ 2,047 |
| Accrued payroll and related expenses | 1,004 | 1,593 |
| Deferred revenue | 1,396 | 2,345 |
| Other current liabilities | 1,574 | 1,436 |
| Income taxes payable | 139 | 1,528 |
| Current portion of debt obligations | 780 | 1,157 |
| Total current liabilities | 6,601 | 10,106 |
| Deferred income taxes and other long-term liabilities | 858 | 545 |
| Debt obligations | 3,123 | 2,648 |
| Total liabilities | 10,582 | 13,299 |
| Commitments and contingencies (Note 6) | | |
| Shareholders' equity: | | |
| Common stock, no par value; 50,000,000 shares authorized; 12,006,641 and 12,166,016 outstanding in 2002 and 2003, respectively | 99,911 | 101,099 |
| Retained earnings | 24,475 | 7,008 |
| Accumulated other comprehensive loss | (280) | 334 |
| Total shareholders' equity | 124,106 | 108,441 |
| Total liabilities and shareholders' equity | $ 134,688 | $ 121,740 |

See notes to consolidated financial statements.

**NANOMETRICS INCORPORATED**
**CONSOLIDATED STATEMENT OF OPERATIONS**
**(In thousands, except per share amounts)**

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Net revenues: | | | |
| Product sales | $ 42,653 | $ 28,669 | $ 34,592 |
| Service | 4,931 | 6,054 | 7,010 |
| Total net revenues | 47,584 | 34,723 | 41,602 |
| Costs and expenses: | | | |
| Cost of product sales | 17,949 | 13,237 | 17,691 |
| Cost of service | 5,406 | 5,765 | 6,620 |
| Research and development | 10,760 | 13,765 | 13,399 |
| Selling | 9,523 | 10,862 | 11,496 |
| General and administrative | 4,177 | 5,104 | 4,689 |
| Goodwill impairment | — | 1,077 | — |
| Total costs and expenses | 47,815 | 49,810 | 53,895 |
| Loss from operations | (231) | (15,087) | (12,293) |
| Other income (expense): | | | |
| Interest income | 2,576 | 583 | 397 |
| Interest expense | (86) | (94) | (96) |
| Other, net | (517) | 100 | 385 |
| Total other income, net | 1,973 | 589 | 686 |
| Income (loss) before provisions (benefit) for income taxes | 1,742 | (14,498) | (11,607) |
| Provision (benefit) for income taxes | 782 | (6,230) | 5,860 |
| Net income (loss) | $ 960 | $ (8,268) | $(17,467) |
| Basic net income (loss) per share: | | | |
| Net income (loss) | $ 0.08 | $ (0.70) | $ (1.45) |
| Diluted net income (loss) per share: | | | |
| Net income (loss) | $ 0.08 | $ (0.70) | $ (1.45) |
| Shares used in per share computation: | | | |
| Basic | 11,691 | 11,878 | 12,043 |
| Diluted | 12,161 | 11,878 | 12,043 |

See notes to consolidated financial statements.

## NANOMETRICS INCORPORATED
## CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY AND COMPREHENSIVE INCOME (LOSS)
## (In thousands, except share amounts)

| | Common Stock | | Retained | Accumulated Comprehensive Other | Total Shareholders' | Comprehensive |
|---|---|---|---|---|---|---|
| | Shares | Amount | Earnings | Income (Loss) | Equity | Income (Loss) |
| Balances, December 31, 2000 | 11,607,839 | $ 95,929 | $ 31,783 | $ (703) | $ 127,009 | |
| Comprehensive income: | | | | | | |
| Net income | — | — | 960 | — | 960 | $ 960 |
| Other comprehensive loss, net of tax: | | | | | | |
| Foreign currency translation adjustments | — | — | — | (698) | (698) | (698) |
| Unrealized loss on investments | — | — | — | (28) | (28) | (28) |
| Comprehensive income | — | — | — | — | — | $ 234 |
| Other stock issued | 12,813 | 214 | — | — | 214 | |
| Issuance of common stock under employee stock purchase plan | 33,845 | 453 | — | — | 453 | |
| Issuance of common stock under stock option plan | 132,536 | 914 | — | — | 914 | |
| Tax benefit of employee stock transactions | — | 1,021 | — | — | 1,021 | |
| Balances, December 31, 2001 | 11,787,033 | 98,531 | 32,743 | (1,429) | 129,845 | |
| Comprehensive loss: | | | | | | |
| Net loss | — | — | (8,268) | | (8,268) | $ (8,268) |
| Other comprehensive income, net of tax: | | | | | | |
| Foreign currency translation adjustments | — | — | — | 1,148 | 1,148 | 1,148 |
| Unrealized gain on investments | — | — | — | 1 | 1 | 1 |
| Comprehensive loss | — | — | — | — | — | $ (7,119) |
| Issuance of common stock under employee stock purchase plan | 125,403 | 568 | — | — | 568 | |
| Issuance of common stock under stock option plan | 94,205 | 578 | — | — | 578 | |
| Tax benefit of employee stock transactions | — | 234 | — | — | 234 | |
| Balances, December 31, 2002 | 12,006,641 | 99,911 | 24,475 | (280) | 124,106 | |
| Comprehensive loss: | | | | | | |
| Net loss | — | — | (17,467) | — | (17,467) | $ (17,467) |
| Other comprehensive income, net of tax: | | | | | | |
| Foreign currency translation adjustments | — | — | — | 614 | 614 | 614 |
| Comprehensive loss | — | — | — | — | — | $ (16,853) |
| Issuance of common stock under stock option plan | 159,375 | 1,188 | — | — | 1,188 | |
| Balances, December 31, 2003 | 12,166,016 | $ 101,099 | $ 7,008 | $ 334 | $ 108,441 | |

See notes to consolidated financial statements.

**NANOMETRICS INCORPORATED**
**CONSOLIDATED STATEMENTS OF CASH FLOWS**
**(In thousands)**

| | December 31, | | |
|---|---|---|---|
| | **2001** | **2002** | **2003** |
| Cash flows from operating activities: | | | |
| Net income (loss) | $ 960 | $ (8,268) | $ (17,467) |
| Reconciliation of net income (loss) to net cash used in operating activities: | | | |
| Depreciation and amortization | 1,681 | 2,405 | 2,506 |
| Goodwill impairment | — | 1,077 | — |
| Loss on sale/disposal of property | 7 | — | — |
| Deferred income taxes | (1,212) | (1,945) | 6,007 |
| Changes in assets and liabilities: | | | |
| Accounts receivable | 4,630 | 558 | (4,630) |
| Inventories | (11,259) | 1,006 | 2,042 |
| Prepaid income taxes | 1,939 | (37) | 2,195 |
| Prepaid expenses and other | (797) | (378) | 155 |
| Accounts payable, accrued and other current liabilities | (3,335) | (1,813) | 794 |
| Deferred revenue | (717) | (961) | 778 |
| Income taxes payable | 986 | 86 | 1,374 |
| Net cash used in operating activities | (7,117) | (8,270) | (6,246) |
| Cash flows from investing activities: | | | |
| Purchases of short-term investments | (112,146) | (65,899) | (71,044) |
| Sales/maturities of short-term investments | 165,000 | 37,000 | 78,000 |
| Purchases of property, plant and equipment | (13,178) | (2,767) | (990) |
| Other assets | (3,373) | — | 28 |
| Net cash provided by (used in) investing activities | 36,303 | (31,666) | 5,994 |
| Cash flows from financing activities: | | | |
| Proceeds from issuance of debt obligations | — | 268 | 285 |
| Repayments of debt obligations | (866) | (416) | (818) |
| Sale of shares under employee stock purchase and stock option plans | 1,367 | 1,146 | 1,188 |
| Net cash provided by financing activities | 501 | 998 | 655 |
| Effect of exchange rate changes on cash | 606 | (322) | (421) |
| Net change in cash and cash equivalents | 30,293 | (39,260) | (18) |
| Cash and cash equivalents, beginning of year | 16,934 | 47,227 | 7,967 |
| Cash and cash equivalents, end of year | $ 47,227 | $ 7,967 | $ 7,949 |
| Supplemental disclosure of cash flow information: | | | |
| Cash paid for interest | $ 103 | $ 96 | $ 96 |
| Cash paid (received) for income taxes, net | $ 2,402 | $ (4,634) | $ (3,955) |

See notes to consolidated financial statements.

## 1. Significant Accounting Policies

*Description of Business* – Nanometrics Incorporated and its wholly-owned subsidiaries design, manufacture, market, sell and support thin film, optical critical dimension and overlay dimension metrology systems for customers in the semiconductor and flat panel display industries. These metrology systems precisely measure a wide range of film types deposited on substrates during manufacturing in order to control manufacturing processes and increase production yields in the fabrication of integrated circuits and flat panel displays. The thin film metrology systems use a broad spectrum of wavelengths, high-sensitivity optics, proprietary software, and patented technology to measure the thickness and uniformity of films deposited on silicon and other substrates as well as their chemical composition. Our optical critical dimension technology is a patented critical dimension measurement technology that is used to precisely determine the dimensions on the semiconductor wafer that directly control the resulting performance of the integrated circuit devices. The overlay metrology systems are used to measure the overlay accuracy of successive layers of semiconductor patterns on wafers in the photolithography process.

*Basis of Presentation* – The consolidated financial statements include Nanometrics Incorporated and its wholly-owned subsidiaries. All significant intercompany accounts and transactions have been eliminated in consolidation.

*Use of Estimates* – The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

*Fiscal Year* – Nanometrics uses a 52/53 week fiscal year ending on the Saturday nearest to December 31. Accordingly, fiscal years 2001 and 2002 consisted of 52 weeks and ended on December 29, 2001 and December 28, 2002, respectively and 2003 consisted of 53 weeks and ended on January 3, 2004. For convenience in the accompanying consolidated financial statements, the year end is denoted as December 31.

*Cash and Cash Equivalents* – Cash and cash equivalents include cash and highly liquid debt instruments with original maturities of three months or less when purchased.

*Short-Term Investments* – Short-term investments consist of United States Treasury bills, mature in April 2004, and are stated at fair value based on quoted market prices. Short-term investments are classified as available-for-sale based on Nanometrics' intended use. The difference between amortized cost and fair value representing unrealized holding gains or losses are recorded as a component of shareholders' equity as accumulated other comprehensive loss. Gains and losses on sales of investments are determined on a specific identification basis.

*Fair Value of Financial Instruments* – Financial instruments include cash equivalents, short-term investments and debt obligations. Cash equivalents and short-term investments are stated at fair market value based on quoted market prices. The recorded carrying amount of Nanometrics' debt obligations approximates fair market value.

*Inventories* – Inventories are stated at the lower of cost (first-in, first-out) or market.

*Property, Plant and Equipment* – Property, plant and equipment are stated at cost. Depreciation is computed using straight line and accelerated methods over the following estimated useful lives of the assets:

| | |
|---|---|
| Building and improvements | 6 - 40 years |
| Machinery and equipment | 4 - 17 years |
| Furniture and fixtures | 5 - 20 years |

*Intangible Assets* – Nanometrics amortizes acquired intangible assets (included in other assets) using the straight-line method over an estimated useful life of five to seven years.

*Goodwill* – On January 1, 2002, Nanometrics adopted Statement of Financial Accounting Standards ("SFAS") No. 142, *Goodwill and Other Intangible Assets*. This Statement eliminates the amortization of goodwill and requires that

goodwill be reviewed at least annually for impairment. Upon implementation of this Statement, the transition impairment test for goodwill was performed as of January 1, 2002, and no impairment loss was recorded. SFAS No. 142 requires that goodwill be reviewed at least annually for impairment. Nanometrics elected to test its goodwill for possible impairment in the fourth quarter of 2002. Based upon the results of the annual impairment test, Nanometrics recognized a goodwill impairment loss of $1,077,000 in the fourth quarter of 2002. The fair value of the segment was estimated using a discounted cash flow methodology. Nanometrics had no goodwill on its balance sheet at December 31, 2002 or 2003. A reconciliation of previously reported net income and net income (loss) per share to the amounts adjusted for the exclusion of goodwill amortization, net of related income tax effect, is as follows (in thousands, except per share amounts):

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Reported net income (loss) | $ 960 | $ (8,268) | $ (17,467) |
| Add goodwill amortization, net of tax | 68 | — | — |
| Adjusted net income (loss) | $ 1,028 | $ (8,268) | $ (17,467) |
| Basic net income (loss) per share on reported net income (loss) | $ 0.08 | $ (0.70) | $ (1.45) |
| Goodwill amortization, net of tax | 0.01 | — | — |
| Adjusted net income (loss) | $ 0.09 | $ (0.70) | $ (1.45) |
| Diluted net income (loss) per share on reported net income (loss) | $ 0.08 | $ (0.70) | $ (1.45) |
| Goodwill amortization, net of tax | 0.01 | — | — |
| Adjusted net income (loss) | $ 0.09 | $ (0.70) | $ (1.45) |

This Statement also requires that the useful lives of previously recognized intangible assets be reassessed and the remaining amortization periods be adjusted accordingly. Adoption of this Statement did not require any adjustments to be made to the useful lives of existing intangible assets and no reclassifications of intangible assets to goodwill were necessary.

*Long-Lived Assets* – On January 1, 2002, Nanometrics adopted SFAS No. 144, *Accounting for the Impairment of Disposal of Long-Lived Assets*. SFAS No. 144 supersedes SFAS No. 121, Accounting for the Impairment of Long-Lived Assets and Long-Lived Assets to be Disposed of, but retains its fundamental provision for recognizing and measuring impairment of long-lived assets to be held and used. This Statement requires that all long-lived assets to be disposed of by sale be carried at the lower of carrying amount of fair value less cost to sell, and that depreciation cease to be recorded on such assets. SFAS No. 144 standardizes the accounting and presentation requirements for all long-lived assets to be disposed of by sale, and supersedes previous guidance for discontinued operations of business segments. The initial adoption of this Statement did not have any impact of the consolidated financial statements of Nanometrics. No impairment charge has been recorded in any of the periods presented.

*Income Taxes* – Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes and operating loss and tax credit carryforwards measured by applying currently enacted tax laws. A valuation allowance is provided when necessary to reduce deferred tax assets to an amount that is more likely than not to be realized.

*Accumulated Other Comprehensive Loss* – Accumulated other comprehensive loss consists of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2002 | 2003 |
| Accumulated unrealized gains on available-for-sale securities, net | $ 1 | $ 1 |
| Accumulated translation adjustments, net | (281) | 333 |
| Accumulated other comprehensive loss | $ (280) | $ 334 |

*Revenue Recognition* – Nanometrics recognizes revenue when persuasive evidence of an arrangement exits, delivery has occurred or services have been rendered, the seller's price is fixed or determinable, and collectibility is reasonably assured. For product sales, this generally occurs at the time of shipment if Nanometrics has met defined customer acceptance experience levels with both the customer and the specific type of equipment. All other product sales are recognized upon customer acceptance. In certain geographical regions where risk of loss and title transfers upon customer acceptance, revenue is recognized upon customer acceptance. Revenue related to spare part sales is recognized

on shipment and is included as part of service revenue. Revenue related service contracts is recognized ratably over the period under contract. Unearned maintenance and service contract revenue is not significant and is included in deferred revenue.

*Warranties* – In November 2002, the Financial Accounting Standards Board ("FASB") issued Interpretation No. 45, *Guarantor's Accounting and Disclosure Requirements for Guarantees, Including Indirect Guarantees of Indebtedness of Other* ("FIN 45"). FIN 45 requires a guarantor to include disclosures of certain obligations, and if applicable, at the inception of the guarantee, recognize a liability for the fair value of other obligations undertaken in issuing a guarantee.

The initial recognition and initial measurement provisions apply on a prospective basis to guarantees issued or modified after December 31, 2002 and did not have a material impact on Nanometrics' consolidated financial statements.

Nanometrics sells the majority of its products with a one-year repair or replacement warranty and records a provision for estimated claims at the time of sale. Components of the warranty accrual, which are included in the accompanying consolidated balance sheets as other current liabilities, are as follows:

| | |
|---|---|
| Balance as of January 1, 2003 | $ 261,000 |
| Actual warranty costs | (160,000) |
| Revision to existing warranty | (303,000) |
| Provision for warranty | 715,000 |
| Balance as of December 31, 2003 | $ 513,000 |

*Guarantees* – In addition to product warranties, Nanometrics, from time to time, in the normal course of business, indemnifies certain customers with whom it enters into contractual relationships. Nanometrics has agreed to hold the other party harmless against third party claims that Nanometrics' products, when used for their intended purpose(s), infringe the intellectual property rights of such third party or other claims made against certain parties. It is not possible to determine the maximum potential amount of liability under these indemnification obligations due to the limited history of prior indemnification claims and the unique facts and circumstances that are likely to be involved in each particular claim. Historically, Nanometrics has not made payments under these obligations and no liabilities have been recorded for these obligations on the balance sheets as of December 31, 2002 and 2003.

*Stock-Based Compensation* – In December 2002, the FASB issued SFAS No. 148, *Accounting for Stock-Based Compensation - Transition and Disclosures, an Amendment of FASB Statement No. 123*. This Statement provides alternative methods of transition for companies who voluntarily change to the fair value-based method of accounting for stock-based employee compensation in accordance with SFAS No. 123, Accounting for Stock-Based Compensation and enhances the disclosure requirements. This statement was effective upon its issuance. The adoption of this Statement did not have any impact on the consolidated financial statements of Nanometrics.

Nanometrics continues to account for stock-based compensation using the intrinsic value method in accordance with the provision of Accounting Principles Board Opinion No. 25, *Accounting for Stock Issued to Employees*, as allowed by SFAS No. 123, *Accounting for Stock Based Compensation* as amended by SFAS No. 148, *Accounting for Stock Based Compensation - Transition and Disclosures, an Amendment of FASB Statement No. 123*. Under the intrinsic value method, Nanometrics does not recognize any compensation expense, as the exercise price of all stock options is equal to the fair market value at the time the options are granted. Had compensation expense been recognized using the fair value-based method under SFAS No. 123, Nanometrics' pro forma consolidated income (loss) and income (loss) per share would have been as follows (in thousands, except per share amounts):

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Net income (loss): | | | |
| As reported | $ 960 | $ (8,268) | $ (17,467) |
| Deduct: Total stock-based employee compensation expense determined under fair value based method for all awards, net of related tax effects | (3,659) | (4,692) | (8,521) |
| Pro forma | $ (2,699) | $ (12,960) | $ (25,988) |
| Basic net income (loss) per share: | | | |
| As reported | $ 0.08 | $ (0.70) | $ (1.45) |
| Pro forma | (0.23) | (1.09) | (2.16) |
| Diluted net income (loss) per share: | | | |
| As reported | 0.08 | (0.70) | (1.45) |
| Pro forma | (0.23) | (1.09) | (2.16) |

*Foreign Currency* – The functional currencies of Nanometrics' foreign subsidiaries are the local currencies. Accordingly, translation adjustments for the subsidiaries have been included in shareholders' equity. Gains and losses from transactions denominated in currencies other than the functional currencies of Nanometrics or its subsidiaries are included in other income (expense) and consist of a loss of $614,000 in 2001 and gains of $154,000 and $424,000 in 2002 and 2003, respectively.

*Net Income Per Share* – Basic net income (loss) per share excludes dilution and is computed by dividing net income (loss) by the number of weighted average common shares outstanding for the period. Diluted net income (loss) per share reflects the potential dilution from outstanding dilutive stock options (using the treasury stock method) and shares issuable under the employee stock purchase plan. During the years ended December 31, 2002 and 2003, diluted net loss per share excludes common equivalent shares outstanding, as their effect is antidilutive. The reconciliation of the share denominator used in the basic and diluted net income per share computations is as follows (in thousands):

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Weighted average shares outstanding - shares used in basic net income per share computation | 11,691 | 11,878 | 12,043 |
| Dilutive effect of common stock equivalents, using the treasury stock method | 470 | — | — |
| Shares used in diluted net income per share computation | 12,161 | 11,878 | 12,043 |

For the years ended December 31, 2001, 2002 and 2003, diluted net loss per share excluded common equivalent shares outstanding of 901,917, 1,410,594 and 2,915,196, respectively, as their effect was antidilutive.

*Reclassifications* – Certain reclassifications have been made to the prior years' financial statement presentations to conform to the current year presentation. Such reclassifications had no impact on the consolidated statements of operations or retained earnings.

*Recently Issued Accounting Pronouncements*

In April 2003, the Financial Accounting Standards Board (FASB) issued SFAS 149, Amendment of Statement 133 on Derivative Instruments and Hedging Activities, which amends and clarifies accounting for derivative instruments, including certain derivative instruments embedded in other contracts, and for hedging activities under SFAS 133, Accounting for Derivative Instruments and Hedging Activities.

SFAS 149 was effective for contracts entered into or modified after June 30, 2003, except as noted below, and for hedging relationships designated after June 30, 2003. The guidance was to be applied prospectively. The provisions of SFAS 149 that relate to SFAS 133 Implementation Issues that were effective for fiscal quarters that began prior to June 15, 2003 continue to be applied in accordance with their respective effective dates. The adoption of SFAS 149 did not have a material effect on our consolidated financial position, results of operations or cash flows.

The Company adopted Emerging Issues Task Force ("EITF") Issue No. 00-21, "Revenue arrangements with Multiple Deliverables", which requires companies to determine whether an arrangement involving multiple deliverables contains more than one unit of accounting. In applying EITF Issue No. 00-21, revenue arrangements with multiple deliverables should be divided into separate units of accounts, if the deliverables in the arrangement meet certain criteria. Arrangement consideration should be allocated among the separate units of accounting based on their relative fair values. This issue was effective for revenue arrangements entered into in fiscal periods beginning after June 15, 2003. There was no impact on our results of operations or financial position as a result of adopting EITF Issue No. 00-21.

The FASB issued Interpretation No. 46 ("FIN 46"), "*Consolidation of Variable Interest Entities*," in January 2003, and a revised interpretation of FIN 46 ("FIN 46-R") in December 2003. FIN 46 requires certain variable interest entities ("VIEs") to be consolidated by the primary beneficiary of the entity if the equity investors in the entity do not have the characteristics of a controlling financial interest or do not have sufficient equity at risk for the entity to finance its activities without additional subordinated financial support from other parties. The provisions of FIN 46 are effective immediately for all arrangements entered into after January 31, 2003. Since January 31, 2003, Nanometrics has not invested in any entities it believes are variable interest entities for which Nanometrics is the primary beneficiary. For arrangements entered into prior to February 1, 2003, Nanometrics is required to adopt the provisions of FIN 46-R in the first quarter of fiscal 2004. Nanometrics does not expect the adoption of FIN 46-R to have an impact on the financial position, results of operations or cash flows of Nanometrics.

In May 2003, the FASB issued SFAS No. 150, *Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity*, which requires that certain financial instruments be presented as liabilities that were previously presented as equity or as temporary equity. Such instruments include mandatory redeemable preferred and common stock, and certain options and warrants. SFAS No. 150 is effective for financial instruments entered into or modified after May 31, 2003 and was effective at the beginning of the first interim period beginning after June 15, 2003. In November 2003, the FASB issued FASB Staff Position ("FSP") No. 150-3, *Effective Date, Disclosures, and Transition for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests under SFAS No. 150*, which defers the effective date for various provisions of SFAS No. 150. Nanometrics believes that it has properly classified and measured in its balance sheets and disclosed in its consolidated financial statements financial instruments with characteristics of both liabilities and equity.

*Certain Significant Risks and Uncertainties* – Financial instruments which potentially subject Nanometrics to concentration of credit risk consist of cash and cash equivalents, short-term investments and accounts receivable (see Note 10). Cash and cash equivalents and short-term investments are held primarily with two financial institutions and consist primarily of cash in bank accounts and United States Treasury bills. Nanometrics sells its products primarily to end users in the United States and Asia, and generally does not require its customers to provide collateral or other security to support accounts receivable. Management performs ongoing credit evaluations of its customers' financial condition. Nanometrics maintains allowances for estimated potential bad debt losses.

Nanometrics participates in a dynamic high technology industry and believes that changes in any of the following areas could have a material adverse effect on Nanometrics' future financial position, results of operations or cash flows: advances and trends in new technologies and industry standards; competitive pressures in the form of new products or price reductions on current products; changes in product mix; changes in the overall demand for products offered by Nanometrics; changes in third-party manufacturers; changes in key suppliers; changes in certain strategic relationships or customer relationships; litigation or claims against Nanometrics based on intellectual property, patent, product, regulatory or other factors; fluctuations in foreign currency exchange rates; risk associated with changes in domestic and international economic and/or political regulations; availability of necessary components or subassemblies; disruption of manufacturing facilities; and Nanometrics' ability to attract and retain employees necessary to support its growth.

Nanometrics' customer base is highly concentrated. A relatively small number of customers have accounted for a significant portion of Nanometrics' revenues. In 2003, aggregate revenue from Nanometrics' top ten largest customers consisted of 51.8% of Nanometrics' total net revenues.

Certain components and subassemblies used in Nanometrics' products are purchased from a sole supplier or a limited group of suppliers. In particular, Nanometrics currently purchases its spectroscopic ellipsometer and robotics used in its advanced measurement systems from a sole supplier or a limited group of suppliers. Any shortage or interruption in the supply of any of the components or subassemblies used in Nanometrics' products or the inability of Nanometrics to procure these components or subassemblies from alternate sources on acceptable terms, could have a material adverse effect on Nanometrics' business, financial condition and results of operations.

*Related Party Transactions* – As of December 31, 2003, Nanometrics had outstanding long-term notes to one officer and three employees in the amount of $447,000. The note to the officer bears interest at 6% per annum and is due in October 2004. The notes to two employees bear no interest and are due July 2004 and February 2006. The remaining note to an employee bears 5% interest and is due in 2006. Two notes for $76,000 are classified as other assets on the balance sheet and the remaining $371,000 is classified as prepaid expenses and other.

During 2003, Nanometrics purchased a vehicle from an officer for $17,000.

## 2. Inventories

Inventories consist of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2002 | 2003 |
| Raw materials and subassemblies | $ 18,353 | $ 15,450 |
| Work in process | 4,733 | 4,506 |
| Finished goods | 2,761 | 4,308 |
| Total inventories | $ 25,847 | $ 24,264 |

## 3. Property, Plant and Equipment

Property, plant and equipment consists of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2002 | 2003 |
| Land | $ 16,716 | $ 16,856 |
| Building and improvements | 31,261 | 32,217 |
| Machinery and equipment | 6,326 | 6,625 |
| Furniture and fixtures | 1,429 | 1,681 |
| Construction in progress | — | 200 |
| | 55,732 | 57,579 |
| Accumulated depreciation and amortization | (5,682) | (7,841) |
| Total property, plant and equipment, net | $ 50,050 | $ 49,738 |

## 4. Other Current Liabilities

Other current liabilities consist of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2002 | 2003 |
| Commissions payable | $ 291 | $ 32 |
| Accrued warranty | 261 | 513 |
| Accrued professional services | 169 | 254 |
| Other | 853 | 637 |
| Total other current liabilities | $ 1,574 | $ 1,436 |

## 5. Debt Obligations

Debt obligations consist of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2002 | 2003 |
| 1995 working capital bank loan | $ 834 | $ 561 |
| 1996 working capital bank loan | 287 | 232 |
| 2000 working capital bank loan | 2,502 | 2,708 |
| Other debt obligations | 280 | 304 |
| Total | 3,903 | 3,805 |
| Current portion of debt obligations | (780) | (1,157) |
| Debt obligations | $ 3,123 | $ 2,648 |

The 1995 working capital bank loan was obtained by Nanometrics' Japanese subsidiary. The loan is collateralized by receivables of the Japanese subsidiary and is guaranteed by the parent, Nanometrics Incorporated. The loan is denominated in Japanese yen (¥60,000,000 at December 31, 2003) and bears interest at 2.9% per annum. The loan is payable in quarterly installments with unpaid principal and interest due in May 2005.

The 1996 working capital bank loan was obtained by Nanometrics' Japanese subsidiary and is collateralized by land and building. The loan is denominated in Japanese yen (¥24,800,000 at December 31, 2003) and bears interest at 3.4% per annum. The loan is payable in quarterly installments with unpaid principal and interest due in May 2006.

The 2000 working capital bank loan was obtained by Nanometrics' Japanese subsidiary and is collateralized by land and building. The loan is denominated in Japanese yen (¥289,600,000 at December 31, 2003) and bears interest at 2.1% per annum. The loan is payable in quarterly installments with unpaid principal and interest due in November 2010.

Other debt obligations represent short-term borrowings by Nanometrics' Japanese subsidiary which are collateralized by the subsidiary's accounts receivable. The borrowings are denominated in Japanese yen and bear interest at 2.74% per annum.

At December 31, 2003, future annual maturities of debt obligations are as follows (in thousands):

| | |
|---|---|
| 2004 | $ 1,157 |
| 2005 | 666 |
| 2006 | 441 |
| 2007 | 389 |
| 2008 | 389 |
| Thereafter | 763 |
| Total | $ 3,805 |

## 6. Commitments and Contingencies

Nanometrics' leases manufacturing and administrative facilities and certain equipment under noncancellable operating leases. Rent expense for 2001, 2002, and 2003 was approximately $302,000, $233,000, and $414,000, respectively. Future minimum lease payments under Nanometrics' operating leases for each of the years ending December 31 are as follows (in thousands):

| | |
|---|---|
| 2004 | $ 136 |
| 2005 | 67 |
| 2006 | 18 |
| 2007 | 10 |
| 2008 | 7 |
| Thereafter | 2 |
| Total | $ 240 |

In September 1998, Nanometrics' Korean subsidiary entered into a lease agreement for manufacturing facilities. The lease payments are based on a percentage of net product sales, as defined. The lease was terminated in February 2001.

Pursuant to a 1985 agreement, as amended, if Nanometrics' Chairman of the Board is involuntarily removed from his position, Nanometrics is required to continue his salary and related benefits for a period of five years from such date.

## 7. Shareholders' Equity

*Common Stock*

The authorized capital stock of Nanometrics consists of 50,000,000 common shares, of which 50,000,000 shares have been designated "Common Stock."

*Stock Option Plans*

Under the 1991 Stock Option Plan (the 1991 Option Plan), as amended, Nanometrics may grant options to acquire up to 3,000,000 shares of common stock to employees and consultants at prices not less than the fair market value at date of grant for incentive stock options and not less than 50% of fair market value for nonstatutory stock options. These options generally expire five years from the date of grant and become exercisable as they vest, generally 33.3% upon each anniversary of the grant, as set forth in the stock option agreements. The 1991 Option Plan expired in July 2001.

Under the 1991 Directors' Stock Option Plan (the 1991 Directors' Plan), nonemployee directors of Nanometrics are automatically granted options to acquire 10,000 shares of common stock, at the fair market value at the date of grant, each year that such person remains a director of Nanometrics. Options granted under the Directors' Plan become exercisable as they vest 33.3% upon each anniversary of the grant and expire five years from the date of grant. The total shares authorized under the 1991 Directors' Plan are 300,000. The 1991 Directors' Plan expired in July 2001.

Under the 2000 Stock Option Plan (the 2000 Option Plan), as amended, Nanometrics may grant options to acquire up to 2,450,000 shares of common stock to employees and consultants at prices not less than the fair market value at date of grant for incentive and nonstatutory stock options. These options generally expire seven years from the date of grant, or a shorter term as provided by the stock option agreement and become exercisable as they vest, generally 33.3% upon each anniversary of the grant, as set forth in the stock option agreements. The 2000 Option Plan is the successor to the 1991 Option Plan, and all options existing under the 1991 Option Plan will continue to be governed by existing terms until exercise, cancellation or expiration.

Under the 2000 Directors' Stock Option Plan (the 2000 Directors' Plan), nonemployee directors of Nanometrics are automatically granted options to acquire 10,000 shares of common stock, at the fair market value at the date of grant, each year that such person remains a director of Nanometrics. Options granted under the Directors' Plan become exercisable as they vest 33.3% upon each anniversary of the grant and expire seven years from the date of grant. The total shares authorized under the 2000 Directors' Plan are 250,000. The 2000 Directors' Plan is the successor plan to the 1991 Directors' Plan, and all options existing under the 1991 Directors' Plan will continue to be governed by existing terms until exercise, cancellation or expiration.

Under the 2002 Nonstatutory Stock Option Plan (the 2002 Option Plan), Nanometrics may grant options to acquire up to 1,200,000 shares of common stock to employees and consultants at prices determined by the 2002 Option Plan administrator at the date of grant. These options generally expire seven years from the date of grant, or a shorter term as provided by the stock option agreement and become exercisable as they vest as set forth in the stock option agreements.

During the fourth quarter of 2002, Nanometrics offered to cancel qualifying options to purchase up to 1,962,020 shares of Nanometrics common stock granted under the 2000 Option Plan and the 1991 Option Plan. Qualifying options included only those options with an exercise price of greater than or equal to $10.00 per share. Nanometrics granted all participating employees options equal to 90% of the options cancelled on June 17, 2003 at the then fair value of the common stock. Nanometrics cancelled options to purchase 1,569,020 shares and issued options to purchase 1,398,621 shares on June 17, 2003.

| | Outstanding Options | | |
|---|---|---|---|
| | Shares Available | Number of Shares | Weighted Average Exercise Price |
| Option activity under the plans is summarized as follows: | | | |
| Balances, December 31, 2000 (634,696 exercisable at a weighted average price of $6.62) | 1,191,978 | 1,867,024 | $ 18.73 |
| Exercised | — | (132,536) | 6.90 |
| Expired | (40,744) | — | — |
| Granted (weighted average fair value of $9.45) | (780,250) | 780,250 | 18.14 |
| Canceled | 91,516 | (91,516) | 21.01 |
| Balances, December 31, 2001 (1,017,033 exercisable at a weighted average price of $13.91) | 462,500 | 2,423,222 | 19.11 |
| Additional shares added through 2002 Option Plan | 1,200,000 | — | — |
| Exercised | — | (94,205) | 6.13 |
| Granted (weighted average fair value of $8.57) | (937,100) | 937,100 | 14.58 |
| Canceled | 1,855,523 | (1,855,523) | 21.15 |
| Balances, December 31, 2002 (839,095 exercisable at a weighted average price of $13.39) | 2,580,923 | 1,410,594 | 14.27 |
| Exercised | — | (159,375) | 7.46 |
| Granted (weighted average fair value of $2.70) | (2,030,495) | 2,030,495 | 6.67 |
| Canceled (including 250,342 shares under the terminated 1991 Option Plan) | 116,176 | (366,518) | 10.16 |
| Balances, December 31, 2003 | 666,604 | 2,915,196 | $ 9.86 |

Additional information regarding options outstanding as of December 31, 2003 is as follows:

| | Options Outstanding | | | Options Exercisable | |
|---|---|---|---|---|---|
| Range of Exercise Prices | Number Outstanding | Weighted Average Remaining Contractual Life (Years) | Weighted Average Exercise Price | Number Exercisable | Weighted Average Exercise Price |
| $ 3.14 - $ 5.70 | 1,498,778 | 6.27 | $ 5.58 | 129,031 | $ 5.50 |
| 6.33 - 9.00 | 584,052 | 4.67 | 7.50 | 154,171 | 7.36 |
| 12.86 - 23.50 | 714,366 | 4.27 | 16.82 | 267,717 | 17.99 |
| 25.24 - 47.63 | 118,000 | 1.78 | 33.85 | 77,285 | 34.48 |
| $ 3.14 - $ 47.63 | 2,915,196 | 4.90 | $ 9.86 | 628,204 | $ 14.84 |

*Employee Stock Purchase Plan*

Under the 1986 Employee Stock Purchase Plan (the Purchase Plan), eligible employees are allowed to have salary withholdings of up to 10% of their base compensation to purchase shares of common stock at a price equal to 85% of the lower of the market value of the stock at the beginning or end of each six-month offering period, subject to an annual limitation. Shares issued under the plan were 33,845 and 125,403 in 2001 and 2002, respectively, at weighted average prices of $13.39 and $4.53, respectively. The weighted average per share fair values of the 2001 and 2002 awards were $5.94 and $1.26, respectively. During the fourth quarter of fiscal year 2002, the Board of Directors terminated the Purchase Plan effective September 28, 2002.

Under the 2003 Employee Stock Purchase Plan (the 2003 Stock Plan), eligible employees are allowed to have salary withholdings of up to 10% of their base compensation to purchase shares of common stock at a price equal to 85% of the lower of the market value of the stock at the beginning or end of each six-month offering period, subject to an annual limitation. Nanometrics may grant up to 750,000 shares under the 2003 Stock Plan. No shares were issued under the plan in 2003.

*Additional Stock Plan Information*

As discussed in Note 1, Nanometrics accounts for its stock-based awards using the intrinsic value method in accordance with APB No. 25, *Accounting for Stock Issued to Employees*, and its related interpretations. Accordingly, no compensation expense has been recognized in the accompanying consolidated financial statements for employee stock arrangements.

Also as discussed in Note 1, Nanometrics adopted the provisions of SFAS No. 148, which amends SFAS No. 123 as stated. Under SFAS No. 123, as amended, the fair value of stock-based awards to employees is calculated through the use of option pricing models, even though such models were developed to estimate the fair value of freely tradable, fully transferable options without vesting restrictions, which differ significantly from Nanometrics' stock option awards. These models also require subjective assumptions, including future stock price volatility and expected time to exercise, which greatly affect the calculated values. Nanometrics' fair value calculations on stock-based awards under the 1991 and 2001 Option Plans and the 1991 and 2001 Directors' Plans were made using the Black-Scholes option pricing model with the following weighted average assumptions: expected life, three years from the date of grant in 2001, 2002, and 2003; stock volatility, 80% in 2001 and 2002, and 90% in 2003; risk free interest rate, 4.2% in 2001, 3.4% in 2002 and 2.4% in 2003; and no dividends during the expected term. Nanometrics' calculations are based on a single option valuation approach and forfeitures are recognized at a historical rate of 24% for 2001, 30% for 2002, and 25% for 2003. Nanometrics' fair value calculations on stock-based awards under the Purchase Plan were also made using the Black-Scholes option pricing model with the following weighted average assumptions: expected life, six months in 2001; stock volatility, 80% in 2001, risk free interest rate, 3.1% in 2001; and no dividends during the expected term. There were no options outstanding under the Purchase Plan in 2002 and 2003. See Note 1, Stock-Based Compensation, for the disclosure of the pro forma effects of SFAS No. 123. Nanometrics' fair value calculations on stock-based awards under the Purchase Plan were also made using the Black-Scholes option pricing model with the following weighted average assumptions; expected life, six months in 2003; stock volatility, 90% in 2003, risk free interest rate 1.2 % in 2003 and no dividends during the expected term.

## 8. Income Taxes

Income (loss) before provision (benefit) for income taxes consists of the following (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Domestic | $ (1,516) | $ (11,751) | $ (11,637) |
| Foreign | 3,258 | (2,747) | 30 |
| Income (loss) before income taxes | $ 1,742 | $ (14,498) | $ (11,607) |

The provision (benefit) for income taxes consists of the following (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Current: | | | |
| Federal | 1,136 | $ (4,847) | $ (553) |
| State | 439 | 266 | 4 |
| Foreign | 419 | 296 | 402 |
| | 1,994 | (4,285) | (147) |
| Deferred: | | | |
| Federal | (1,073) | (506) | 3,700 |
| State | (437) | (1,480) | 2,306 |
| Foreign | 298 | 41 | 1 |
| | (1,212) | (1,945) | 6,007 |
| Provision (benefit) for income taxes | $ 782 | $ (6,230) | $ 5,860 |

Significant components of Nanometrics' deferred tax assets and liabilities are as follows (in thousands):

| | December 31, | |
|---|---|---|
| | 2002 | 2003 |
| Deferred tax assets - current: | | |
| Reserves and accruals not currently deductible | $ 2,369 | $ 3,551 |
| Capitalized inventory costs | 696 | 774 |
| Tax credit carryforwards | 3,835 | 4,717 |
| Total gross deferred tax assets - current | 6,900 | 9,042 |
| Valuation allowance | (60) | (9,042) |
| Total net deferred tax assets - current | $ 6,840 | $ — |
| Deferred tax assets (liabilities) noncurrent: | | |
| Reserves and accruals | $ 58 | $ — |
| Net operating loss carryforwards | 892 | 4,596 |
| Depreciation | (2,357) | (2,537) |
| Goodwill and capitalized technology | 934 | 2,724 |
| Translation adjustments | (25) | (412) |
| Total net deferred tax assets (liabilities) - noncurrent | (498) | 4,371 |
| Valuation allowance | (360) | (4,783) |
| Total net deferred tax assets (liabilities) - noncurrent | $ (858) | $ (412) |

As of December 31, 2003, Nanometrics had net operating loss carryforwards for federal income tax purposes of approximately $11,958,000, which expire after 2023.

As of December 31, 2003, Nanometrics had available for carryforward research and experimental tax credits, minimum tax credits and foreign tax credits for federal income tax purposes of $2,493,000, $329,000, $565,000, respectively. Federal credit carryforwards begin to expire after 2006.

As of December 31, 2003, Nanometrics had available for carryforward state credits of $1,969,000, as well as net operating loss carryforwards for state income tax purposes of $2,503,000. State credits and state net operating loss carryforwards begin to expire after 2009 and 2013, respectively.

Nanometrics had available for carryforward a net operating loss for Korean income tax purposes of $690,000 as of December 31, 2003. Net operating loss carry forwards expire after 2005.

Differences between income taxes computed by applying the statutory federal income tax rate to income before income taxes and the provision (benefit) for income taxes consist of the following (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Income taxes computed at U.S. statutory rate | $ 610 | $(5,074) | $(4,062) |
| State income taxes | 1 | (790) | (1,394) |
| Foreign tax provision higher than U.S. rates | 134 | 178 | 426 |
| Foreign sales corporation benefit | — | (80) | (11) |
| Change in valuation allowance | 342 | 77 | 13,405 |
| Tax credits | (450) | (746) | (1,323) |
| Other, net | 145 | 205 | (1,181) |
| Provision (benefit) for income taxes | $ 782 | $(6,230) | $ 5,860 |

Nanometrics' Korean subsidiary was granted a seven-year tax holiday in 1999 by the Korean government for having established a high-tech manufacturing operation in Korea, which expires in 2006. There has been no aggregate net tax effect of the tax holiday for the Korean subsidiary because their net losses have offset net income during the period of the tax holiday.

## 9. Bonus Plans

Nanometrics paid $416,000, $0, and $0 in 2001, 2002, and 2003, respectively, under formal discretionary cash bonus plans which cover all eligible employees.

## 10. Major Customers

In 2001, sales to Applied Materials accounted for 17.6% of total net revenues. In 2002, sales to Applied Materials accounted for 13.8% and sales to TSMC accounted for 10.9% of total net revenues. In 2003, sales to Applied Materials accounted for 15.4% and sales to Hynix Semiconductor accounted for 12.0% of total net revenues.

At December 31, 2001 and 2002, no single customer accounted for 10% or more of accounts receivable. At December 31, 2003, two customers accounted for 15.2% and 10.4% of accounts receivable, respectively.

## 11. Intangible Assets

Intangible assets are recorded at cost, less accumulated amortization. Intangible assets as of December 31, 2002 and 2003 consist of (in thousands):

| 2003 | Gross Carrying Amount | Accumulated Amortization | Net Intangible Assets |
|---|---|---|---|
| Technology | $ 2,709 | $ 1,466 | $ 1,243 |
| Other | 250 | 171 | 79 |
| Total | $ 2,959 | $ 1,637 | $ 1,322 |

| 2002 | Gross Carrying Amount | Accumulated Amortization | Net Intangible Assets |
|---|---|---|---|
| Technology | $ 2,709 | $ 1,090 | $ 1,619 |
| Other | 250 | 121 | 129 |
| Total | $ 2,959 | $ 1,211 | $ 1,748 |

The estimated future amortization expense is as follows (in thousands):

| Fiscal Years | |
|---|---|
| 2004 | $ 397 |
| 2005 | 285 |
| 2006 | 256 |
| 2007 | 256 |
| 2008 | 128 |
| Total amortization | $1,322 |

Amortization is computed using the straight-line method over a weighted average period of seven years for purchased technology and five years for other intangible items. Amortization for the years ended December 31, 2003 and 2002 were $426,000 and $490,000, respectively.

## 12. Product, Segment and Geographic Information

Nanometrics' operating divisions consist of its geographically based entities in the United States, Japan, South Korea and Taiwan. All such operating divisions have similar economic characteristics, as defined in SFAS No. 131, *Disclosures About Segments of an Enterprise and Related Information*, and accordingly, Nanometrics operates in one reportable segment: the sale, design, manufacture, marketing and support of thin film, optical critical dimension and overlay dimension metrology systems. For the years ended December 31, 2001, 2002, and 2003, Nanometrics recorded revenue from customers throughout North America, Europe and Asia. The following table summarizes total net revenues and long-lived assets attributed to significant countries (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Total net revenues: | | | |
| United States | $ 16,752 | $ 10,770 | $ 10,504 |
| Japan | 13,712 | 8,284 | 10,319 |
| Korea | 4,693 | 3,647 | 9,063 |
| Taiwan | 6,727 | 7,898 | 8,935 |
| Germany | 2,018 | 378 | 299 |
| All other | 3,682 | 3,746 | 2,482 |
| Total net revenues* | $ 47,584 | $ 34,723 | $ 41,602 |

| | December 31, | |
|---|---|---|
| | 2002 | 2003 |
| Long-lived assets: | | |
| United States | $ 42,989 | $ 41,914 |
| Japan | 6,787 | 7,225 |
| Korea | 3,367 | 3,240 |
| Taiwan | 168 | 39 |
| Total long-lived assets | $ 53,311 | $ 52,418 |

* Net revenues are attributed to countries based on the deployment and service locations of systems.

Nanometrics' product lines differ primarily based on the environment the systems will be used in. Automated systems are used primarily in high-volume production environments. Integrated systems are installed inside wafer processing equipment to provide near real-time measurements for improving process control and increasing throughput. Tabletop systems are used primarily in low-volume production environments and in engineering labs where automated handling and high throughput are not required. Sales by product type were as follows (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2001 | 2002 | 2003 |
| Automated systems | $ 27,416 | $ 19,969 | $ 25,620 |
| Integrated systems | 7,527 | 4,155 | 6,106 |
| Tabletop systems | 7,710 | 4,545 | 2,866 |
| Total product sales | $ 42,653 | $ 28,669 | $ 34,592 |

## 13. Selected Quarterly Financial Results (Unaudited)

The following tables set forth selected quarterly results of operations for the years ended December 31, 2002 and 2003 (in thousands, except per share amounts):

| | Quarters Ended | | | |
|---|---|---|---|---|
| | Mar. 31, 2002 | Jun. 30, 2002 | Sep. 30, 2002 | Dec. 31, 2002 |
| Total net revenues | $ 8,025 | $ 8,392 | $ 8,569 | $ 9,737 |
| Gross profit | 3,976 | 3,909 | 3,840 | 3,996 |
| Loss from operations | (2,547) | (3,088) | (3,915) | (5,537) |
| Net loss | (1,547) | (1,702) | (1,816) | (3,203) |
| Net loss per share, basic and diluted | $ (0.13) | $ (0.14) | $ (0.15) | $ (0.27) |
| Shares used in per share computation, basic and diluted | 11,790 | 11,837 | 11,886 | 11,998 |

| | Quarters Ended | | | |
|---|---|---|---|---|
| | Mar. 31, 2003 | Jun. 30, 2003 | Sep. 30, 2003 | Dec. 31, 2003 |
| Total net revenues | $ 9,350 | $ 9,734 | $ 10,131 | $ 12,387 |
| Gross profit | 3,805 | 3,299 | 4,167 | 6,020 |
| Loss from operations | (3,637) | (4,033) | (3,187) | (1,436) |
| Net loss | (9,584)* | (4,083) | (2,996) | (804) |
| Net loss per shares, basic and diluted | $ (0.80) | $ (0.34) | $ (0.25) | $ (0.07) |
| Shares used in per share computations, basic and diluted | 12,007 | 12,008 | 12,033 | 12,122 |

* Includes a $6,020 charge to record a valuation allowance against deferred income tax assets.

* * * * *

## ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

## ITEM 9A. CONTROLS AND PROCEDURES

Nanometrics maintains disclosure controls and procedures that are designed to ensure that information required to be disclosed in the periodic reports filed by Nanometrics with the Securities and Exchange Commission (the "Commission") is recorded, processed, summarized and reported within the time periods specified in the rules and forms of the Commission and that such information is accumulated and communicated to Nanometrics' management. In designing and evaluating the disclosure controls and procedures, Nanometrics' management recognized that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives and management necessarily was required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Based on their most recent evaluation, Nanometrics' Chief Executive Officer and Chief Financial Officer have concluded that the Company's disclosure controls and procedures (as defined in Rules 13a-15e and 15d-15e of the Securities Exchange Act of 1934, as amended) are effective as of the end of the period covered by this Annual Report Form 10-K. There were not any significant changes in internal controls or in other factors that could significantly affect these internal controls during the fourth quarter.

## PART III

### ITEM 10. DIRECTORS AND EXECUTIVE OFFICERS OF THE REGISTRANT

The sections titled "Election of Directors" and "Section 16(a) Beneficial Ownership Reporting Compliance" appearing in the Registrant's proxy statement for the annual meeting of shareholders for the year ended January 3, 2004 sets forth certain information which is incorporated by reference. Certain information with respect to persons who are executive officers of the Registrant is set forth under the caption "Business - Executive Officers of the Registrant" in Part I of this report.

We have adopted a code of ethics, entitled the Code of Business Conduct and Ethics, that applies to our employees, including our chief executive officer and chief financial officer. The Code of Business Conduct and Ethics is posted on our website, www.nanometrics.com.

### ITEM 11. EXECUTIVE COMPENSATION

The section titled "Executive Compensation" appearing in the Registrant's proxy statement for the annual meeting of shareholders for the year ended January 3, 2004 sets forth certain information with respect to the compensation of management of the Registrant and is incorporated herein by reference.

### ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED SHAREHOLDER MATTERS

The section titled "Election of Directors" appearing in the Registrant's proxy statement for the annual meeting of shareholders for the year ended January 3, 2004 sets forth certain information with respect to the ownership of the Registrant's Common Stock and is incorporated herein by reference.

### ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS

The section titled "Transactions with Management" appearing in the Registrant's proxy statement for the annual meeting of shareholders for the year ended January 3, 2004 sets forth certain information with respect to certain business relationships and transactions between the Registrant and its directors and officers and is incorporated herein by reference.

### ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this Item is incorporated by reference and will be set forth under the heading "Relationship with Independent Public Accountants" to be included in the Company's Proxy Statement for the 2004 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our most recent fiscal year.

## PART IV

## ITEM 15. EXHIBITS, CONSOLIDATED FINANCIAL STATEMENT SCHEDULES, AND REPORTS ON FORM 8-K

(a) 1. Consolidated Financial Statements.

See Index to Consolidated Financial Statements at Item 8 on page II-16 of this Annual Report on Form 10-K.

2. Consolidated Financial Statement Schedules.

The following consolidated financial statement schedules of Nanometrics Incorporated are filed as part of this Annual Report on Form 10-K and should be read in conjunction with the Consolidated Financial Statements of Nanometrics Incorporated:



Schedules not listed above have been omitted because they are not applicable or are not required or the information required to be set forth therein is included in the Consolidated Financial Statements or notes thereto.

(b) Reports on Form 8-K. We furnished a Report on Form 8-K disclosing our earnings release on October 23, 2003.

(c) Exhibits.

The following exhibits are filed with this Annual Report on Form 10-K:

| Exhibit No. | Description |
|---|---|
| 3.1[8] | Amended and Restated Articles of Incorporation of Nanometrics Incorporated. |
| 3.2[2] | Bylaws of Nanometrics Incorporated. |
| 3.3[5] | Certificate of Amendment of Amended and Restated Bylaws of Nanometrics Incorporated. |
| 4.1[1] | Form of Common Stock Certificate. |
| 10.1[2] | Form of Indemnification of Agreement for Directors & Officers. (Management contract required to be filed pursuant to Item 15(c) of this report.) |
| 10.2[3] | 1991 Stock Option Plan, as amended through May 15, 1997. |
| 10.3[6] | 1991 Director Option Plan. |
| 10.4[2] | Loan Agreement between Japan Development Bank and Nanometrics Japan k.k. |
| 10.5[2] | Loan Agreement and Guarantee dated June 5, 1995 between Mitsubishi Bank, Limited and Nanometrics Japan Ltd. |
| 10.6[4] | Nanometrics Incorporated 2000 Employee Stock Option Plan and form of Stock Option Agreement. |
| 10.7[4] | Nanometrics Incorporated 2000 Director Stock Option Plan and form of Stock Option Agreement. |
| 10.8[7] | Nanometrics Incorporated 2002 Nonstatutory Stock Option Plan and form of Stock Option Agreement. |
| 14 | Code of Business Conduct and Ethics |
| 21[2] | Subsidiaries of Registrant. |
| 23.1 | Independent Auditors' Consent. |
| 24 | Power of Attorney (see page IV-3). |
| 31.1 | Certificate of Chief Executive Officer |
| 31.2 | Certificate of Chief Financial Officer. |
| 32.1 | Certificate of Chief Executive Officer and Chief Financial Officer. |

(1) Incorporated by reference to exhibits filed with Registrant's Registration Statement on Form S-1 (File No. 2-93949), which became effective November 28, 1984.
(2) Incorporated by reference to the Registrant's Annual Report on Form 10-K (File No. 000-13470) filed on April 1, 1998.
(3) Incorporated by reference to Exhibit 4.1 filed with Registrant's Registration Statement on Form S-8 (File No. 333-33583) filed on August 14, 1997.
(4) Incorporated by reference to exhibits filed with Registrant's Registration Statement on Form S-8 (File No. 333-40866) filed on July 7, 2000.
(5) Incorporated by reference to Exhibit 3.10 filed with Registrant's Annual Report on Form 10-K dated March 30, 2001.
(6) Incorporated by reference to Exhibit 4.2 filed with Registrant's Registration Statement on Form S-8 (File No. 33-43913) filed on November 14, 1991.
(7) Incorporated by reference to Exhibit 4.1 filed with the registrant's Registration Statement on Form S-8 (File No. 333-101137) filed on November 11, 2002.
(8) Incorporated by reference to registrant's Annual Report on Form 10-K for the year ended December 31, 2002 (File No. 000-13470) filed on March 28, 2003.

(d) Consolidated Financial Statements and Schedules.

See Item 15(a) of this Annual Report on Form 10-K above.

## SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Dated: March 31, 2004

**NANOMETRICS INCORPORATED**

By: /s/ Paul B. Nolan
Paul B. Nolan
Chief Financial Officer and Vice President

## POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints John D. Heaton and Paul B. Nolan jointly and severally, his attorneys-in-fact, each with the power of substitution, for him in any and all capacities, to sign any and all amendments to this Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that said attorneys-in-fact, or his substitute or substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this Report on Form 10-K has been signed below by the following persons on behalf of the registrant on the 31st day of March, 2004 in the capacities indicated.

| Signature | Title |
|---|---|
| /s/ John D. Heaton<br>John D. Heaton | President, Chief Executive Officer and Director<br>(Principal Executive Officer) |
| /s/ Paul B. Nolan<br>Paul B. Nolan | Chief Financial Officer and Vice President<br>(Principal Financial and Accounting Officer) |
| /s/ Vincent J. Coates<br>Vincent J. Coates | Chairman of the Board |
| /s/ Nathaniel Brenner<br>Nathaniel Brenner | Director |
| /s/ William Oldham<br>William Oldham | Director |
| /s/ Edmond R. Ward<br>Edmond R. Ward | Director |

## SCHEDULE II

## NANOMETRICS INCORPORATED
## VALUATION AND QUALIFYING ACCOUNTS
### Allowance for Doubtful Accounts Receivable

| Year Ended | Balance at beginning of period | Charged to costs and expenses | Deductions-write-offs of accounts | Balance at end of period |
|---|---|---|---|---|
| December 31, 2001 | $ 418,000 | $ 150,000 | $ 6,000 | $ 562,000 |
| December 31, 2002 | $ 562,000 | $ 4,000 | $ 0 | $ 566,000 |
| December 31, 2003 | $ 566,000 | $ 10,000 | $ 0 | $ 576,000 |

**EXHIBIT 23.1**

**INDEPENDENT AUDITORS' CONSENT**

We consent to the incorporation by reference in Registration Statement Nos. 333-33583, 333-40866, 333-91714, 333-101137, and 333-108474 of Nanometrics Incorporated on Form S-8 of our report dated March 29, 2004 (which report expresses an unqualified opinion and includes an explanatory paragraph relating to a change in method of accounting for goodwill and other intangible assets), appearing in this Annual Report on Form 10-K of Nanometrics Incorporated for the fiscal year ended January 3, 2004.

Deloitte & Touche LLP

San Jose, California
March 29, 2004

**EXHIBIT 31.1**

I, John D. Heaton, certify that:

1. I have reviewed this annual report on Form 10-K of Nanometrics Incorporated;

2. Based on my knowledge, this annual report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this annual report;

3. Based on my knowledge, the financial statements, and other financial information included in this annual report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this annual report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this annual report is being prepared;

   (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this annual report based on such evaluation; and

   (c) Disclosed in this annual report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of this annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 31, 2004

By: /s/ John D. Heaton
Name: John D. Heaton
Title: Chief Executive Officer

**EXHIBIT 31.2**

I, Paul B. Nolan, certify that:

1. I have reviewed this annual report on Form 10-K of Nanometrics Incorporated;

2. Based on my knowledge, this annual report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this annual report;

3. Based on my knowledge, the financial statements, and other financial information included in this annual report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this annual report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this annual report is being prepared;

   (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (c) Disclosed in this annual report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of this annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting, which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 31, 2004

By: /s/ Paul B. Nolan
Name: Paul B. Nolan
Title: Chief Financial Officer

**EXHIBIT 32.1**
**CERTIFICATION OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER**
**PURSUANT TO**
**18 U.S.C. SECTION 1350,**
**AS ADOPTED PURSUANT TO**
**SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

Each of the undersigned hereby certifies, for purposes of Section 906 of the Sarbanes-Oxley Act of 2002, in his capacity as an officer of Nanometrics Incorporated (the "Company") that based on his knowledge:

1. The Annual Report on Form 10-K of the Company for the annual period ended January 3, 2004 (the "Report") fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

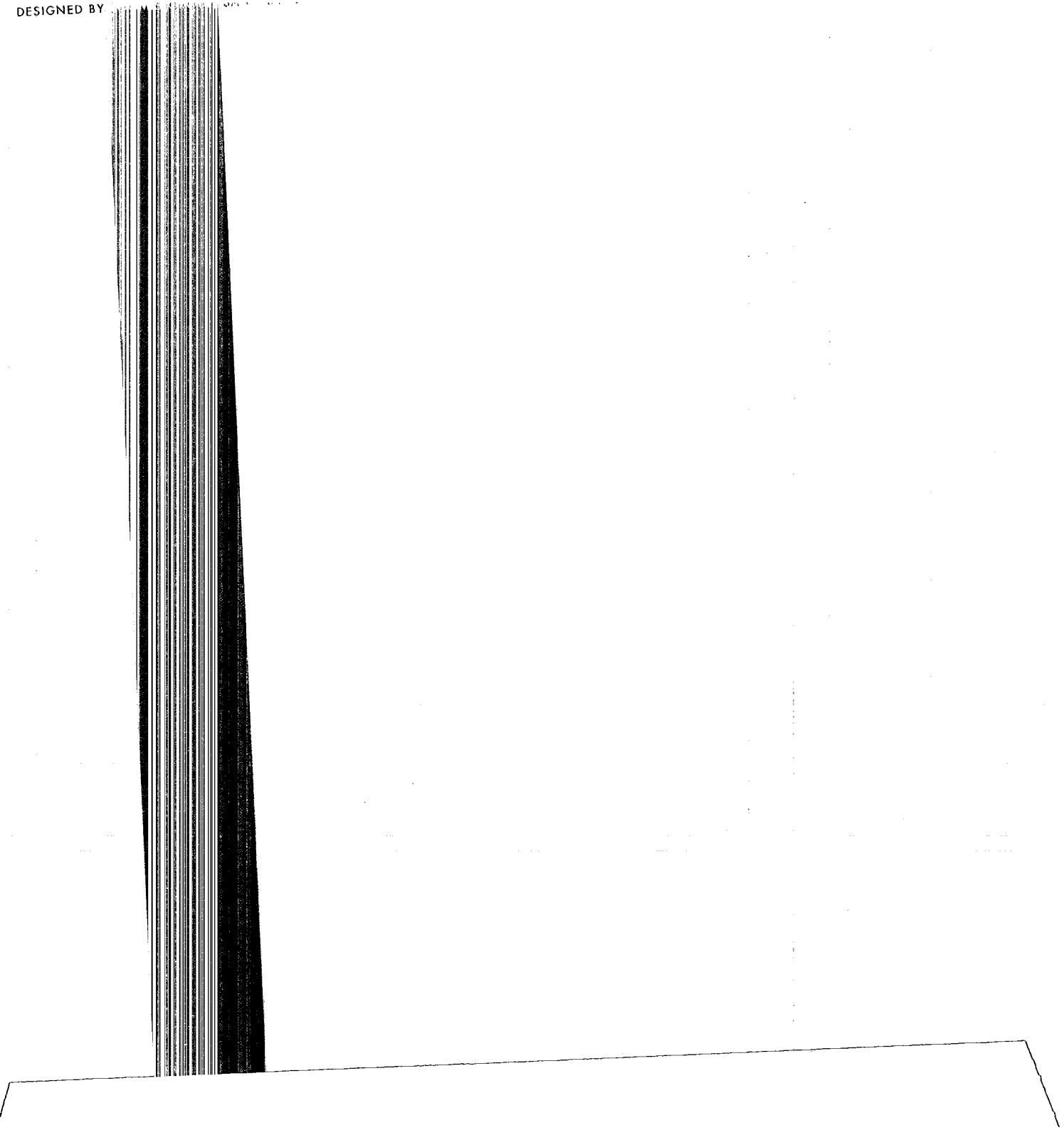
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 31, 2004

By: /s/ John D. Heaton
Name: John D. Heaton
Title: Chief Executive Officer

Date: March 31, 2004

By: /s/ Paul B. Nolan
Name: Paul B. Nolan
Title: Chief Financial Officer


DESIGNED BY

NANOmetrics NANOMETRICS, INCORPORATED 1550 BUCKEYE DRIVE MILPITAS CA 95035 USA

Better measurement

# Better control

That's Nanometrics