

Semiconductor Production Equipment

Continuous advances in semiconductors are driving the information and without continuous advances in the semiconductor production equipment (SPE) tion by helping chipmakers execute their product strategies successfully.



RAPIDLY EXPANDING END-USE APPLICATIONS DRIVE INDUSTRY GROWTH

At one time, personal computers were the main end-use application for semiconductors. Today, however, a broad array of products rely on semiconductors to offer increased performance and functionality, including mobile phones, personal digital assistants (PDAs), game consoles, DVD players and other digital consumer electronic products. Furthermore, new, yet-to-be-imagined applications will continue to fuel demand for chips.

TOKYO ELECTRON IS A LEADER IN WAFER FABRICATION EQUIPMENT

Wafer fabrication equipment uses mainly physical and chemical processes to create minute, multi-layer circuits on round silicon wafers. While various types of equipment are used for performing these microscopic processes, most of these products can be grouped into several broad categories. Most equipment suppliers focus on a single market segment, but Tokyo Electron is a world leader in many of them.

Wafer Fabrication Equipment

- Thermal Systems
- Ion Implantation Systems
- Film Deposition Systems
- Lithography/Patterning Systems
- Removal Systems

— The Source of Innovation

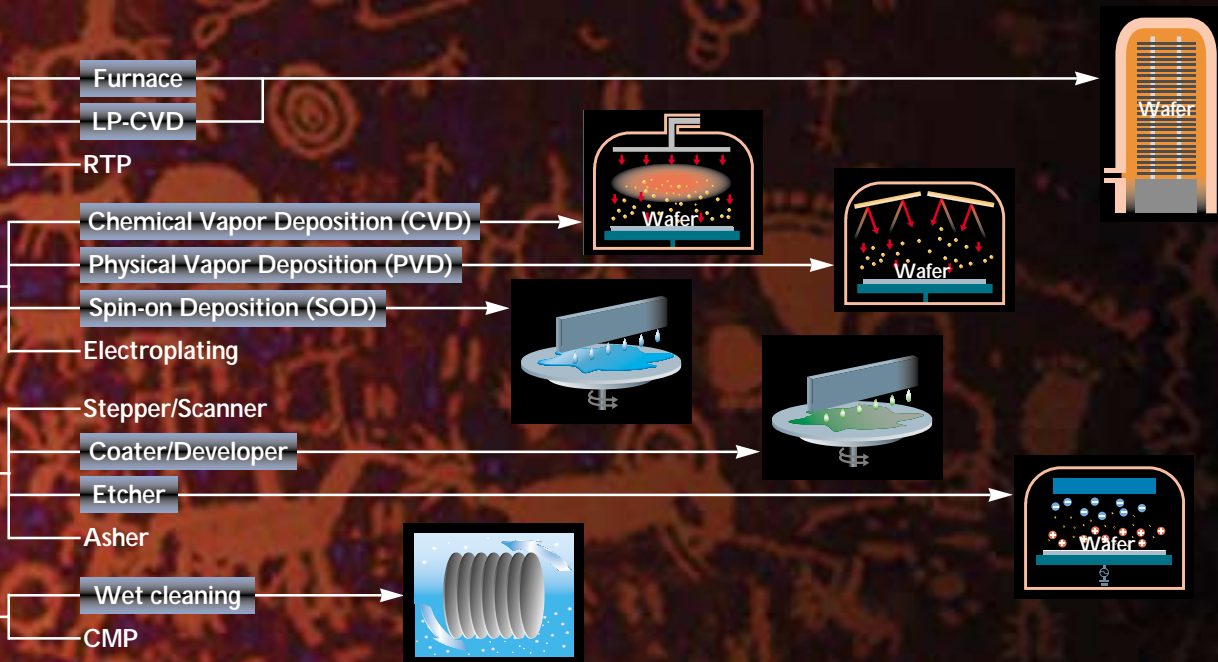
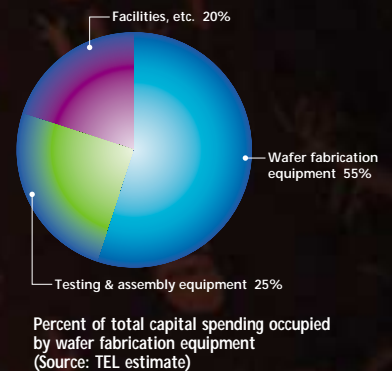
communications revolution. This revolution, however, would not be possible that is used to make chips. Tokyo Electron operates at the heart of this revolu-

SEMICONDUCTOR PRODUCTION EQUIPMENT – A LARGE AND INTEGRAL PART OF THE SEMICONDUCTOR INDUSTRY

The semiconductor production equipment industry is a large and integral part of the semiconductor industry. Information and communications products demand higher performance chips from chipmakers, who demand higher performance equipment from equipment suppliers, whose advances drive the information and communications revolution.

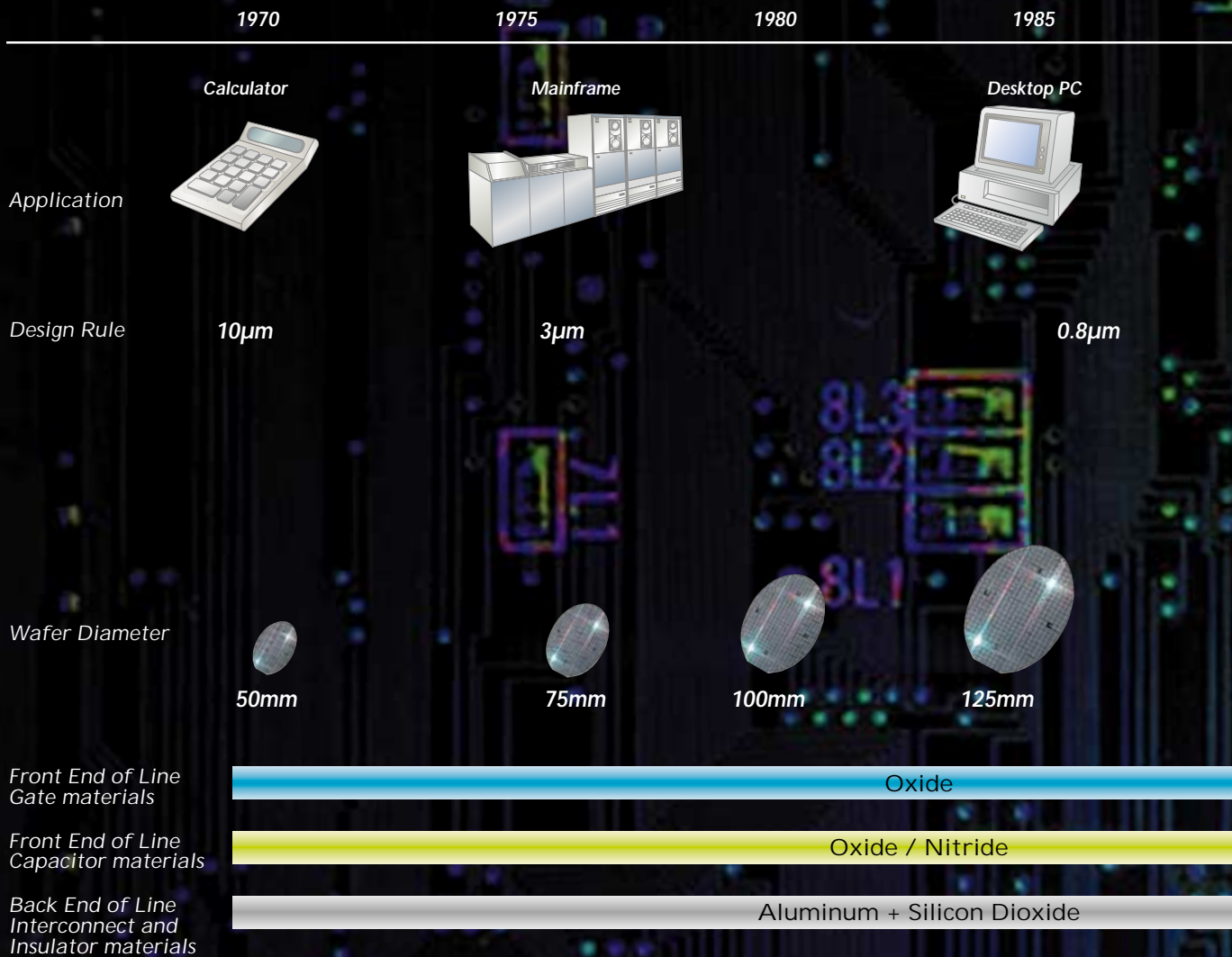
WAFER FABRICATION EQUIPMENT IS A PRIMARY SPE MARKET

Semiconductor production equipment is largely segmented into wafer fabrication equipment that is used in the initial stages of semiconductor production, and testing and assembly equipment that is used in the latter stages. Wafer fabrication equipment accounted for about 55 percent of the \$33 billion of total world capital spending for semiconductors in 1999. Tokyo Electron primarily participates in this wafer fabrication equipment market and it maintains a very strong presence globally.



New Mega Trends Drive SPE Demand

Three major trends are taking place simultaneously in the semiconductor industry: – in particular, copper for metalization and low-k (k = dielectric constant) dielectrics SPE to stay at the leading edge of technology. Tokyo Electron already offers proven



LARGER WAFER SIZE REDUCES UNIT COST OF CHIPS

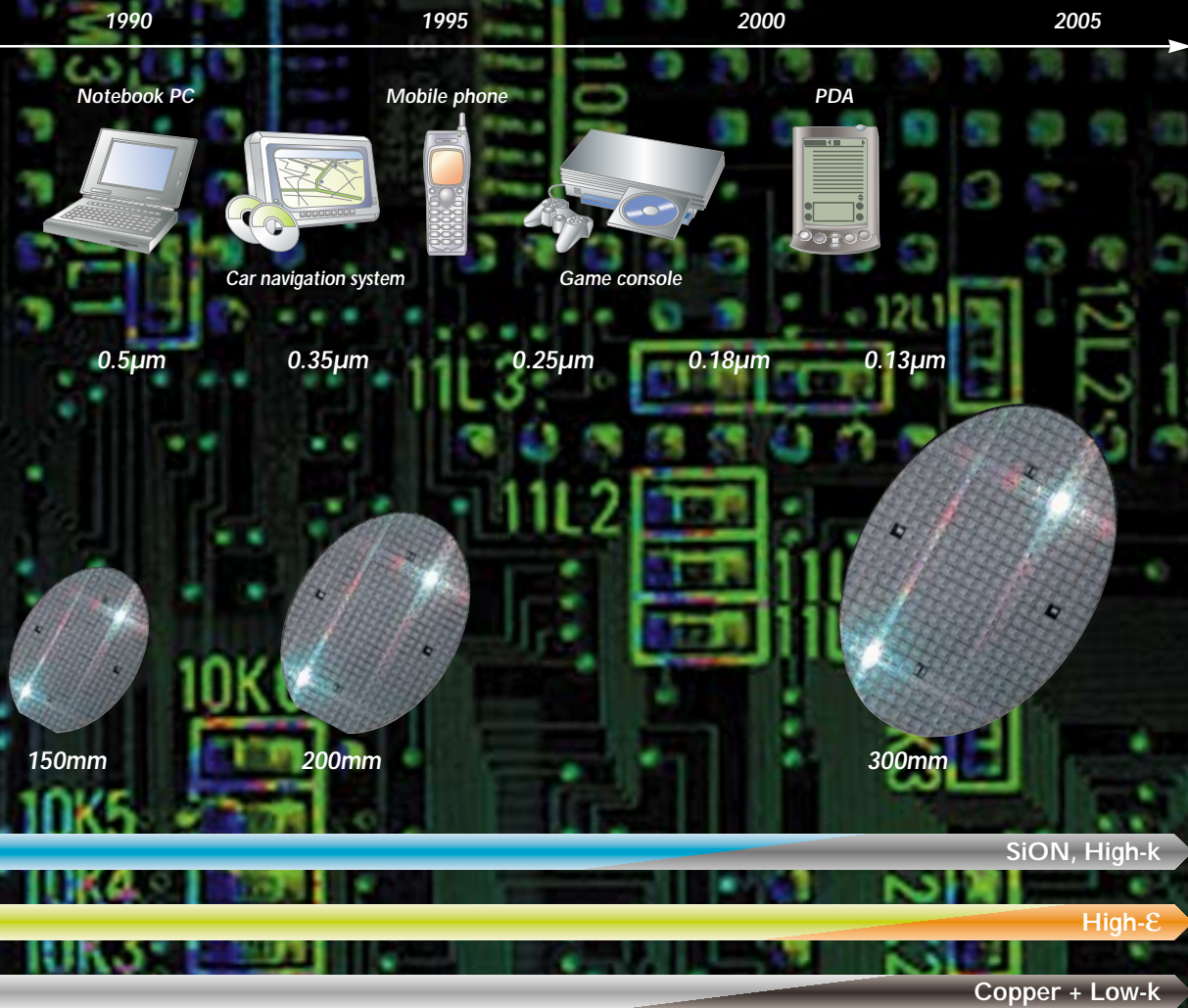
Larger wafers reduce unit costs because processing a 300mm wafer costs little more than processing the current industry standard 200mm wafer, but the larger wafers yield significantly more chips. Tokyo Electron is in

a particularly strong position to capitalize on this trend, with a comprehensive lineup of 300mm-ready equipment, and a fully dedicated 300mm New Process Technology Center to support customers' demands in their transition to 300mm technology.

SMALLER FEATURE SIZES INCREASE YIELDS AND PERFORMANCE

Current feature sizes are approximately 100 times smaller than they were just three decades ago, allowing for smaller, faster chips with substantially increased performance. Decreasing chip size by shrinking fea-

the move toward larger 300mm wafers, smaller feature sizes and new materials as insulators. These trends are driving chipmakers to invest in new, highly advanced solutions for 300mm wafers, smaller feature sizes and low-k dielectrics.



ture sizes allows more chips to be produced from the same wafer. As the world's leading supplier of coater/developers and oxide etch systems that are directly related to reducing feature sizes, Tokyo Electron is well positioned to take advantage of this trend.

NEW MATERIALS BOOST CHIP PERFORMANCE

In the 0.13µm generation and beyond, decreasing signal delay will become critical in creating faster chips. The solution to this problem is new materials. In the early 2000s, two dramatic changes will begin to take place: the adoption of high-k and high-ε materials for gate and capacitor formation in the

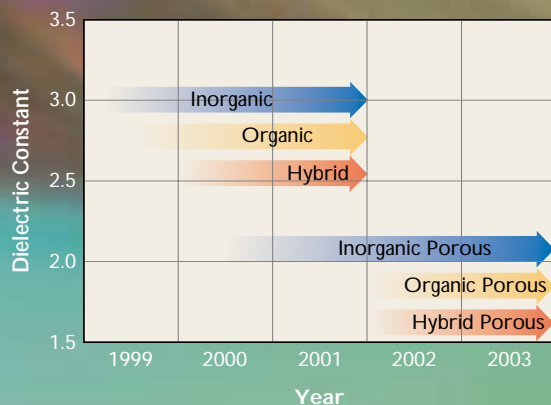
FEOL (transistor) process, and copper and low-k materials as interconnect and insulation materials in the BEOL (interconnect) process. Historically strong in providing FEOL solutions, Tokyo Electron is also working to provide integrated BEOL solutions around its core spin-on dielectric system for low-k materials.

Tokyo Electron's Low-k Toolset Offers Interconnect Processes

Continuous improvements in semiconductor device performance and Law, which states that chip density doubles approximately every 18 months, because the signal time delay has become the largest bottleneck.

Breakthrough Technology

SOD Materials



Integrated Solutions for Advanced

*functionality have been achieved by scaling devices according to Moore's
Further improvements, however, cannot be achieved by scaling alone*

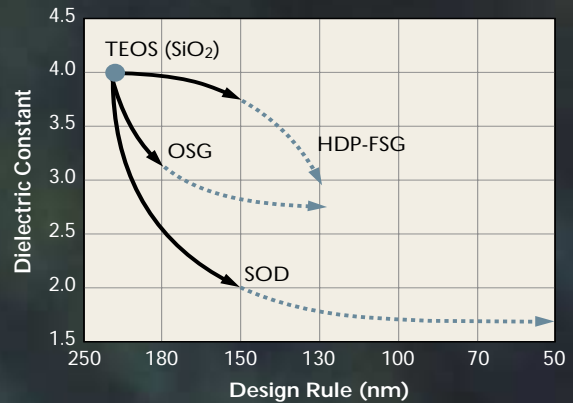
TEL'S LOW-K TECHNOLOGY SOLUTIONS

Copper interconnects recently started to come into use as a partial solution to the signal delay barrier. To further improve device performance and complete the solution, low-k dielectric materials are currently being developed.

Tokyo Electron's low-k toolset provides chipmakers with the current-best dielectric k value at the mass-produc-

tion level. By employing spin-on dielectric (SOD) low-k technology, Tokyo Electron enables numerous materials to be used on its tool platforms for coating, curing, etching and cleaning. Our longstanding collaborative alliances with leading SOD material suppliers around the world also ensure that chipmakers receive the optimum technological solutions with the freedom to choose the chemistry that best suits their needs.

Low-k Materials



Furnace
• ALPHA (α)-8SE



Etch System
• UNITY® Ver. IIe



Cleaning System
• PR200Z

Spin-on Dielectric System
• CLEAN TRACK ACT® 8 SOD



ENVIRONMENT

A COMMITMENT TO SOCIAL RESPONSIBILITY

Tokyo Electron believes that preserving and constantly improving the global environment are objectives of the highest priority both for the Company and for humanity, and must be considered in management. Based on this philosophy, we are determined to remain in harmony with the global environment through a wide range of environmental protection activities as we expand our business. Doing so will help us retain the trust of customers, shareholders, employees, local communities and society in general.

Milestones in Environmental Protection

To 1995:	Carried out studies for an environmental management system Eliminated CFC usage
1996:	Established first Tokyo Electron Environmental Committee Implemented environmental management system
1997-1999:	Obtained ISO 14001 certification of the environmental management systems at seven main domestic plants
1999:	Created Product EHS Roadmap
2000:	Began environmental accounting

Specific Activities

ISO 14001 Certification

Tokyo Electron has devoted substantial resources to obtaining ISO 14001 certification, an international standard for environmental management systems. The Company began working to obtain this certification in 1997, and obtained it for all domestic plants by the end of 1999, with the exception of Tokyo Electron Miyagi Limited. As the certifying body, Tokyo Electron used Det Norske Veritas (DNV), which has extensive experience in environmental management and had carried out the Company's audit for ISO 9001 certification. Preparations for certification are under way at Tokyo Electron Miyagi Limited, which began operations in 1998, and the Company is aiming for certification in April 2002. In the future, Tokyo Electron plans to obtain ISO 14001 certification for its U.S. plants.

Development of Environmentally Friendly Products

Tokyo Electron is active in developing products with reduced environmental impact. The *CLEAN TRACK ACT[®] 8* coater/developer and the *UW200Z* cleaning system both incorporate new design concepts that significantly reduce footprint, energy consumption and chemical usage compared with previous models. Moreover, the Company is conducting R&D with C_5F_8 , a fluorine gas that reduces the effects that lead to global warming without any sacrifice in technical specifications, and is now using it in the etching system process. The C_5F_8 process received recognition as a method to combat global warming from



Semiconductor Equipment and Materials International (SEMI) Japan in December 1999. Also in 1999, Tokyo Electron created its Product EHS Roadmap to support concrete measures to reduce the environmental impact of each system the Company supplies, in an effort to produce products that are even more environmentally friendly.

Chemical Management

The control of chemical substances requires not only compliance with the law, but also comprehensive management that includes toxicity evaluation and measures for safe storage and dealing with emergencies. Tokyo Electron is therefore striving to establish a system for reviewing and registering newly purchased chemical substances, and is moving forward with a rigorous program to stop pollution before it is produced. Moreover, in April 2000, domestic facilities implemented the Pollutant Release and Transfer Register (PRTR) system, which entails computing the amounts of each listed chemical substance released into the environment and providing reports to governmental and trade organizations.

Waste Reduction, Recycling and Other Activities

Demonstrating the effectiveness of Tokyo Electron's efforts to reduce waste products and consumption of energy and resources and to promote recycling and green purchasing, domestic facilities produced 21 percent less waste in 1998 than in 1997. The Company's recycling ratio has increased significantly, from 15.3 percent in 1996 to 40.9 percent in 1997 and 49.7 percent in 1998. Administrative divisions are promoting the purchase of environmentally friendly paper products, office supplies and printed matter.

Contribution to Customers, Communities and the Industry

Tokyo Electron's proactive efforts to develop environmentally friendly products make a material contribution to our customers' efforts to protect the environment. We also cooperate with environmental initiatives in every region we serve. In addition, we actively participate at every stage, from planning to implementation, of industry efforts regarding disclosure and standards. We intend to further build on our record of corporate citizenship.

Implementation of Environmental Accounting

From the year ending March 2001, Tokyo Electron's domestic operations will begin using environmental accounting in order to quantify the effectiveness of environmental protection activities.

Disclosure

Tokyo Electron will promote broader awareness and understanding of its efforts to protect the environment by publishing an annual environmental report beginning in 2001.