



Challenge for the Future

We develop with society and continue to fulfill our goals of being a responsible and innovative company.

Management Principles

Continue efforts to enhance our technology; Raise the quality levels of our products; Contribute to society; and, Create a frank and open-minded business culture.

Management Vision

Aim to be a globally trusted corporate group by inspiring customers with high value-added products that have satisfying features, low cost and superior quality.

The Source of the Value We Create

—Microprocessing Technologies That Create Inspiration

TOK delivers value in a wide variety of fields, including the manufacture of semiconductors, by rolling out microprocessing and applied technologies for the nanoscale* domain, along with implementing our strategy of building close relationships with customers and developing high value-added technologies from new standpoints.

* Nanometer (1nm) = one millionth of a millimeter; one hundred-thousandth the width of a human hair

TOK founder **Shigemasa Mukai**

During Japan's advanced stage of economic growth that began at the outset of the Showa era, when industrialization gained momentum, the founder of TOK, Shigemasa Mukai, provided industry with numerous world-leading products through sheer ingenuity and grit. The following words that Mukai repeatedly said to his employees have continued to live in our DNA to this day.



—Ideals when TOK was founded—

Challenge ourselves to develop products that entail any difficulties but are useful to society and are not offered by other companies

—Policy when TOK reemerged after World War II—

We shall conduct manufacturing to create products that others cannot imitate, to be original, to focus on high purity products, and to support manufacturing with advanced technological capabilities.

—On the establishment of the Tokyo Ohka Foundation for The Promotion of Science and Technology—

The development of Japan, a nation with few natural resources, depends on the development of innovative technologies from advances in fundamental research, and the application of these technologies in industry will lead to peace and prosperity for humanity.






Value Creation Rooted in Our Management Principles

Over the 78 years since its founding, TOK has done its best to put into practice its four management principles, evolving along the way.

With a frank and open-minded business culture, we will carry on, contributing to society by continuing efforts to enhance our technology and raise the quality levels of our products.

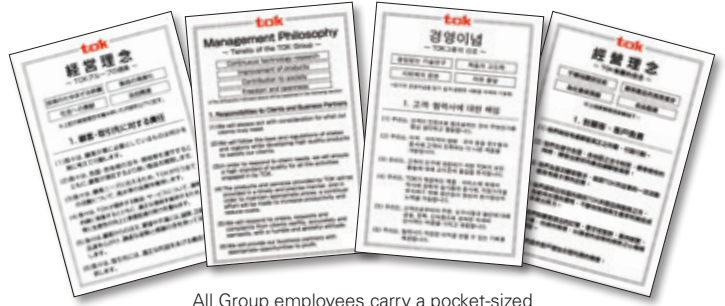
Founding to 1969

1970–

| Contribute to society | Contribution to industrialization of society | Contribution to innovation |
|--|--|---|
| <p>Contribute to society</p> <ul style="list-style-type: none"> Development and provision of fine chemical products that will contribute to innovation in many industries Contribution to solving social issues |  <p>Major applications/End products, etc.</p> <ul style="list-style-type: none"> Battery used in hard hat light for coal miners Electrical wire Black and white TV |  <p>Contribution to innovation</p> <ul style="list-style-type: none"> Color TV/Electronic calculator Word processor/PC Videocassette recorder CD player/Home game console |
| <p>Continue efforts to enhance our technology</p> <ul style="list-style-type: none"> Development of photoresists throughout time | <p>Establishment of "Photoresists Specialist TOK"</p>  <p>Major photoresists</p> <ul style="list-style-type: none"> 1968*¹ Negative photoresists for semiconductors 1971 Eco-friendly synthetic rubber photoresists 1972 Japan's first positive photoresists for semiconductors | |
| <p>Raise the quality levels of our products</p> <ul style="list-style-type: none"> Pursuit of high purification technology that minimizes impurities in products | <p>Establishment of world-leading "high purification technology"</p>  <p>Major high-purity products, etc.</p> <ul style="list-style-type: none"> 1936 Japan's first high-purity potassium hydroxide 1964 The world's highest-purity potassium hydroxide | |
| <p>Create a frank and open-minded business culture</p> <ul style="list-style-type: none"> Creation of workplaces where employees can work in a motivated manner Creation of safe and sound working environment Diversity and inclusion | <p>Foster a frank and open-minded corporate culture</p>  <p>Key employee and occupational safety measures</p> <ul style="list-style-type: none"> 1961 Launched employee proposal system 1976 Formed the Tokyo Ohka Kogyo Labor Union 1979 Established Employee Stock Ownership Plan 1986 Established the Tokyo Ohka Kogyo Health Insurance Society | |

*1 Years in front of product names indicate, in principle, the year the first product was shipped.
Circuit line width generations include TOK's estimates.

Management Principles Card



All Group employees carry a pocket-sized card with our management principles written down in Japanese, English, Korean or Chinese.

1990-

2000-

2010-

throughout time by developing and supplying semiconductor photoresists



Mobile phone
DVD player
Hybrid car



LCD
Smartphone
Tablet device



AI
IoT
Self-driving vehicle
5G communication

Line width **130*1nm**



1987 i-Line photoresists
1995 KrF excimer laser photoresists

Line width **130-32nm**



2001 ArF excimer laser photoresists

Line width **32-7nm**



2018 EUV photoresists

Impurities in products **Less than 1ppm*2**



High purification of photoresists
Reductions in impurities in high-purity chemicals

*2 ppm: parts per million, ppt: parts per trillion, ppq: parts per quadrillion

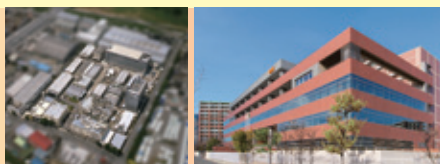
Impurities in products **Less than 10ppt*2**



High purification of photoresists
Reductions in impurities in high-purity chemicals
Ultra-high-performance clean solutions

Move to ppq*2 level

Expansion of human resources alongside growth



1990 Introduced the childcare leave system
1991 Achieved 5.4 million hours of zero-accident (type 1) operations at the Sagami Operation Center
1993 Adopted the sick leave system

2003 Introduced the rehiring system
2005 Adopted the occupational rehabilitation system
2007 Introduced childcare time
2008 Introduced the expired paid leave reserve system

Training next generation of global personnel



2012 Introduced the Employee Stock Ownership Plan (ESOP) Trust (Trust matured in 2017)
2012 First woman appointed to a management position
2014 Started TOK Global Practical Training for Selected Members
2015 Formulated Data Health Plans for health & productivity management
2016 Set target of 20% or higher for women's recruitment ratio

*3 Received the Kurumin mark in 2012; selected as a constituent stock in the MSCI Japan Empowering Women Index in 2017 and 2019, MSCI Japan ESG Select Leaders Index in 2019, and SNAM Sustainability Index in fiscal 2018; and recognized in the 2018 Certified Health & Productivity Management Outstanding Organizations Recognition Program (White 500).

Our Resources

Accumulation of Unique Management Resources

TOK has never stopped contributing to innovation, addressing the needs of its customers and society throughout time, while accumulating robust financial capital and unique non-financial capital. The Company will further advance both types of capital and strengthen its capabilities for sustainable value creation.

Financial capital

Financial capital



- Financial foundation for the super-long term
- Dividend policy based on net assets

Balance Sheet Management

TOK seeks the optimal balance between investment, cash reserves and shareholder returns within the context of its niche top strategy, which has been in its DNA since its founding, aggressive risk-taking as an R&D-driven company, and competition with rivals larger in size.

Solid Financial Position

TOK's policy on cash reserves, consisting of working capital, investment reserves and risk reserves, takes into account requirements for developing technologies in anticipation of a super-long time frame, continuously tackling challenges over a super-long time frame, and responding to the unexpected, including major disasters. As of December 31, 2018, the Company had an equity ratio of 78.0% and a debt-to-equity ratio of 0.07 times, representing top-class financial soundness in the chemicals sector.

Strengthened Shareholder Returns

Beginning on December 31, 2018, the Company distributed dividends based on its new dividend policy targeting a DOE of 3.5%, with the objective of steadily and continuously returning profits to shareholders.

Pursuit of Higher Asset Efficiency

The Company targets an ROE of over 8%, and uses ROIC, IRR, etc. as indicators for monitoring investments and business strategies.

Manufactured capital

Manufactured capital



- World-leading microprocessing technology
- World-leading high purification technology

Microprocessing Technology

TOK continues to satisfy the sophisticated needs of its customers, i.e., manufacturers of semiconductors and electronic components, by accumulating and applying its world-leading microprocessing technology in the development and production of materials to make semiconductor circuit line widths fine, materials used to make high-density semiconductor packages, and materials for stacking semiconductor devices in three dimensions.

High Purification Technology

TOK supplies chemicals (clean solutions, thinner, developing solutions, etc.) of the highest purity in the world with an absolute minimum of impurities, realizing shared value with customers by improving yields on their mass production lines for cutting-edge devices. TOK has expertise in highly challenging domains, such as controlling performance down to the molecule.

Niche Top Products

Having inherited the DNA that has existed in TOK since its founding, we are developing a business to continue to create materials that support advanced technologies and that cannot easily be imitated by other companies. We are developing a business model able to continue developing and bringing to market new, high-end, high-value-added products. Our primary domains are niche business fields shaped by extremely disruptive and rapid cycles of technological change.

Intellectual capital

Intellectual capital



- Sustaining high levels of R&D investment
- Improving R&D efficiency

High Ratio of R&D Costs to Net Sales

The Company's R&D budget is equivalent to roughly 8% of consolidated net sales, which is primarily used to strengthen R&D functions in Japan and overseas, including the U.S., South Korea, and Taiwan. Our main focus is on research into functional polymer materials and the development of applied technologies. We are also concentrating on the development of better microprocessing and high purification technologies for the cutting-edge electronics field, in addition to the development of related equipment and production technologies. In new business development, we are accelerating open innovation.

Refining Our R&D Strategy

R&D efficiency (operating income/R&D costs) has been improving as a result of efforts to further refine our strategies in R&D fields and the marketing of technologies.

Strategic Patent Portfolio

TOK has been expanding its portfolio of patents related to semiconductors, displays, and new businesses. The Company aims to develop reliable businesses with new promising technologies, and erect barriers to entry with its patent portfolio.

Human capital

Human capital



- Increasing investment in human capital
- Hiring foreign employees locally

Human Resources as a Company Asset

Based on the spirit of a frank and open-minded business culture, one of our management principles, the Company focuses its energy on creating safe and sound working environments where each and every employee can work in a motivated manner. The Company is also expanding investments in human capital in line with its human resources policy of never forgetting that business always starts with "people." The average annual salary at TOK has increased for nine consecutive years to reach ¥8.16 million*¹ as of December 31, 2018, and the average tenure figure rose to 20.8 years*¹, also increasing for a ninth straight year. The ratio of employees taking paid leave was 75.3%, much higher than the average of 58.4%*² for the manufacturing industry.

*¹ Non-consolidated basis

*² Source: Ministry of Health, Labour and Welfare's 2018 Summary of General Survey of Working Conditions for 2017 or fiscal 2016

Advancing Globalization of Personnel

The consolidated ratio of non-Japanese employees is on the rise, reflecting the expansion of customer-oriented sites overseas and an emphasis on merit-based hiring and promotions regardless of nationality. The Company has made progress appointing non-Japanese employees to top positions and promoting local hires to key positions at local subsidiaries. In sales and marketing departments in particular, local personnel who have a deep understanding of TOK's management principles and approach to marketing have made strong contributions to sales growth.

Social and relationship capital

Social and relationship capital



- Robust customer base and relationships based on trust
- Supplier engagement

Development of Customer-Oriented Sites Overseas

TOK has established manufacturing and development sites in the U.S., South Korea, and Taiwan where many of our customers are located. By introducing prototype production lines equal to customers' lines, we can quickly commercialize the results of development, and build a robust customer base with solid trust relationships in the fast-changing semiconductor/electronics industry.

Collaboration with Stakeholders Other Than Customers

As technical development in cutting-edge semiconductor fields grows increasingly difficult with each passing year, building ties with a variety of stakeholders aside from customers will become a key to solving issues and innovating on the technological front. TOK is working to build deep social and relationship capital through R&D. These efforts include discovering and supporting venture companies with superior technological capabilities, engaging in joint research with academics, and participating in a variety of consortiums.

Cooperation with Suppliers

The Company is strengthening and augmenting its engagement with suppliers, because cooperation with suppliers is essential to managing risks inherent in chemical substances, and because it is necessary to start at the raw material formulation stage in order to further raise the quality levels of its products.

Natural capital

Natural capital



- Creating environmental value through business activities
- Minimizing environmental risks

Provision of Environmentally Beneficial Products

One example of creating environmental value through business is our supply of photoresists that contribute to the miniaturization of semiconductors, which in turn reduces energy consumption. Furthermore, TOK has a top share* of the world market for g-Line and i-Line photoresists that are essential in the manufacture of power semiconductors used to conserve and control energy in renewable energy systems, electric vehicles and hybrid cars. Sales of g-Line and i-Line photoresists have reliably accounted for almost 10% of consolidated net sales.

* Share of sales volume for 2017 (Source: Fujii Keizai's "Whole View of Photo-functional Material and Product Market 2018")

Responsible Care Activities

As a manufacturer that handles chemical substances and uses large volumes of water in production processes, TOK focuses efforts on the minimization of environmental risk in the production process and throughout its supply chain. With laws, regulations and customer requirements regarding the management of chemical substances at increasingly high levels overseas, the Company also focuses on Responsible Care activities* as a part of its GMS (Group Management System) that reinforces the Group management structure globally.

* Activities in which companies handle chemical substances voluntarily take environmental, safety and health measures in every process from chemical substance development through manufacturing, logistics, use and final consumption to disposal and recycling, and announce the results of these activities while engaging in dialogue and communication with the public. (Defined by Japan Chemical Industry Association)



Our Material Issues

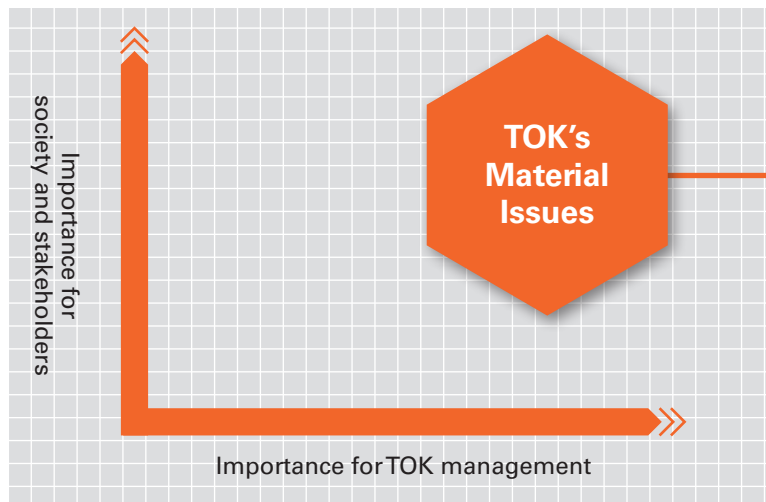
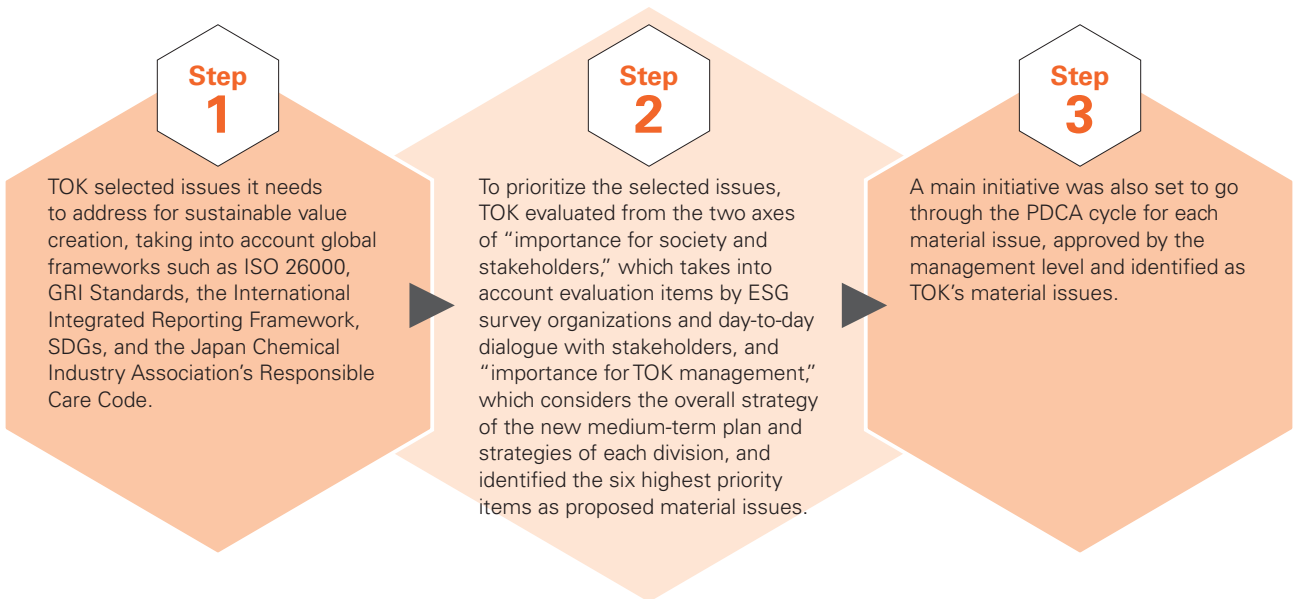
Identification of Material Issues for Enhancing Corporate Value

TOK has identified material issues to improve corporate value for further evolution of non-financial capital and to promote sustainable growth. Through efforts for these material issues, we aim to create shared value and enhance sustainable corporate value.

—Continuing Contributions to Society—






















TOK aims for sustainable enhancement of corporate value by contributing to resolving social issues through provision of high value-added products in cutting-edge fields, as well as sincerely and pro-actively fulfilling its social responsibilities through all of its activities (value chain). Going forward, we will focus on material issues, which are guidelines to respond to various stakeholders' expectations and trust, and to continue to "contribute to society," a management principle.

Material Issues Identification Process



Sustainable enhancement of corporate value through shared value creation

Material issues for enhancing corporate value

| Material issues | ESG fields | Key initiatives | Related SDGs |
|---|-----------------|--|--|
| Development and provision of high value-added products that will contribute to innovation | Social (S) | Further improve customer satisfaction |      |
| | | Contribute to innovation and solving social issues | |
| Environmental protection | Environment (E) | Promote environmental management |        |
| | | Address climate change issues | |
| | | Promote resource recycling | |
| | | Preserve air, water, and soil environments | |
| | | Preserve biodiversity | |
| Chemical substance management | | Precisely address laws and regulations |   |
| Enhancement of personnel measures | Social (S) | Strengthen personnel capabilities |     |
| | | Diversity and inclusion | |
| Occupational health and safety/security and disaster prevention | Social (S) | Respect for human rights and fair working conditions |   |
| | | Occupational health and safety/Reduction of risks posed by chemical substances | |
| Enhancement of corporate governance | Governance (G) | Strengthen the effectiveness of governance |  |
| | | Compliance | |
| | | Risk management | |

Our Value Creation
Solve social issues through business

Our Foundation
Sustainable foundation for value creation

Our Value Creation

Our Focus

Our Foundation

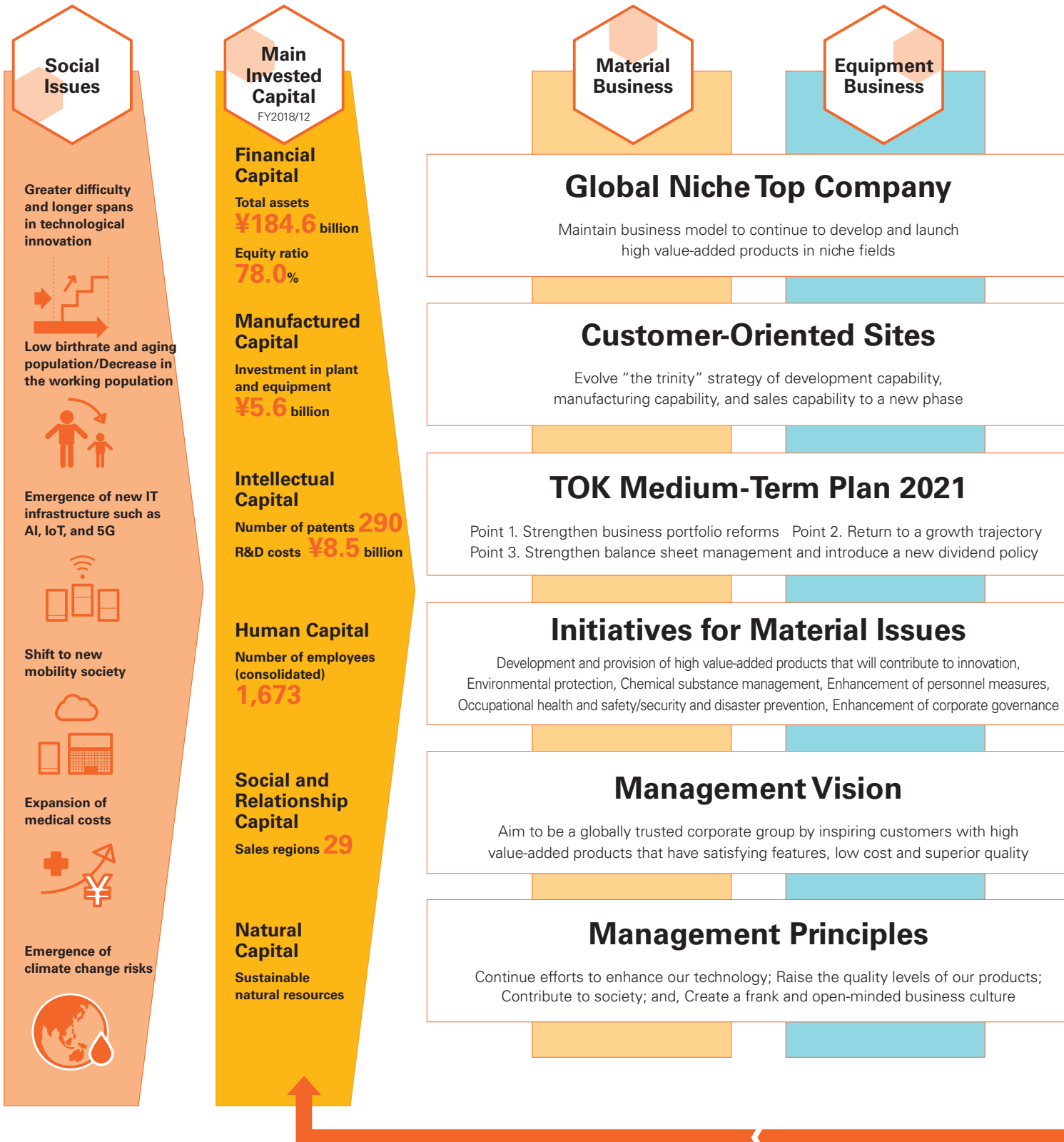
Data Section



Our Value Creation Process

TOK's Sustainable Value Creation Process

As a global niche top company, TOK is contributing to solving social issues by developing products that are useful to society and are not offered by other companies, based on a solid customer foundation it has built within and outside of Japan. Sustainable value creation in the semiconductor-related and electronics-related businesses, where technologies change at an extremely fast pace, is supported by a financial foundation with a super-long-term view, world-leading technological capabilities, constant R&D and investment in human capital.



Social Issues

Greater difficulty and longer spans in technological innovation



Low birthrate and aging population/Decrease in the working population



Emergence of new IT infrastructure such as AI, IoT, and 5G



Shift to new mobility society



Expansion of medical costs



Emergence of climate change risks



Main Invested Capital FY2018/12

Financial Capital

Total assets
¥184.6 billion
Equity ratio
78.0%

Manufactured Capital

Investment in plant and equipment
¥5.6 billion

Intellectual Capital

Number of patents **290**
R&D costs **¥8.5 billion**

Human Capital

Number of employees (consolidated)
1,673

Social and Relationship Capital

Sales regions **29**

Natural Capital

Sustainable natural resources

Material Business

Equipment Business

Global Niche Top Company

Maintain business model to continue to develop and launch high value-added products in niche fields

Customer-Oriented Sites

Evolve "the trinity" strategy of development capability, manufacturing capability, and sales capability to a new phase

TOK Medium-Term Plan 2021

Point 1. Strengthen business portfolio reforms Point 2. Return to a growth trajectory
Point 3. Strengthen balance sheet management and introduce a new dividend policy

Initiatives for Material Issues

Development and provision of high value-added products that will contribute to innovation, Environmental protection, Chemical substance management, Enhancement of personnel measures, Occupational health and safety/security and disaster prevention, Enhancement of corporate governance

Management Vision

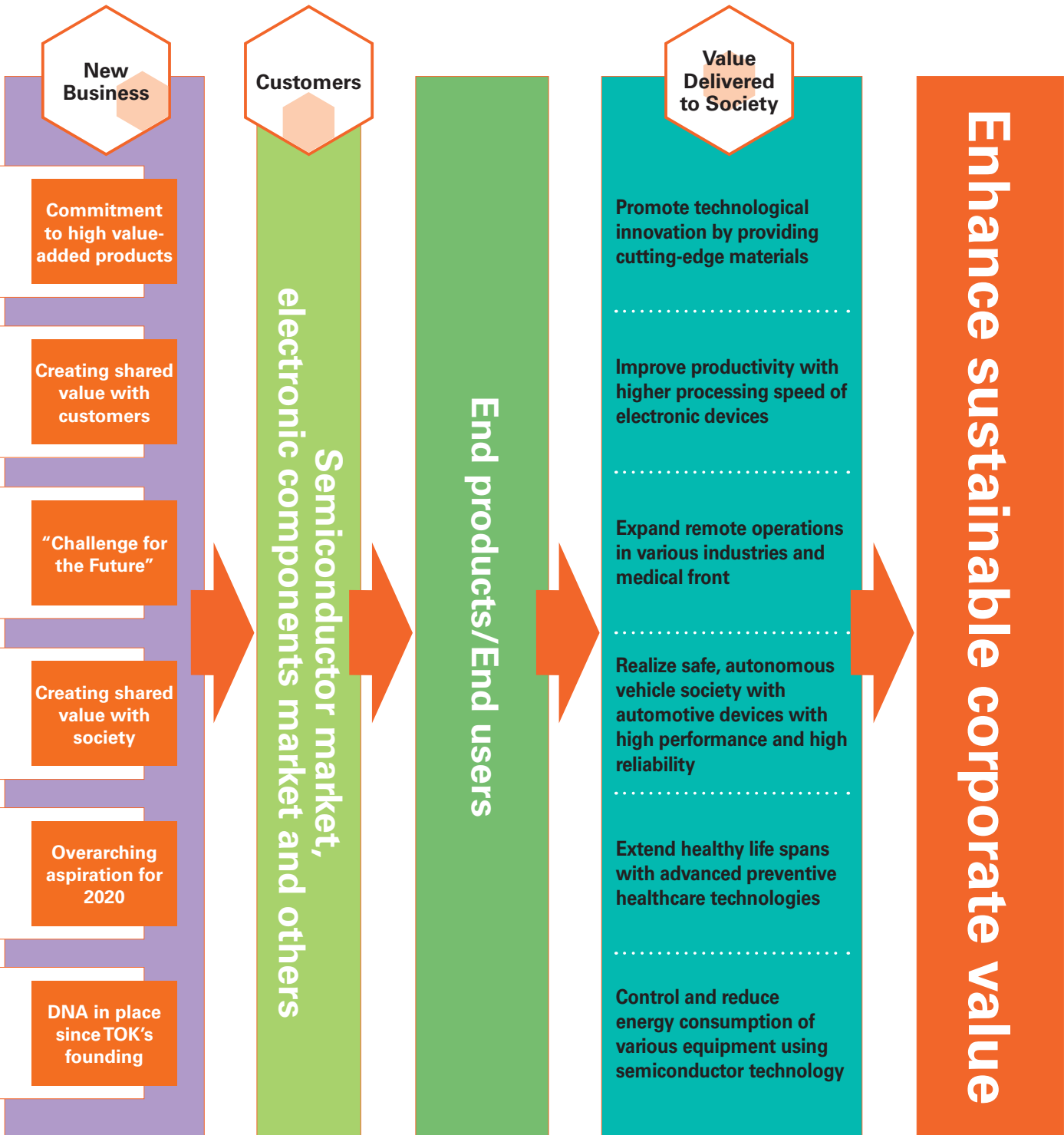
Aim to be a globally trusted corporate group by inspiring customers with high value-added products that have satisfying features, low cost and superior quality

Management Principles

Continue efforts to enhance our technology; Raise the quality levels of our products; Contribute to society; and, Create a frank and open-minded business culture

Under the TOK Medium-Term Plan 2021, we will create shared value by further evolving these management resources and focusing on initiatives for material issues and reinvesting toward sustainable value creation.

Performance targets for FY2021/12: Net sales **125.0 to 145.0** billion yen Operating income **15.0 to 20.5** billion yen



Reinvest toward sustainable value creation



TOK's Photoresists

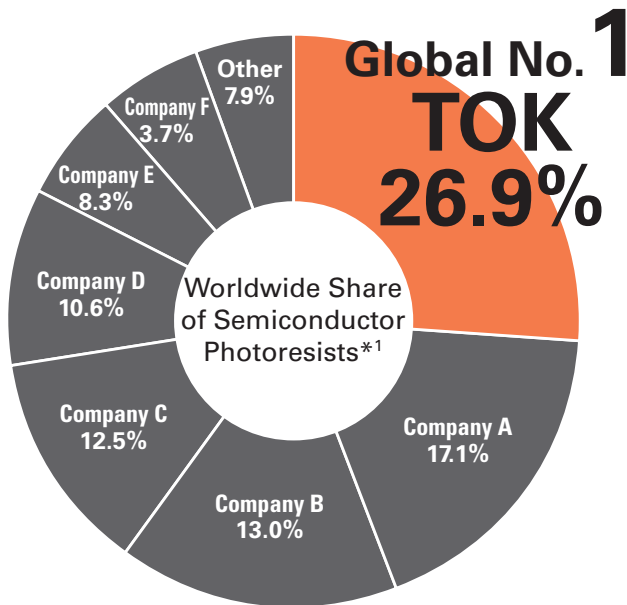
TOK is the world's No.1 manufacturer of photoresists, which are photosensitive materials indispensable for the manufacture of semiconductors. We will explain the functions and performance of photoresists in the semiconductor manufacturing process.

Breakdown

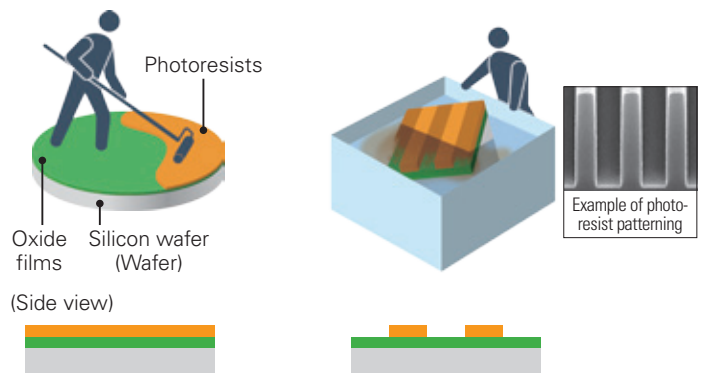
TOK's Semiconductor Photoresist Business

Front-end processes of semiconductor manufacturing

Process of making integrated circuits on a silicon circuit board and producing LSI chips. The process utilizes photoresists' resistance to etching.



*1 Based on actual total sales volume of ArF, KrF, g-Line and i-Line photoresists in 2017 (Calculated by TOK based on Fuji Keizai's "Whole View of Photo-functional Material and Product Market 2018")



Semiconductor manufacturing flow

Front-end processes

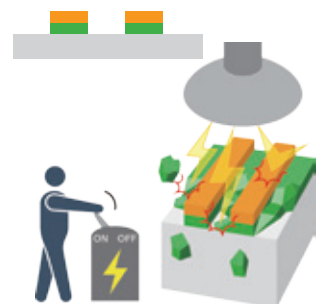
(2) Exposure

A photomask (circuit design) is transferred to the photoresist.



(4) Etching (Engraving)

Patterns are formed in the etching process. (Photoresist works as a protective film.)



Our Value Creation

We have accumulated deep knowledge of all front-end processes of semiconductor manufacturing through our engagement not only in photoresists, but also in high-purity chemicals and process equipment. This enables the creation of further high added value.



Creating Shared Value

Mount in various types of end products and create shared value

Our Strength

Providing photoresists that become growth drivers in both **front-end processes** and **back-end processes** of semiconductor manufacturing

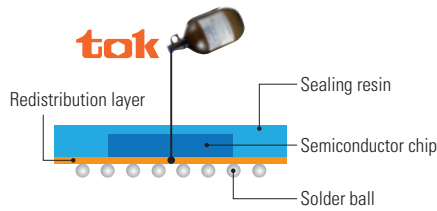
Achieving SDGs



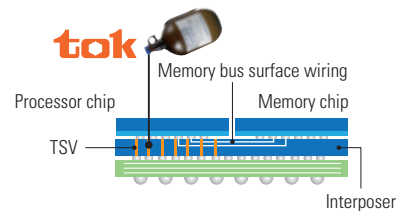
Back-end processes of semiconductor manufacturing

Process of dicing individual semiconductor chips and inserting in each type of packaging. The process utilizes photoresists' thick-film forming capabilities.

EX. 1 Fan-out wafer level packaging (FOWLP) with photoresists for RDL fabrication



EX. 2 2.5D interposer with photoresists for RDL fabrication



(5) Removal of photoresists
Photoresist having served its purpose is removed from the circuit board.

(7) Formation of insulation film and wiring
Aluminum or copper wirings are formed.

(9) Completion of an integrated circuit
Multiple ICs are created on wafer surface using microprocessing technology.

Semiconductor chips completed
After dicing, each wafer portion becomes a semiconductor chip.

(6) Formation of a semiconductor field
A semiconductor field is formed by coating with a diffusing agent and baking at high temperature.

(8) Formation of integrated circuits
ICs are formed by repeating the processes (1) through (7).

(10) Dicing of wafers
Wafer is diced into chip-sized components.

Back-end processes

Our Value Creation

Our Focus

Our Foundation

Data Section

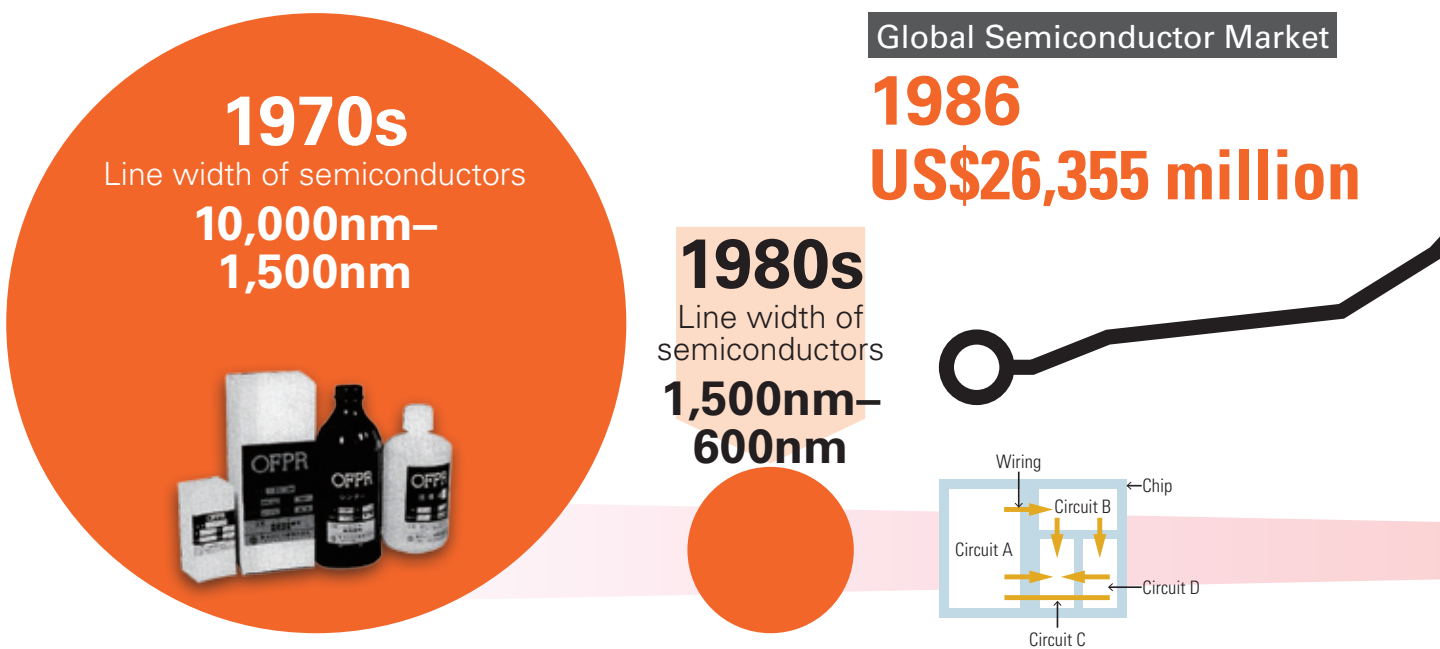
Core Values of the Photoresist Business

Even when making semiconductors with the same line width and specifications, the features required of photoresists and methods in which they are used can be vastly different depending on the semiconductor manufacturer. TOK's photoresist business provides finely tuned tailor-made products appropriately and swiftly for the different needs and requirements of each customer or process, contributing to the evolution of all types of industry and technological innovation and creation of an environmentally friendly society.

Semiconductor Line Width*¹ and Global Semiconductor Market Size*²

*1 Includes TOK's estimates for the decades shown

*2 Source: World Semiconductor Trade Statistics

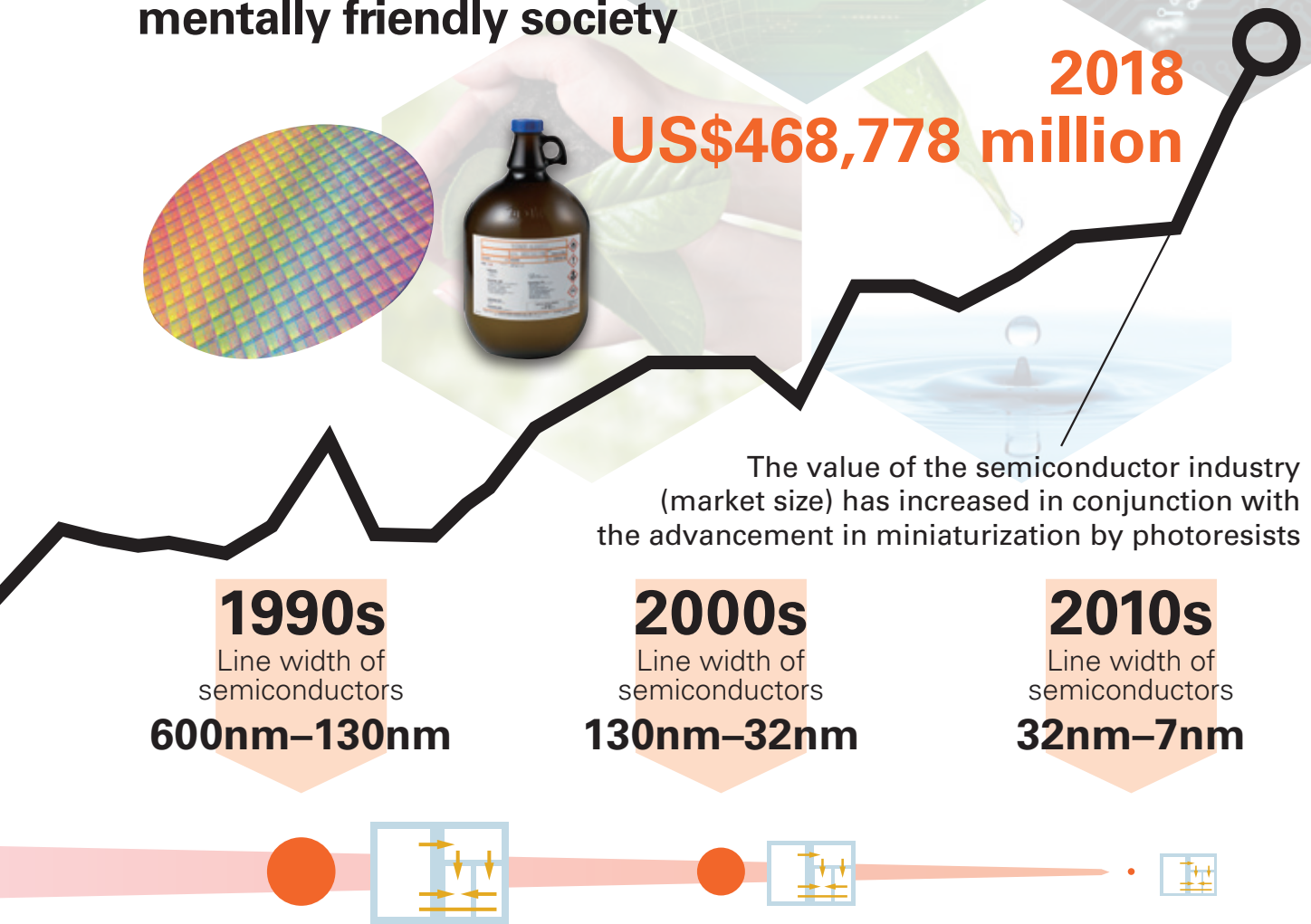


TOK's Core Values

Factors Adding Value to Semiconductor Photoresists

- Sensitivity
- Resolution
- Roughness*
* Fluctuations in line width
- Etching resistance
- Substrate adhesiveness
- Processing applicability
- Purity
- Substance safety
- Cost

Contributing to the evolution of all types of industry and technological innovation/creation of an environmentally friendly society



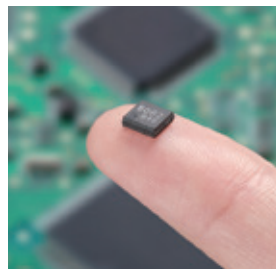
Our Value Creation

Our Focus

Our Foundation

Data Section

Higher processing speeds and lower manufacturing costs of semiconductors



Higher performance, greater compactness, lower power consumption, and lower cost of electronic devices

We have **the capability** of swiftly providing finely tuned tailor-made photoresists for the different needs and requirements of each customer or process



| | | | |
|------------|-----------|------------|-------------|
| Customer A | Process A | Process B | Process C |
| Customer B | Process 1 | Process 2 | Process 3 |
| Customer C | Process I | Process II | Process III |



TOK at a Glance

Business Portfolio

We are leveraging the Material Business, our current earnings driver centering on cutting-edge domains, and realizing synergy with our Equipment Business, which is cultivating new niche business domains.

Material Business

Develops high value-added products as an earnings driver

Electronic functional materials

Photoresists

Widely used materials indispensable for the **microprocessing** of devices including semiconductors, LCDs, and other electronic products



High-density integration materials

Packaging photoresists and MEMS materials compatible with **multilayer stacking** accompanying advances made in semiconductor microprocessing



High-purity chemicals

High-purity chemicals

Developing solutions, clean solutions, rinsing solutions, thinners and other chemicals with **world-leading high purity**



Inorganic and organic chemicals

Chemicals used in a wide range of industries



Other
0.1%

Material Business:
Electronic functional materials
55.9%

Equipment Business

Getting one step ahead of market needs in synergy with the Material Business

Process equipment

Semiconductor manufacturing equipment

TOK's Zero Newton wafer handling system that enables significant increases in efficiency of the **3D packaging process** of semiconductors



LCD panels manufacturing equipment

Various types of process equipment including UV curing machines used to manufacture **flexible displays**, coating machines that can achieve high-precision performance, and coating machines for R&D



Equipment Business
2.5%

Material Business:
High-purity chemicals
41.5%

FY2018/12
Consolidated
net sales
105.2
billion yen

Materials

Equipment

—M&E (Materials & Equipment) Strategy—

Material Business



Strengthen our value creation in all directions in the 2D and 3D semiconductor markets

SWOT analysis by segment
>>> Refer to pages 58 and 62

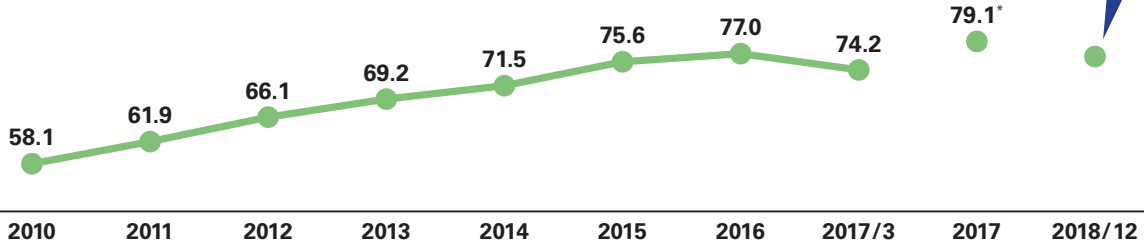


Equipment Business

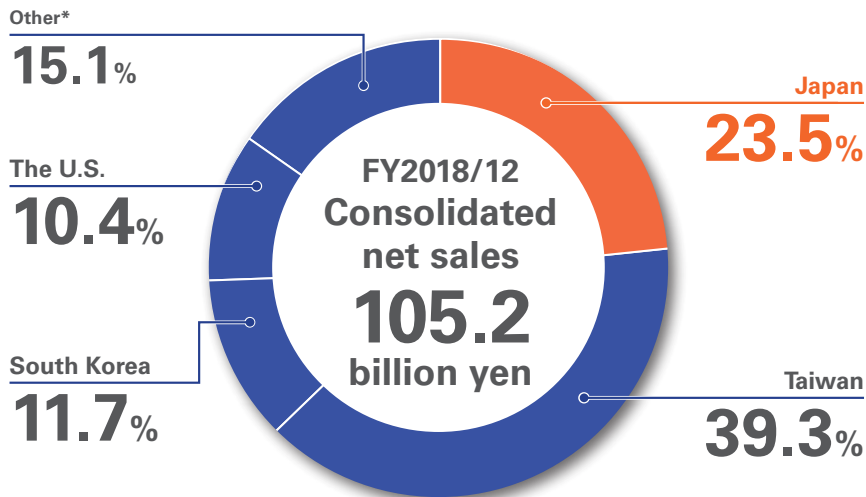
Global Expansion

As a result of our focus on the semiconductor field and strategy of building close relationships with customers, overseas net sales account for approximately 75% of consolidated net sales, and are on an upward trend.

Overseas sales ratio (%)



* Due to a change in fiscal year-end, the fiscal year ended December 31, 2017 was an irregular nine-month period in Japan, and 12 months overseas.



* Other: China, Europe, and Singapore, etc.

Japan

Headquarters/Five plants/
Two operation centers/
Distribution control center

- Headquarters (9 sites)
- Number of employees (consolidated): 1,199

The United States

TOKYO OHKA KOGYO AMERICA, INC.

- 1 local subsidiary (2 sites)
- Number of employees (consolidated): 113

South Korea

TOK Advanced Materials Co., Ltd.

- 1 local subsidiary (1 site)
- Number of employees (consolidated): 121

Taiwan

TOK TAIWAN CO., LTD.

- 1 local subsidiary (3 sites)
- Number of employees (consolidated): 175

* Number of employees: as of December 31, 2018

Product Portfolio

We excel in niche areas in both the front-end process and back-end process of semiconductor manufacturing, and we excel at both miniaturization and 3D packaging. We also offer cutting-edge value in the fields of high-purity chemicals, which are non-photosensitive materials, and equipment.

| | | | | |
|---|--|---------------------------------|--|--|
| <h3>Semiconductor Manufacturing Field</h3>  | | | g-Line/i-Line Photoresists Global No.1* | KrF Excimer Laser Photoresists Global No.1* |
| ArF Excimer Laser Photoresists | EUV (Extreme Ultraviolet) Photoresists | EB (Electron Beam) Photoresists | | |
| Interlayer Insulating Film | Diffusing Agents | Materials for Shrink Process | | |
| Materials for Cover Coat | Directed Self-Assembly Materials (DSA) | High-Purity Chemicals | | |
| <h3>Semiconductor Packaging Manufacturing Field</h3>  | | | Bump Photoresists | Resists for Wafer-level CSP |
| | | High-Purity Chemicals | | |
| <h3>Image Sensor/MEMS Manufacturing Field</h3>  | | | Materials for Photosensitive Permanent Films | Resists for Micro Lens |
| | Lift-off Resists | High-Purity Chemicals | | |
| <h3>3D Packaging Field</h3>  | | | 3D Packaging Equipment Zero Newton | Adhesive Materials |
| | | High-Purity Chemicals | | |
| <h3>Panel Manufacturing Field</h3>  | | | TFT Resists | Resists for Color Filters |
| | Resists for Organic EL | UV Curing Machines | | |
| | High-reliability Transparent Materials | High-Purity Chemicals | | |
| <h3>High-Purity Chemicals</h3>  | | | Clean Solutions | Thinner |
| | Organic Chemicals | Developing Solutions | | |
| | Inorganic Chemicals | | | |

VALUE

VALUE

* Share of sales volume for 2017 (Source: Fuji Keizai's "Whole View of Photo-functional Material and Product Market 2018")

Main Target Markets, Applications, and End Products, etc.

All of TOK's products are based on the B-to-B business, and people never see our products in their daily lives. However, these materials are essential for the evolution of end products, and they contribute to various innovations and to solving a range of social issues.



To Our Stakeholders — A Message from the President —



Challenge for the Future

I will drive TOK's sustainable value creation by strengthening our marketing to "Meet Social Expectations with Chemicals."

Noriaki Taneichi

Representative Director, President & Chief Executive Officer



TOK's Value Creation

◆ Providing High Added Value for Customers in All Our Output

The smartphone has become embedded in our lifestyles, as an essential part of our daily lives. The maturing smartphone market is unlikely to grow much more, given its large size already. In the coming era of 5G and IoT, however, the smartphone is evolving into a “hub” of new innovations, as one of the most important items that connect people with society. Smartphones compatible with 5G are forecast* to spread at a faster pace than previous mobile phones.

Do you know how much the data storage capacity of a major smartphone brand has increased over the 11 years since it emerged in the U.S. in 2007? It has actually increased 128 times. This could not have been achieved without fine chemical manufacturers like TOK supplying unceasingly evolving photoresists and other materials to global semiconductor manufacturers, helping them narrow the line width of semi-

conductors to less than one quarter of what they were 11 years ago. This advance, called semiconductor miniaturization, has allowed higher performance and smaller sizes in not only smartphones, but also many other types of electronic devices.

Semiconductor miniaturization has continued to contribute to the sustainable development of society by improving environmental performance and ensuring safety and security in our daily lives.

In addition to photoresists, all of our products and services deliver high added value for customers. Our products start as an input in the value creation process of customers, and have a special influence on the quality of customers’ output in terms of product quality and yields. In other words, the “Development and provision of high value-added products that will contribute to innovation,” one of TOK’s material issues, entails contributing to industrial evolution and technological innovation by providing high value-added tailor-made products alongside customers on the cutting edge of the world of technology. I believe this is the true essence of value creation at TOK, and a driving force behind the creation of shared value for our customers and society, which helps solve social issues.

* Source: IHS Markit

◆ Meeting Customer and Social Expectations with Chemicals

The semiconductor industry accounts for about 0.5%*¹ of global GDP, but the ripple effects are several ten times higher than this figure when including the impact semiconductors have on final products and other industries. Semiconductors are essential for industry, and have been one of the most important industries from the standpoint of solving issues faced by the human race and for the sustainable development of society. Make no mistake, the value delivered by semiconductors will continue to increase into the future as well. Moreover, this means that the social responsibilities and public mission of TOK, as the world’s leading*² manufacturer of photoresists, an irreplaceable material in semiconductor production, will only increase in importance.

Since being offered the position of president of TOK last year, I had been thinking about my final decision. The reason why was because I was regretful for the slow progress made

on reforming the business portfolio in the final year of the “TOK Medium-Term Plan 2018” as the person in charge of new business development, and also because I had spent the previous 14 years focused on marketing to create new business pillars to complement photoresists. I

needed this time to ask myself what only I could accomplish as president of TOK, and also to reassess the *raison d’être* for TOK in society.

While mulling for several months, I noticed that two Japanese characters in the Company’s name (Ohka) mean more than “applied chemistry.” They also mean to “meet expectations with chemicals,” and this is where TOK finds its *raison d’être*. The process of “meeting customer expectations with chemicals,” and ultimately solving the social issues behind customer expectations, is fundamentally the marketing that I had poured my heart into for many years. Once I realized this, it clearly dawned on me what my mission is. I will drive the creation of new value by further enhancing our marketing and continuing to hone our world-leading technological capabilities that have been accumulated over the past 80 years or so.

*1 Based on 2017 results (calculated by TOK based on data from the World Bank and World Semiconductor Trade Statistics)

*2 Share of sales volume for 2017 (Calculated by TOK based on Fuji Keizai’s “Whole View of Photo-functional Material and Product Market 2018”)

Honing our world-leading technological capabilities while further enhancing marketing

◆ **Becoming a “100-Year Company” in 2040**

Another reason to enhance marketing is to fortify TOK's ability to sustainably create value.

Our founder Shigemasa Mukai's philosophy has been passed down through the generations, and TOK has sustained growth with a business model that prioritized the continued development and introduction of high value-added products to the niche markets with rapidly changing technologies. With this in our DNA, we will not waver from the basic strategy of continuing to advance our world-leading high purification technology and microprocessing technology while staying in tune with customer needs.

However, to expand profits further and become a “100-year company” in 2040, we must continue to prosper in existing businesses while building new earning pillars. The pace of technological change in the electronics industry has accelerated, and development has become increasingly difficult every year. In the context of prospering and establishing new earning pillars against this backdrop, starting development after discussions with customers is already too late. We must enhance our marketing strategy to quickly build a marketing model in which we proactively repeat the cycle of hypothesis and verification.



◆ **Meeting Social Expectations with Chemicals for a Sustainable Earth**

While solidifying our ability to sustainably create value, we will continue to put into practice the four management principles we have had since our founding: “Continue efforts to enhance our technology,” “Raise the quality levels of our products,” “Contribute to society,” and “Create a frank and open-minded business culture.”

Given the rapid pace of change in the business environment and deepening seriousness of social issues such as climate change, I felt we must slightly reinterpret these four management principles in order to increase their effectiveness while redoubling our efforts. Going forward, we will put our management principles into practice based on a rewritten mission to “Explore new technologies and enhance technological capabilities to meet social expectations with chemicals for a

sustainable earth.”

By “meeting social expectations with chemicals,” we aim to enhance marketing and realize an abundant society with more conveniences. TOK will continue to refine its strengths that facilitate sustainable value creation on the cutting edge, while listening to the voices of its customers and working closely with them in various regions around the world. At the same time, we will improve our ability to take a bird's eye view of trends in society and markets.

The newly added “for a sustainable earth” reflects the rather large role that TOK should play in combating the increasing risks caused by climate change. For example, data

servers for the cloud computing environments that have grown exponentially over the past few years use a fair number of cutting-edge semiconductors that consume less power, but more electricity than is saved on the semiconductor side is required for air conditioning systems to cool down these computers. This

is because excess unconsumed energy is released as heat, one issue that we intend to solve by advancing semiconductors and the materials used to make them.

I majored in chemistry at university, partially out of concern for environmental problems, and I have long been very interested in environmental-related businesses. As products related to technologies that control electrons, TOK has provided cutting-edge photoresists that help reduce power consumption in semiconductors, i-Line photoresists for power semiconductors, as well as 3D packaging equipment and plasma ashing systems for power devices. TOK will develop materials that contribute to technologies for controlling heat and light in a bid to create new environmentally friendly products. In terms of technologies for controlling heat, we are developing high-functional films with high heat resistance, high chemical resistance, and ultra-low dielectric constants for use in high value-added lithium-ion batteries, for example. In terms of technologies for controlling light, TOK has been advancing joint development with Pixelligent Technologies, LLC in the U.S., in which it made an investment in April 2018, with the aim of creating high refractive index materials that should considerably help reduce power consumption.

In addition to these initiatives, TOK will enhance marketing in environmental-related fields while expanding its lineup of high value-added environmentally friendly products. The Company is in position to promote the creation of value for a sustainable earth.



Continue to hone our strengths that enable sustainable value creation on the cutting edge while working closely with customers

TOK Medium-Term Plan 2021



Review of the “TOK Medium-Term Plan 2018”

TOK recorded its first operating loss since going public in the fiscal year ended March 31, 2009, soon after the collapse of Lehman Brothers. Although the Company secured operating income in the following year of 2010, thanks to business structural reform, in order to reenergize shaken employee morale and aim for a new stage of growth, TOK formulated “Overarching aspiration” as its long-term management vision targeting 2020, 10 years into the future. Under the “TOK Medium-Term Plan 2018,” launched as a three-year plan for achieving our numerical target for operating income of ¥20 billion in 2020, we endeavored to “Reform business portfolios,” “Evolve strategy of building close relationships with customers,” “Develop global personnel” and “Strengthen management foundation” while making aggressive strategic investments.

Although TOK was able to see results in line with objectives for KrF excimer laser photoresists for 3D-NAND, high-density integration materials and high-purity chemicals, the Company was unable to get major customers to adopt its ArF excimer laser photoresists as expected, partly resulting from delays in major customers’ production plans, and it encountered delays in developing the Equipment Business and new business. As a result, operating income did not meet the target of ¥15 billion in the final year of the plan. Even though the global semiconductor market was expanding on an unprecedented scale, we regret disappointing many of our shareholders and investors by not reaching a new record high in profits, despite being the subject of their interest as a company with advantages in miniaturization, higher densities, and 3D packaging. During the new medium-term plan, TOK aims to stage a comeback in areas that led to the shortfall, namely ArF excimer laser photoresists, the Equipment Business, and the creation of new businesses.

However, TOK made considerable progress setting a foundation for sustainable growth in the future. The Company was able to secure a good position in the development of EUV photoresists for the 7nm node on the cutting edge of semiconductor miniaturization, thanks in part to results from open innovation. We successfully developed and won a major contract for ultra-high-performance clean solutions for the 10nm node. Our strategy of building close relationships with customers has advanced to a new stage, as we are building development systems even closer with this customer for reaching even

greater levels of miniaturization. In high-density integration materials, sales have grown to roughly quadruple their level six years ago, reflecting strong growth in materials for fan-out wafer level packaging, which contribute to the smaller sizes and lower energy consumption of smartphones, and MEMS materials, which enable high-density integration. I was extensively involved in the launch of this business about 10 years ago, coming up with a marketing strategy while working closely with the development team. Our decision to specialize in the development of next-generation high-resolution positive photoresists and not immediately enter the market was the right move in hindsight. With this as a model example of TOK’s future marketing strategy, we will steadily tackle growing customer needs in the 5G and IoT era.

With the preparations we made during the “TOK Medium-Term Plan 2018,” we will return to a growth trajectory while firmly leveraging our reinforced R&D and production bases inside and outside Japan. The “TOK Medium-Term Plan 2021,” launched in the fiscal year ending December 31, 2019, was created with “meeting customer and social expectations with chemicals” in mind.

Return to a growth trajectory by steadily reaping the benefits of preparations made to date

Basic Policies and Targets of the “TOK Medium-Term Plan 2021”

Under the “TOK Medium-Term Plan 2021,” we continuously aim to be a globally trusted corporate group by inspiring customers with high value-added products, the “Overarching aspiration for 2020” in our long-term management vision. Our qualitative goal is to “Cultivate niche markets that the TOK Group should develop.”

With the semiconductor industry likely to expand over the long term, TOK is prepared to aggressively pursue business opportunities in the Chinese market in particular. However, due to strong uncertainties arising from semiconductors being a focal point of the trade friction between the U.S. and China recently, we have set ranges for quantitative targets, and aim for operating income in the ¥15.0–20.5 billion range for the fiscal year ending December 31, 2021. With this target, we are focusing on measures to strengthen business portfolio reforms and return to a growth trajectory with the aim of attaining record-high profits in the second year of the plan. While this would be one year later than our target for operating income of ¥20 billion in 2020, we are keen to achieve this target.

◆ Growth Drivers in 5G, IoT and Innovation

As growth drivers for strengthening business portfolio reforms, we are focusing on maximizing opportunities that will arrive in the coming 5G and IoT era. It is estimated* that 5G will add a total of \$2.2 trillion to the global economy by 2034, and account for 5.3% of GDP growth, and semiconductors are likely to represent a large portion of this.

In addition to smartphones and tablet devices, all sorts of things, like automobiles, home appliances, and industrial equipment, will be connected to networks, and data obtained from various sensors will be processed digitally. All of these devices will require high-speed data processing capabilities in a society with 5G and IoT. Semiconductors will continue to see even greater demand for higher performance. Leveraging the advantages of 5G, namely high-speed, high capacity, low latency, and multiple simultaneous connections, it will become possible to alleviate personnel shortages in healthcare, construction, and logistics situations through remote operations. The spread of 5G and IoT will make it possible to solve a variety of social issues like this.

The TOK Group will focus on the following business strategies leveraging its technological capabilities accumulated over many years in the semiconductor front-end (miniaturization) and back-end (packaging, 3D packaging, etc.) processes, as well as its close relationships of trust with customers on the cutting edge of technology. TOK aims to help solve many issues faced by society while achieving the quantitative targets in the “TOK Medium-Term Plan 2021.”

* Source: GSMA Intelligence “The Mobile Economy 2019”

◆ ArF/EUV Photoresists

In ArF excimer laser photoresists for 10nm-level semiconductors, which are likely to be increasingly used in mobile devices, HPC*, game consoles and 5G base stations, TOK targets higher sales in the U.S. and South Korea, where customers have already adopted our photoresists, while seeking to expand sales in China. The Company also aims to steadily increase sales of EUV photoresists for 7nm semiconductors in Taiwan, where mass production is ramping up.

* High Performance Computing: Massive calculations and data processing performed by super computers and other high-performance computers

◆ KrF/i-Line Photoresists

In KrF excimer laser photoresists for 3D-NAND, which is expected to find greater use in data servers, mobile devices, automotive equipment and 5G base stations, TOK will firmly latch onto opportunities presented by more layers being added to 3D-NAND, along with higher production volumes, in Japan and Asia. For i-Line photoresists, TOK is engaging in R&D to create more added value to meet new emerging needs in line with advances in semiconductor devices.

◆ High-Purity Chemicals

As with ArF excimer laser photoresists, the Company plans to increase sales of clean solutions and high value-added thinner to customers that have already adopted our products for 10nm-level semiconductor processes in North America and Taiwan. Moreover, TOK will make efforts to expand sales of high-purity chemicals in China.

◆ High-Density Integration Materials

Among high-density integration materials for semiconductor devices, which are likely to be used in mobile devices and HPC applications, TOK intends to maintain its share in packaging materials with existing customers, while focusing on expanding sales to OSAT* manufacturers and winning adoption for cutting-edge processes. In MEMS materials, the Company aims to increase sales for high-frequency devices and expand the customer base in order to increase sales further.

* Outsource Assembly and Test: A business model that only entails the back-end process for semiconductor foundries

◆ Equipment Business

As the core product of the Equipment Business, TSV* equipment is the most promising piece of equipment for semiconductor 3D packaging and high-integration technologies. However, earnings have been stagnant in this segment due to the slow launch of the TSV market. Investors and analysts have criticized our strategy, suggesting we integrate it with the Material Business segment or withdraw entirely.

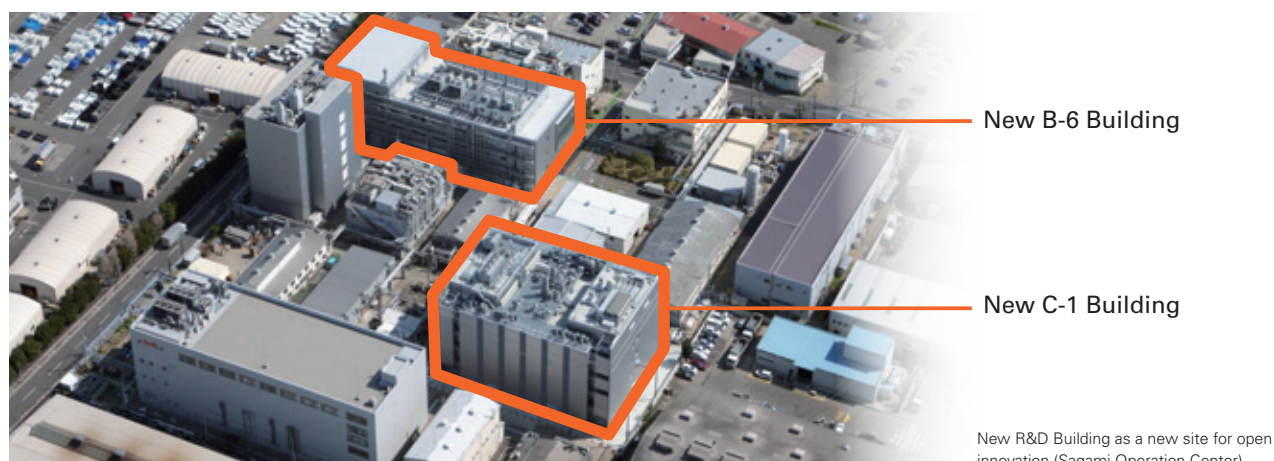
However, the Company’s Equipment Business focuses on niche domains that differ from major equipment manufacturers. We are focusing our energies on the M&E (Materials & Equipment) strategy for proposing “processes” that draw out the maximum potential of the characteristics of materials, based on our deep knowledge of semiconductor materials. Recently, our plasma ashing system and TSV equipment have been adopted for the production of power devices. We are confident that there are still many opportunities for growth backed by the Company’s strengths and recent social issues. To address the high cost structure, a feature of providing original solutions for each process at customers, we are moving ahead with measures to increase efficiency including integration of a related subsidiary and cost reduction.

* Through Silicon Via



M&E (Materials & Equipment) Strategy

Aim to achieve the quantitative targets in the “TOK Medium-Term Plan 2021” and help solve the many issues faced by society



◆ New Business

New business development plays a crucial role in strengthening business portfolio reforms. TOK is concentrating resources in the three fields of high-functional films, optical materials, and life science-related materials.

In high-functional films, an application of the Company's dry film photoresist technologies to porous polyimide, TOK is focusing on the expansion of sales and development of applications, as customers have begun to adopt our films in separators for lithium-ion batteries used in special applications that require high heat resistance and safety.

In optical materials, which enable both control and sensitivity of light, we are leveraging our production expertise for photoresists to develop nanoimprint materials and high refractive index materials.

In life science-related materials, the Company is keen to expand sales in Europe with biochips leveraging our photoresist technology beginning to be used in DNA sequencers*.

* DNA sequencer: This system rapidly decodes the base sequences of DNA, and is expected to contribute to the advancement of medical care and drug discovery.

◆ Investment Plan

TOK plans to spend a total of ¥31 billion on capital investments over the next three years in order to smoothly execute the aforementioned business strategies and maintain investments with long-term perspectives extending into and beyond the next medium-term plan.

Overseas, the Company is expanding production facilities in the U.S., South Korea, and Taiwan, and reaping benefits from R&D conducted during the previous medium-term plan while making preparations for future growth.

In Japan, TOK continues to invest in the Sagami Operation Center, its main R&D site for core technologies. Moreover, the Company is investing in a super clean room for the development of next-generation miniaturization products, and is constructing an open innovation facility to create new value with many stakeholders, which will be completed in September 2019.

◆ Company-Wide Strategies for Sustainable Value Creation

The series of business strategies and investment plans I have described so far have been formulated within the scope of our projections at this juncture, but actual technological innovation could exceed our expectations, or the projections of anyone else, and place unprecedented demands on speed.

With this in mind, the TOK Group intends to focus on the following four company-wide strategies and reinforce balance sheet management, in order to rapidly respond to sudden changes in the future, and to realize sustainable value creation.

Implement business strategies to steadily address recent needs, and company-wide strategies to realize sustainable value creation

◆ Company-Wide Strategy (1)

Accurately identify and rapidly address the customers' voice to build an even larger and stronger pipeline to customers—Rapidly and steadily work to develop a support structure rigorously focused on customer satisfaction along with R&D

Approximately five years have passed since the Company embarked on its strategy of building close relationships with customers, developing “the trinity” of development, manufacturing, and sales by establishing local sites close to customers in the U.S., South Korea, and Taiwan, the leaders in cutting-edge semiconductor fields. These local customers have adopted many of our products, especially our cutting-edge products. Our strategy of building close relationships with customers has become the norm, and is deeply ingrained in all employees at all front lines of the Group. On the other hand, every year the level of difficulty increases in developing products for cutting-edge fields, leading to an increase in projects requiring the collective capabilities of the TOK Group, and not just the resources of local sites overseas.

In this context, TOK plans to make its pipelines to customers larger and stronger by rapidly providing local customers with the highest added value from any site in the world.

◆ Company-Wide Strategy (2)

Strengthen marketing, increase understanding of the customers' value creation processes and translate these efforts into new value creation—Through rigorous marketing, TOK will carefully identify solutions that lead to the creation of new value for customers as it makes intensive and proactive efforts to address those solutions

As we described above, our capability to develop high value-added tailor-made products by listening to customers and working closely with them over and over again is a strength of TOK that has been passed down since its founding. When I joined the Company, my superiors told me to simply get out of the office and visit customers, ingraining in me the importance of face-to-face communications. As a result of putting this idea into practice in Taiwan and the U.S., TOK was honored with best supplier awards from a major customer in the U.S. TOK will maintain this ability to work with customers, and will enhance its ability to sustainably create value. To this end, we will strive to resolve issues customers have not noticed yet, using our technologies based on proactive hypotheses and verifications of customers' value creation processes.

Supplier awards received in recent years

● Intel Corporation
"Preferred Quality Supplier (PQS) Award"
(2018, 2016)

● Texas Instruments Inc.
"Supplier Excellence Award" (2018)

● Taiwan Semiconductor Manufacturing Company Limited
"2017 Excellent Performance in Lithography Material"
"IMQR Award" (2016)



◆ Company-Wide Strategy (3)

Strengthen human resources who can perform research, make decisions, and take actions on their own initiative—Bolster human resources that will pursue the possibilities of business with a variety of customers and continue to tackle challenges until they succeed

With close communications with customers embedded in its DNA, TOK has grown allowing customers to shape our HR development. In semiconductor-related business, sales to overseas customers now account for almost 80% of the total, and enhancing training for young employees has become an urgent issue. Accordingly, the Company plans to create a training system that mainly focuses on practical hands-on training in addition to classroom instruction during the first year of the "TOK Medium-Term Plan 2021," and then launch the new training system in the second year.

We are also augmenting our training system for employees in overseas sites. One of my most precious assets is the experiences I had in the semiconductor photoresist business for six years each in Taiwan and the U.S., which exposed me to the business philosophies of our customers overseas, as well as the experience I gained managing local employees. Based on these experiences, I aim to strengthen our human resources at overseas sites.

◆ Company-Wide Strategy (4)

Strengthen management foundation

The Group Management System (GMS) is an initiative TOK undertook during the previous medium-term plan to prevent potential risks from emerging and to minimize the impact of such risks in all of the activities of the Group, since overseas sales account for roughly 80% of the total. In the current medium-term plan, the Company aims to increase the sophistication of the GMS. TOK has reinforced corporate governance, establishing the Nomination and Compensation

Advisory Committee in December 2018, appointing a Chairman and Representative Director in January 2019, and issuing corporate governance guidelines in April 2019. Under this new structure, the Company

will pursue more effective corporate governance. To use management resources more efficiently, we continue to focus on balance sheet management, as explained below.

◆ Strengthen Balance Sheet Management

TOK intends to strengthen balance sheet management in continuation from the previous medium-term plan, focusing on an optimal balance between investment, cash reserves, and shareholder returns while responding to changes in the business environment.

TOK will ensure it has sufficient cash reserves to continue with the development of technologies that distinguish itself from rivals, taking on challenges even if development time frames become considerably longer. At the same time, management aims to improve ROE by enhancing asset efficiency while monitoring indicators such as ROIC and IRR. The Company will maintain R&D functions and expand production capacity at overseas sites, and keep risk reserves for rapidly restoring and rebuilding operations when the unexpected happens, including major disasters. TOK will ensure it has the wherewithal to fulfill its responsibilities as the world's leading supplier of photoresists.

◆ New Shareholder Return Policy and Dividend Policy

TOK has updated its policies on shareholder returns and dividends for shareholders by more clearly explaining its approach to cash reserves with an emphasis on the steady and continuous return of profits to shareholders.

Starting with year-end dividend for the fiscal year ended December 31, 2018, the Company adopted a dividend policy that targets a DOE of 3.5% and increased the annual dividend by ¥32 to ¥96 per share. Management plans to distribute an annual dividend of ¥120 per share, up ¥24, for the fiscal year ending December 31, 2019.

As before, TOK flexibly conducts share buybacks as a means of returning profits to shareholders.

Updated our policy for steady and continuous shareholder returns, targeting a DOE of 3.5%

Aiming to Create Shared Value

◆ Putting Our “Contribute to Society” Corporate Philosophy into Practice throughout Our History

As discussed above, during a few months after being offered the position of President, I thought over the *raison d'être* for TOK in society, and took a long look back at TOK's involvement in society over the course of its history.

Since its founding, “Contribute to society” has been a core aspect of the Company's management philosophy, and TOK has had no shortage of opportunities to put this principle into practice in various situations. For example, our founder Shigemasa Mukai endeavored for six years to finally develop high-purity potassium hydroxide in 1934, an essential material in batteries for hard hat lights worn by coal miners back then. TOK played an instrumental role in improving the safety of coal mines, a major social issue during the early Showa era.

Furthermore, in 1955, TOK was the first company to successfully produce high-purity potassium silicate in Japan, a product it called Ohkaseal. This material lowered the cost of cathode-ray tubes used in black and white TVs, hastening their proliferation in households. Soon after World War II, Japanese citizens had a new form of entertainment in their lives that formed a cornerstone of the information society.

Among the experiences I have had since joining TOK in 1986, one of the most remarkable was TOK's development of the Spinless® coater in 2003 as a key piece of equipment for LCD production. The Spinless® coater reduced the amount of photoresists required in production by one-third, and even though this meant the Company's shipments of photoresists would decline, the Company prioritized the release of this product in order to reduce the impact on the global environment and help customers cut costs.

Moreover, TOK has made even greater contributions to society than these contributions in the display field by helping to reduce power consumption through the miniaturization of semiconductors, and providing photoresists and equipment for power devices, as has been mentioned before.

◆ Identification of Material Issues to Enhance Corporate Value

Taking stock of these contributions to society that TOK had made through these businesses, management created a list of material issues for enhancing corporate value as the first step for organically linking together its growth strategy to become a “100-year company” and the development of new businesses that will become its second and third pillars of earnings. The material issues for the TOK Group have been identified as “Development and provision of high value-added products that will contribute to innovation,” “Environmental protection,” “Chemical substance management,” “Enhancement of personnel measures,” “Occupational health and safety/security and disaster prevention,” and “Enhancement of corporate governance.” By aiming to contribute to the achievement of SDGs related to these material issues, TOK will strive to sustainably increase corporate value and create shared value.

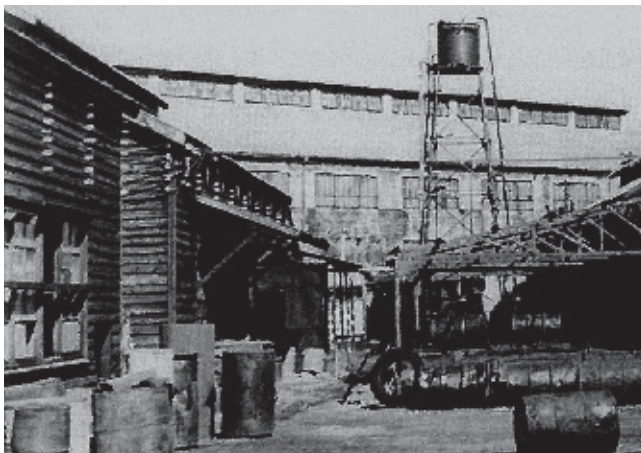
◆ Formulation of the 2030 Vision

There are about 18 months left until the final fiscal year of our “Overarching aspiration for 2020” that was created in 2010. Our long-term management vision will remain “Aim to be a

globally trusted corporate group by inspiring customers with high value-added products.” At the same time, TOK began to formulate its 2030 Vision this fiscal year, including new quantitative targets.

We are now running simulations of potential changes in the business environment and management resources over the next decade with senior department manager-class employees who will steer the operations of the Group in 2030. Using a backcasting approach, we are working on the composition of the business portfolio, quantitative targets and priority measures for 2030. We intend to share our 2030 Vision with stakeholders at a proper time during the current medium-term plan. I hope our stakeholders look forward to learning more about TOK's plans for value creation.

Formulating a new long-term management vision by backcasting



Kawasaki Plant in the 1940s



Special Feature

TOK in Society

— Creating Shared Value through Business —

Megatrends

Megatrends have begun to emerge with new innovations in mobility, such as CASE (Connected, Autonomous, Shared and Electric) and MaaS (Mobility as a Service). In most of these fields, the scope of value provided by semiconductors and semiconductor materials has been growing. With Level 3 (Conditional Driving Automation) reaching a practical stage, major automobile manufacturers and IT platformers are competing more fiercely to develop Level 4 (High Driving Automation) and Level 5 (Full Driving Automation) systems. Recently, SoCs*, the “brains” of automobiles, and automotive storage solutions have become more important. In this context, 10–7nm level semiconductors at the cutting edge of miniaturization, and 3D-NAND with vertically stacked memory cells, have drawn attention as solutions.

* System on a Chip: A semiconductor device with multi-functional parts in a single IC chip

A Conveni- Mobility

Shared

Outline of definitions for self-driving car levels, and progress towards each

| Level | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|-----------------------|--|--|--|---|---|
| Name | Driver Assistance | Partial Driving Automation | Conditional Driving Automation | High Automation | Full Automation |
| Outline of definition | The system executes either a longitudinal or lateral vehicle motion control subtask under limited domains. | The system executes both longitudinal and lateral vehicle motion control subtasks under limited domains. | The system executes all dynamic driving tasks under limited domains. The driver must respond appropriately to requests to intervene when the system encounters problems. | The system executes all dynamic driving tasks and responds when it encounters problems under limited domains. | The system executes all dynamic driving tasks and responds when it encounters problems under all conditions (namely, not in limited domains). |

* Source: Road Transport Bureau, Ministry of Land, Infrastructure, Transport and Tourism’s “Guideline regarding Safety Technology for Automated Vehicles in Japan” (refers to U.S. SAE J3016 (2016), etc.) (September 2018)

Risks and Opportunities

Level 4 and more advanced self-driving vehicles will require not only the world’s highest-performing SoCs and automotive storage, in terms of high-speed, large-capacity, space-saving and low-power-consuming devices, as the human-replacing “brains” that will make instantaneous decisions about driving conditions, but also require strong functional safety features to minimize risks to human life and the risk of accidents. TOK’s customers, semiconductor manufacturers, view self-driving vehicles as a new business opportunity and have been concentrating their resources on the development of semiconductor devices that offer both the highest performance in the world and functional safety. Keen to turn this into an opportunity for new value creation, TOK is developing and providing cutting-edge materials while fine-tuning them for the variances in each process at each customer through its customer-oriented sites in Japan, the U.S., South Korea, and Taiwan.



Connected

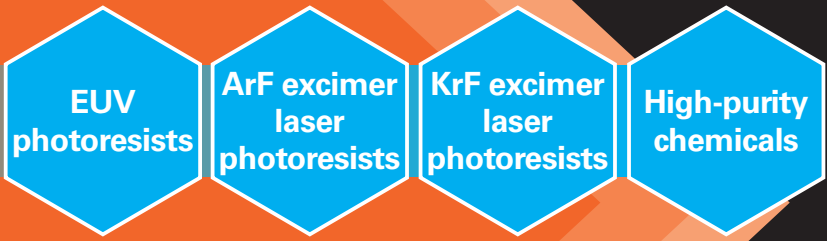


Autonomous



Electric

Development of High Value-Added Products



Achieving SDGs



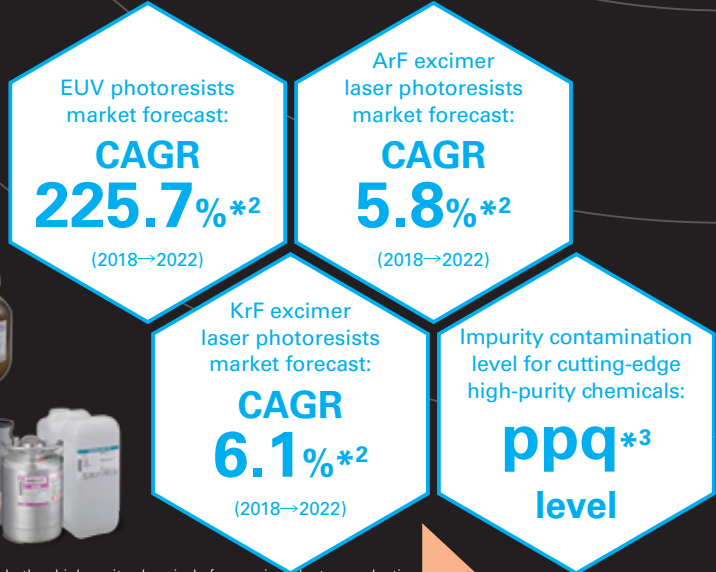
Convenient and Safe Society

Value



Providing Cutting-Edge Materials for the "Brains" of Next-Generation Mobility

More specifically, TOK develops and provides EUV photoresists and ArF excimer laser photoresists for 10–7nm level semiconductors, which include SoCs used in automated driving systems, as well as clean solutions materials^{*1}. The Company also develops and supplies KrF excimer laser photoresists for 3D-NAND, including memory used in automotive storage solutions. Lately, in order to advance miniaturization and increase layers, TOK has been concentrating on the development of EUV photoresists and clean solutions materials for 5nm semiconductors, as well as KrF excimer laser photoresists for 3D-NAND with 100 or more layers. Once these are developed, TOK will be able to contribute even more to the realization of a convenient and safe mobility society.



^{*1} Clean solutions, thinner, developing solutions and other high-purity chemicals for semiconductor production processes
^{*2} Based on sales volume (Calculated by TOK based on Fuji Keizai's "Whole View of Photo-functional Material and Product Market 2018")
^{*3} 1 ppq = 1 part per quadrillion

Tireless Challenge to Become an Only One, Number One Company

At the Tongluo No. 2 Plant, which develops and produces clean solutions for 10–7nm level cutting-edge semiconductors, quality management is extremely strict because our products are used in cutting-edge processes at customers. Materials production methods have become more advanced alongside the miniaturization of circuit line widths. In addition to refining raw materials, we effectively utilize software and hardware to improve quality and manage EHS in order to provide the best value to our customers, while also taking the environment into consideration and ensuring occupational health and safety.

Based on the Group slogan "Challenge for the Future," we aim to become an only one, number one company through the provision of value that exceeds customer expectations, by enhancing the functions of the customer-oriented site in Taiwan and flexibly responding to changes in the market.

Chih-hung Peng Manufacturing Dept. 2, Manufacturing, Tongluo Plant, TOK TAIWAN CO., LTD.



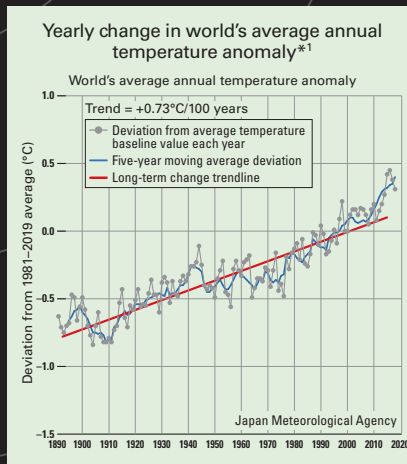
Special Feature

TOK in Society

—Creating Shared Value through Business—

Megatrends

In 2018, the average world temperature (average of temperatures near the earth's land and ocean surfaces) was +0.31°C warmer than the baseline value (30-year average between 1981 and 2010), the fourth-highest temperature since statistics began to be compiled in 1891. While fluctuating up and down, the average annual world temperature has followed an uptrend, rising at a rate of +0.73°C every 100 years over the long term. Research papers indicate that there have been more years with high temperatures since the mid-1990s*1, and this global warming phenomenon has led to more frequent extreme weather events related to climate change, such as larger hurricanes and typhoons.



*1 Source: Japan Meteorological Agency

Risks and Opportunities

Targets of SDGs for combating climate change include “take action to mitigate and adapt to climate change,” “strengthen resilience and adaptive capacity,” “integrate climate change measures into national policies, strategies and planning,” and “improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.” On this basis, national governments, local governments, and corporations are taking steps to minimize climate change risks.

TOK believes addressing climate change risks is an important management issue, and its Environmental Policy calls for action to “promote activities to conserve energy and mitigate global warming.” For the “environmental protection” material issue, TOK is working on “promotion of environmental management” and “addressing climate change issues.” Specifically, the Company has a PDCA cycle in place to make iterative improvements in energy-related CO₂ emissions per base unit, energy consumption per base unit and energy consumption per base unit in distribution. Viewing its products as opportunities to create environmental value, TOK focuses its efforts on helping to reduce power consumption in semiconductors through the miniaturization of semiconductors, and the development and production of environmentally friendly products.



Constantly Creating New Value while Fulfilling Responsibilities as a Supplier

Until the late 1990s, g-Line and i-Line photoresists had propelled advances in the miniaturization of semiconductors. Today, these photoresists are essential materials in the production of power semiconductors, LEDs and sensors, and have become the most-used photoresists in the world*. In addition to reliably supplying i-Line photoresists, TOK has developed new photoresists based on i-Line photoresists for efficiently fabricating SiC (silicon carbide) power semiconductors, a type of next-generation power semiconductor (see page 47 “Creating New Environmental Value through Business”). In this way, the Company focuses on creating new value by applying its technologies in cutting-edge fields. We believe this ability to continuously find new value in legacy products is one factor driving TOK’s sustainable growth potential.

Takeshi Kurosawa *Imaging Material Marketing Div., Marketing Dept.*

* 62.5% of the total the photoresist market on a sales volume (gallon) basis in 2017 (Calculated by TOK based on Fuji Keizai’s “Whole View of Photo-functional Material and Product Market 2018”)

Address
change
Shared

Renewable energy systems

Stable Supply of Environmentally Friendly Products

g-Line photoresists

i-Line photoresists

Achieving SDGs



climate issues

Value

World's Top Share in Materials for Key Energy Conservation Components

Power semiconductors are key energy conservation components in renewable energy systems, including wind and solar power generation that help reduce the risk of climate change, as well as electric vehicles, hybrid cars, and energy-saving home appliances.

TOK has the largest market share*2 in the world for g-Line and i-Line photoresists, which are essential in the manufacture of power semiconductors, and these photoresists have reliably accounted for almost 7 to 10% of consolidated net sales. The volume of g-Line and i-Line photoresists used differs greatly at each semiconductor manufacturer, because they use different volumes and thicknesses in coatings of photoresists. TOK will continue to fulfill its responsibilities as a supplier with top market share by carefully addressing customer needs and stringently managing quality, with the ultimate aim of helping to reduce climate change risks.



Electric vehicles



Energy-saving home appliances



Smart houses



i-Line photoresists



TOK's share of g-Line and i-Line photoresist market (2017):
25.9%*2
Global No.1*2

g-Line/i-Line photoresists market forecast:
CAGR 4.9%*2
(2018→2022)

Overall power semiconductor market forecast:
CAGR 6.7%*3
(2017→2025)

*2 Based on sales volume (Calculated by TOK based on Fuji Keizai's "Whole-View of Photo-functional Material and Product Market 2018")

*3 Manufacturer shipment value basis (Source: Yano Research Institute "A Survey on the Global Power Semiconductors Market (2018)", released on January 15, 2019)

Special Feature

tok in Society

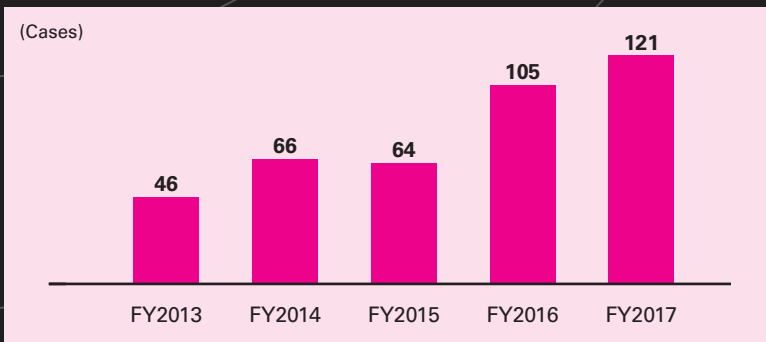
— Creating Shared Value through Business —

Social Issues

Lithium-ion batteries used in smartphones and other mobile devices are also used in electric vehicles, hybrid cars, rolling stock, and industrial machinery. Lithium-ion batteries are essential for our convenient and comfortable life and social infrastructure.

However, the risk of a fire increases when lithium-ion batteries are subject to mechanical shock. Around 2007, there were a few incidents where smartphones and other devices burst into flames because their structures were susceptible to shock. Over the four years since fiscal 2013, the number of such fire incidents has more than doubled, an issue in society in search of a solution.

Number of fire incidents in products with lithium-ion batteries



Source: National Institute of Technology and Evaluation's news release on January 24, 2019



Lower-risk parts and materials need to be developed for lithium-ion batteries, an essential part of our lives

Safety and with Heat

Shared



Lithium-ion battery for special B-to-B applications

Risks and Opportunities

Separators inside lithium-ion batteries can be damaged by external shock, which may cause an internal short between the cathodes and anodes inside the battery, and spark a fire. For this reason, companies in the industry are researching and developing ways to make separators and other battery materials more heat resistant and durable, and companies are also developing next-generation batteries such as solid-state batteries that are safer and more efficient. TOK views this as an important business opportunity to develop new businesses. As a result of efforts to develop materials able to lower the risk of fire in lithium-ion batteries, TOK brought high-functional films to market in 2017.

* Photos of batteries and smartphones on this page are sample images.

