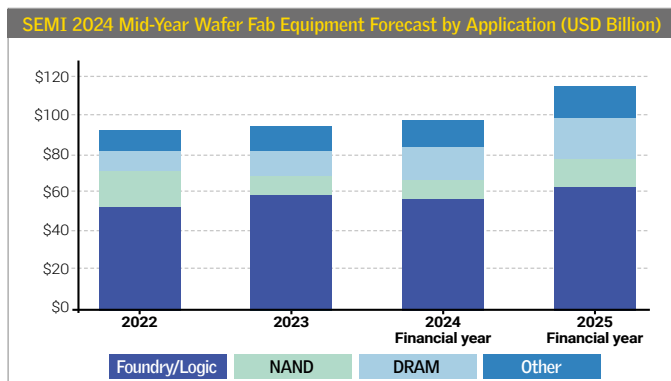
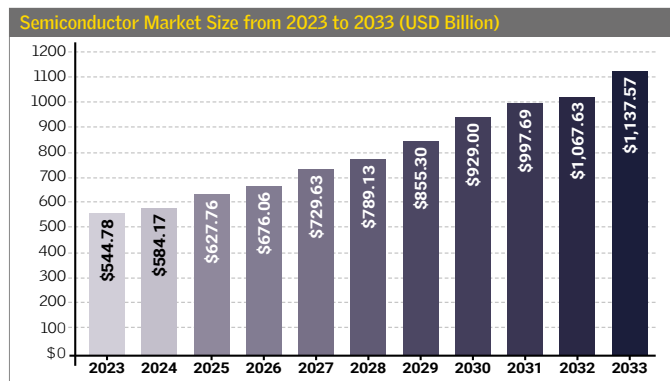


# Japan's Semiconductor Ecosystem Primed to Capitalize on Sector Growth

Amid unprecedented growth in the semiconductor industry, Japan's robust chip ecosystem is uniquely positioned to benefit from soaring global demand. *By Antoine Azoulay and Bernard Thompson*



Source: SEMI Equipment Market Data Subscription (EMDS), July 2024



Source: <https://www.precedenceresearch.com/semiconductor-market>

To a large extent, our modern world is powered by semiconductors, which represent the building blocks of both legacy and emerging applications. As the impact of digital technologies on society and business accelerates, semiconductors are expected to balloon into a \$1 trillion industry by the end of the decade. Their role as enablers of technological megatrends, including artificial intelligence (AI), autonomous driving and 5G networks, makes chips strategically important for achieving both industrial growth and economic security.

Against this backdrop, global powers have all passed legislation to bolster their semiconductor sectors and onshore production, pushing fab capacity to record highs. Most notable among these is the Biden administration's CHIPS Act, one of the few pieces of legislation that appear likely to survive the upcoming change in U.S. leadership. Despite campaign rhetoric, President-elect Donald Trump is unlikely to roll back a policy that boosted employment and attracted critical technologies onshore, according to industry experts.

"Today, there is a profound recognition of the value proposition and vital role semiconductors play in bolstering a nation's economic strength and innovation capacity," observes Eric Johnson, CEO and president of JSR Corporation, a global powerhouse in advanced semiconductor materials responsible for providing around 25 percent of the world's photoresists—light-sensitive resins crucial for creating intricate microchips. "Politically, there has been minimal controversy around the regionalization of foundries. While the technology and its infrastructure are inherently exciting, the ability to invest with minimal friction is the force propelling the current upcycle."

## Japan as a Production Hub

To achieve this revival, the Japanese government and private sector have articulated a three-axis strategy centered on the onshoring of semiconductor production, greater collaboration with international organizations and the development of next-generation technologies. Supported by a large budget dedicated to semiconductor manufacturing, the country has already concluded a series of agreements with

leading players, including the world's largest chipmaker, TSMC, which in 2021 announced it would build a production base on Kyushu Island.

TSMC's investment in Japan is an integral part of the company's expansion strategy, which also includes the construction of a new foundry in Arizona. Because these two projects began almost simultaneously, their evolution provides a glimpse into Japan's advantages as a location for semiconductor production.

Originally scheduled to begin mass production in 2024, TSMC's U.S. project has been plagued with various delays, and production is now expected to begin two years late. In stark contrast, the Kyushu foundry opened in February of this year, with plans underway for a second facility slated for completion by 2027.

While one of the reasons for this divergence is the difference in scale between the two projects—the Arizona plant will focus on higher-end chips—industry executives familiar with the matter also highlight other factors. Most significantly, they say, Japan has better chip industry infrastructure than the U.S.

The comparison between Japan and the U.S. exemplifies a key advantage of the former: its industrial and semiconductor ecosystem. While the country has lost its market share in terms of chip production, it remains a cornerstone of the semiconductor supply chain. Today, Japan controls around 50 percent of the global market for essential chip-making materials and around 40 percent of semiconductor production equipment, according to various industry sources.

As such, the country is home to strategically important enterprises essential to advanced chip production. A case in point is Tokyo Electron (TEL), one of the world's largest and most successful semiconductor equipment makers, which counts among its clients all major foundries.

"Device scaling, deposition, lithography, etching and cleaning are all critical processes in chip production," explains Toshiki Kawai, representative director, president and CEO of TEL. "TEL is the only company in the world that can offer products for these four key processes, and our product market share in each segment is number one or number two at present."

JSR is another such example. Beyond its dominant position in the traditional photoresist sector, the firm has made aggressive investments in the development of metal oxide resists, materials crucial to extreme ultraviolet (EUV) lithography, a production technology used to manufacture today's most advanced chips.

To international foundries, having access to this unique ecosystem represents an obvious comparative advantage. This argument is further strengthened when looking at Japan's entire semiconductor supply chain, which is also composed of a multitude of small- and medium-sized enterprises (SMEs) that provide comprehensive support to larger companies.

## A Unique Ecosystem

"Japan was once the world leader in semiconductor manufacturing, so the supply chains and material manufacturing technologies established during that time still exist today," explains Ikunobu Sonoda, president of Techno Quartz, a company specializing in the production of quartz, silicon and ceramic products. "We believe that this serves as motivation for wanting to establish production bases in Japan."

As a commissioned manufacturer of components for some of the world's leading semiconductor equipment makers, Techno Quartz exemplifies the advantages that Japanese suppliers offer to international firms.

"Competitiveness is not simply a matter of pricing but also encompasses factors such as quality, delivery time, business continuity planning and risk mitigation," says Sonoda. "Catering to a major manufacturer's needs quickly, efficiently and with competitive pricing are the three keys to our business."

To remain competitive in a market dominated by large enterprises, Japan's smaller suppliers have adopted a laser-sharp focus on the development of niche technologies that larger makers do not seek to enter. In turn, this has created a complementary relationship between clients and suppliers.

"The semiconductor industry is formed by the cooperation of specialists, and that is a reason why Japan still has a large share in specific

fields of semiconductor production,” argues Yojiro Kamei, president and CEO of SEIREN KST.

SEIREN KST is a vibrant example of this strategic success. To grow, the company focused on a handful of core applications, including the processing of SOI (silicon on insulator) wafers, a special type of silicon wafer built with an extra layer of insulating material, which allows for faster and more energy-efficient devices by reducing electricity leakage.

“We are able to supply oxide films that are ten times thicker than competitors,” says Kamei. “Our products are widely used in optical devices because they contribute to improved communication accuracy.”

### Explosive Growth Incoming

As global foundry capacity continues to expand against a backdrop of increased demand from both new and legacy applications and strategic onshoring investments, the market for production equipment and materials is set to surge, with global trade organization SEMI expecting to see a 22 percent increase in equipment spending by 2025 to reach \$132 billion.

This trend is providing Japanese suppliers with a window of opportunity to drastically boost exports and expand their customer bases. To prepare for this period of explosive growth, Japanese firms have made strategic investments globally.

This has also been the case for Toray Research Center (TRC), a subsidiary of global

multinational Toray Industries. Established in 1978, TRC specializes in advanced analytical techniques and physical property evaluations to support research and manufacturing across diverse industries, including electronics, materials and life sciences.

“In 2018, we established our first overseas subsidiary in Shanghai, and in October of the same year, we set up an analysis center at the Toray Automotive Center Europe,” says Masanobu Yoshikawa, president of TRC.

With its wide range of analytical instruments capable of analyzing semiconductor materials from both nano and macro perspectives, TRC has become a cornerstone of semiconductor research.

“We have more than 2,000 clients, including companies and research institutions both inside and outside Japan. Global demand for semiconductors is surging, so it is crucial to constantly upgrade ourselves and maintain our position at the forefront of the industry,” explains Dr. Yoshikawa.

With limited scale and resources, Japan’s smaller suppliers that lack the backing of a large multinational group face challenges in capturing global growth. Bridging that gap in the market has created an opportunity for specialized trading companies.

One such example is Mabuchi S&T, a trader of materials and equipment used in the optical and electronic industries. “Our strength as a trading firm is to act as a mediating bridge

between Japanese and overseas companies,” says Takashi Mabuchi, president of Mabuchi S&T. “We have this vast network of companies and we’ve been introducing high-end technologies from SMEs to foreign markets.”

Besides its network, the success of Mabuchi S&T has been built on its ability to provide comprehensive support services to its clients, including quality improvements and delivery optimization. Given the expected growth of the sector, demand for Mabuchi S&T’s services is set to continue expanding.

### An Eye to the Future

While the coming years bode well for Japanese suppliers, the true explosive growth of the semiconductor industry will likely arrive later in the century as emerging technologies become mainstream.

“Up until 2023, we saw that it took 76 years [for the semiconductor market] to reach \$500 billion,” states TEL CEO. Kawai. “Now we estimate that the market size will double in less than six years [and] experts are predicting that the third wave, which will be driven by quantum computing and Industry 5.0, will grow the market to a staggering \$5 trillion valuation by 2050.”

Decades from now, when semiconductors will have ballooned into a multitrillion-dollar industry, will industry experts look back at the current period as the starting point of Japan’s great silicon expansion?

## SEIREN KST Leads Semiconductor Innovation Charge



Yojiro Kamei,  
President,  
SEIREN KST

SEIREN KST is a subsidiary of SEIREN CO., LTD., which controls the world’s top share of the automotive upholstery materials market and has established itself as a leader in the semiconductor industry, renowned for its cutting-edge technologies and high-quality products. Founded in 1998, the company specializes in silicon wafer processing, with a focus on silicon on insulator (SOI), thick thermal oxide and planar lightwave circuit (PLC) technologies.

One of SEIREN KST’s flagship products is SOI, particularly its Thick Box SOI and Cavity SOI. According to Yojiro Kamei, president of SEIREN KST: “We supply SOI with thermal oxide film and bonded silicon wafers to semiconductor device and equipment manufacturers. Our oxide films, which are much thicker than competitors’, are crucial for optical devices and high-voltage power devices.” The company’s expertise in creating

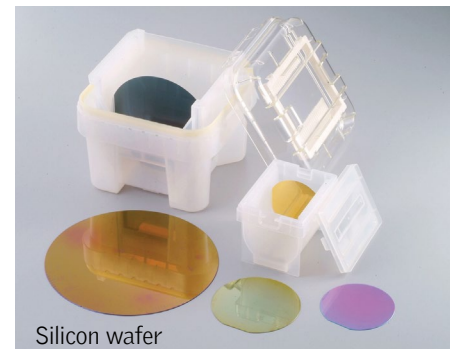
### SEIREN KST excels in SOI, SiC and PLC technologies, driving advancements in semiconductor solutions for various high-tech industries *By Sasha Lauture*

ultra-thick thermal oxide films, with thicknesses up to 20 micrometers, sets it apart in the industry. These films are critical for optical communication devices, enhancing communication accuracy and reliability.

In addition to SOI, SEIREN KST is a significant player in the next-generation semiconductor materials market. The company has ventured into silicon carbide (SiC) processing, a material increasingly essential for electric vehicles (EVs). Kamei explains: “High voltages required for EVs necessitate SiC due to its larger band gap compared to silicon. As the demand for EVs grows, so does the market for SiC, and we are preparing to meet our customers’ needs in this area.”

SEIREN KST’s PLC technology also demonstrates the firm’s innovation. PLC uses thick oxide films to separate and divide various types of light, making it a compact and efficient solution for optical circuitry. This PLC technology can be used for making red-green-blue laser combiners, with the potential for utilization in smart glasses.

Kamei attributes the company’s success to its strong emphasis on research and development. “We invest nearly 10 percent of our sales into R&D, focusing on advancing wafer



Silicon wafer

processing technology and next-generation semiconductors,” he notes. This commitment to innovation has allowed SEIREN KST to maintain a competitive edge and continue meeting the evolving demands of the semiconductor industry.



www.kst.seiren.com

# Materials Innovation at the Core of JSR's Semiconductor Ambitions

Following its recent acquisition by the Japan Investment Corporation, leading material maker JSR has unveiled a new vision for the future. In it, the firm seeks to strengthen its already dominant position in the semiconductor sector by expanding in cutting-edge processes. *By Antoine Azoulay*



JSR's R&D center

How many transistors are packed into NVIDIA's newest artificial intelligence (AI) chip? As incredible as it may seem, the Blackwell B2000—the world's most powerful semiconductor—contains a staggering 208 billion transistors on a surface small enough to fit in the palm of the hand.

To grasp the scale of this astronomical number, consider that scientists estimate there are around 100 billion stars in the Milky Way. In other words, today's most advanced chips hold twice as many transistors as there are stars in the galaxy.

The ability to produce such products isn't just a feat of engineering, it's a gateway to the future. Designed to power advanced AI applications, these semiconductors will drive breakthroughs across industries. From diagnosing diseases more quickly to powering self-driving cars, they will push the boundaries of what machines—and humans—can achieve.

To sustain this pace of innovation, manufacturers are engaged in a relentless pursuit of new technologies. One of the most significant breakthroughs has been the introduction of extreme ultraviolet (EUV) lithography, a manufacturing process that uses ultra-short wavelengths of light to print extremely precise patterns onto wafers, enabling billions of transistors to fit on a single chip.

However, one of the biggest challenges in adopting such advanced production techniques remains the development of appropriate materials, particularly photoresists, the light-sensitive resins that allow patterns to be printed on wafers.

These materials must be highly sensitive to ensure precise patterning, extremely pure to prevent defects, and capable of

maintaining high yields, factors critical to achieving the performance and efficiency required for cutting-edge semiconductors.

Addressing these challenges is precisely what has led to the success of JSR. Founded in 1957, the company has grown into a global leader in material science, currently holding around 25 percent of the photoresist market.

Aside from photoresists, JSR is known for its expertise in chemical mechanical planarization (CMP) slurries and cleaning solutions, essential for smoothing wafer surfaces and removing impurities during multi-layer semiconductor manufacturing. The company also produces advanced resins like ARTON, featuring high optical quality and heat resistance, used in displays, lenses and other optical applications.

This broad portfolio, spanning semiconductor materials, cleaning technologies and optical solutions, reflects JSR's comprehensive approach to materials innovation, supporting both the precision and performance needed for advanced electronics and computing technologies.

"Looking toward the future, our success will hinge on generating returns on R&D—an objective we discussed at the outset of this journey."

Eric Johnson, Representative Director, CEO & President, JSR Corporation

To meet evolving demands, JSR acquired Inpria in 2021, a U.S. company specializing in metal oxide photoresists. These advanced materials, specifically designed for EUV lithography, offer several advantages over traditional organic resists, including higher resolution and improved sensitivity, essential for next-generation semiconductors.

"We had been collaborating with Inpria for nearly a decade prior to the acquisition, treating them as one of our key R&D pathways as we explored metal oxide resists among alternatives for EUV applications,"

explains Eric Johnson, CEO and president of JSR.

"As our confidence in their direction grew, we expanded our partnership to encompass both technology development and manufacturing."

The acquisition of Inpria also underscores a broader challenge: the need to enhance scale and investment capabili-

ties in an increasingly capital-intensive industry. With chemical companies growing larger globally, achieving scale through acquisitions and long-term investments in research has become paramount for survival. This issue is particularly relevant to the photoresist market, which is dominated by mid-size enterprises, leading industry experts to argue for the consolidation of the sector.



Bottles of photoresists

"We must continually remind ourselves that we are not the sole competitors—both domestically and internationally—and global competitors are growing larger each day," advances Johnson.

Recognizing this challenge, JSR underwent a significant transformation. In 2024, it was acquired by the Japan Investment Corporation (JIC), a public-private investment company whose aim is to support next-generation industries. By promoting private sector investment in critical areas, one of JIC's main objectives is to create an innovation ecosystem to strengthen its investees' competitiveness.

"A key advantage of the JIC acquisition is the establishment of a single owner with a clear, focused vision, alleviating the complexities of managing multiple investors with differing timelines," argues Johnson.

In addition to streamlining decision-making and enabling a long-term investment approach, the privatization of JSR positions the firm to pursue more acquisitions. "Our goal is to forge partnerships that create value by driving R&D, enhancing efficiency and achieving scale," adds Johnson. "As we grow, that scale improves corporate efficiency, which, in turn, enhances our investment capacity."

With its new corporate structure and historical capabilities, JSR has designed the ideal model to support the relentless evolution of the electronics sector. By pushing the frontiers of material innovation, the company is set to continue making what was once unfathomable a reality—such as holding the equivalent of two Milky Ways right in the palm of your hand.



JSR Corporation

[www.jsr.co.jp/jsr\\_e](http://www.jsr.co.jp/jsr_e)

# Miniaturization Has Created a Contamination Problem for Chipmakers—AICELLO's Mission Is to Overcome It

As semiconductors shrink in size, microscopic factors are beginning to impact quality in ways previously unimagined. In this environment, the transportation of chemicals used in chip production has become a critical factor, and AICELLO is uniquely equipped to meet this challenge. *By Antoine Azoulay*

Since the invention of the first silicon transistor in 1947, semiconductor technology has progressed at a pace few could have imagined. What began with circuits measured in millimeters has now reached the realm of nanometers—millionths of a millimeter. To put that in perspective, today's semiconductor nodes are tens of thousands of times thinner than a human hair, smaller than most viruses, and far beyond the perception of the naked eye. This astonishing miniaturization allows billions of transistors to fit onto a single microchip, fueling the rapid performance advancements behind the smartphones, computers and medical devices we rely on every day.

Yet, as components shrink, maintaining purity at an atomic level throughout the production process has become one of the most formidable challenges in the semiconductor industry. At nanometer scales, even a micrometer impurity—a particle about one-thousandth of a millimeter in size—becomes a gigantic problem, threatening to disrupt the delicate structures within a microchip. These impurities, which can be stray particles, trace metal ions or volatile vapors, can originate from almost anywhere in the manufacturing environment. With such fine tolerances, every step in production, from chemical storage to equipment packaging, must meet extreme purity standards to protect the reliability of the final product.

One of the few solutions to control impurities during the transportation of semiconductor chemicals is the CLEANBARRIER (CB) bottle by AICELLO, a Japanese manufacturer renowned for high-performance packaging solutions tailored to advanced industries. Designed specifically for the semiconductor sector, CB bottles hold several advantages over the traditional glass bottles utilized to store the ultra-pure chemicals needed in chip production.

As blow-molded, multi-layered containers, CB bottles weigh just one-fifth of their glass counterparts and are also shatter-resistant, preventing potential accidents and



"Through R&D we are continuously finding new ways to minimize contamination."

Satoshi Morita,  
President & CEO,  
AICELLO Corporation



AICELLO's bottles are used to transport ultra-pure materials during advanced semiconductor processes, including EUV lithography



HYPERCLEAN™ bags are used for semiconductor manufacturing equipment parts and HDD packaging. (Left: MB22; right: MA24)

enhancing environmental safety. Additionally, CB bottles have set strict standards in controlling particles and metal ions. Unlike glass bottles, which require extensive pre-treatment—including chemical and ultra-pure water washing, rinsing, drying and particle removal—CB bottles are made from high-purity resin free of additives, eliminating the need for additional preparation. AICELLO also guarantees the metal ion levels within each bottle, providing a streamlined process that allows customers to save both time and money.

As chip fabrication advances beyond the nanometer threshold, even humans are considered contamination factors. Furthermore, with the rise of the artificial intelligence era,

the days of polishing single-function chips are over. Today's technological innovation requires semiconductor foundries to integrate multiple types of chips, each performing specialized functions, such as memory storage, logic processing or communication, all in one compact module. To support these advancements, new chemicals, gases and photoresists that can support the production of ultra-fine semiconductors are continuously emerging, leading industry experts to argue that packaging technology is reaching its limits.

To keep pace with these innovations, AICELLO has made research and development a corporate priority and is continuously finding new ways to minimize contamination from factors like elution, particles

and metal ions. Furthermore, the company has gone beyond its role as a supplier. Today, AICELLO collaborates directly with semiconductor material and equipment manufacturers, offering customized solutions that optimize purity across every stage of semiconductor production. This approach has enabled AICELLO to develop clean bags, which are used to package and enclose precise parts of semiconductor production equipment.

The company's HYPERCLEAN MA24, for example, is the world's first packaging solution to control and manage outgassing—the release of potentially contaminating gases from materials, which can lead to equipment issues and defects in the final chip. This innovative bag, primarily used for packaging semiconductor manufacturing equipment parts and other sensitive devices, provides a purity level unmatched by conventional polyethylene alternatives. According to industry sources, the MA24 was quickly adopted by one of the world's largest semiconductor equipment makers and is currently becoming a de facto industry standard for the storage and transportation of critical components.

"Our clean packaging technology really is one of a kind," explains Satoshi Morita, president and CEO of AICELLO. "To achieve this level of sophistication, we have had to push the boundaries of our own products and production processes. For example, we were the first to start bottle production within a cleanroom, something no one had considered doing before we began work in this field," he adds.

In an industry where even particles smaller than a virus can cause major disruptions, rigorous purity control has become a prerequisite. As miniaturization continues to intensify contamination challenges, AICELLO remains committed to advancing solutions that help chip makers meet these exacting standards.

# Connecting Markets with Optical Precision

Japanese trading company Mabuchi specializes in advanced optical technology, semiconductor solutions and sustainable innovations, connecting cutting-edge small and medium-sized enterprises with the global market.

By Daniel De Bomford and Sean McBride



"We gather excellent technology and find the best applications to expand its usage."

Takashi Mabuchi, President, Mabuchi S&T

The international market has undergone a radical paradigm shift and supply chains have had to scramble to adapt. Japanese trading company Mabuchi S&T has positioned itself as a vital link that connects small and medium-sized enterprises to the global market. Mabuchi has a long history in high-tech industries and specializes in the coordination, development and production of advanced machinery and equipment for optical lenses.



Sustainable materials

With 68 years of expertise in the field, Mabuchi provides high-precision molding machines and innovative technology for creating spherical and aspherical lenses, among other optical components. "We understand the optical needs and applications across industries, allowing us to propose the best equipment and provide a holistic solution," explains company President Takashi Mabuchi.

Previously, the company manufactured its own branded lens polisher. It has leveraged that technical expertise and know-how to become the perfect partner to connect niche manufacturers in Japan with international high-tech producers and customers both at home and abroad. Mabuchi's collaborative work on a new type of aspheric lens mold polishing machine is a poignant example of the company's ability to blend experience with emerging technological needs.

In the semiconductor sector, major processes are highly specialized and dominated by the big tech firms, so they are impossible for a small- or medium-sized enterprise to break into. However, Mabuchi has seized opportunities in niche areas that the largest companies have neglected.

This focus allowed Mabuchi to make significant progress during the COVID-19 pandemic. When Japanese engineers were unable to travel to China, Mabuchi's Suzhou office stepped in, supporting Japanese semiconductor firms through on-ground service in Chinese fabs, significantly strengthening Mabuchi's market presence in the country.

In the current economic climate, Japanese companies are an attractive option for international firms—especially those based in China, Taiwan and South Korea—due to the ongoing weakness of the yen and low interest rates. Furthermore, Japan was the dominant player in semiconductor manufacturing in the past and the companies that persist have maintained that knowledge and experience in-house. "Traditionally, Japan had strong technological know-how and a connection between the workers and the companies," Mr. Mabuchi says.

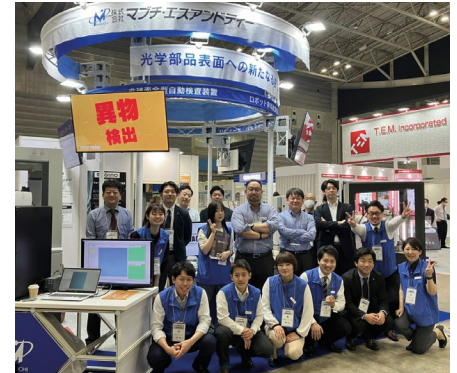
While big players in Japan like Tokyo Electron and Sony dominate this space, Mr. Mabuchi emphasizes the important role that small- and medium-sized enterprises play in the high-tech ecosystem. "These companies have developed as high-technology firms thanks to the Japanese culture and tradition, mainly this mindset of craftsmanship," he says. Mr. Mabuchi further highlights how that craftsmanship and Japanese business culture foster unmatched quality of work through close attention to detail and consideration of those within the industry.



Semiconductor exhibition in Kyushu

These Japanese values are what position trading companies like Mabuchi to be the vital link between innovative high-tech Japanese companies and lucrative international opportunities. "Trading companies like ourselves don't manufacture, but we have a wide connection with other people,

and we are considerate of the people involved in this industry," Mr. Mabuchi says.



OPIE '24

Trading companies, or *shosha*, like Mabuchi are unique to Japan and are vital in the Japanese business ecosystem. Where a company has struggled to bring its technology to market, Mabuchi bridges the gap between the technology and the application. "They have been pursuing this technology so much, but they sometimes cannot find the channels for application or sales," Mr. Mabuchi says. "We gather excellent technology and find the best application for it to expand its usage." Mabuchi leverages its technical know-how and vast network to introduce high-end domestic technology to international companies. "The advantage of a trading firm is that, whereas a manufacturer can only sell its products, we can provide multiple options and suggest the optimal combination based on the needs of the customers," he says.

Environmental sustainability forms the company's third business pillar. Mr. Mabuchi envisions an energy-efficient future where optics play a crucial role in reducing electrical dependence by transmitting massive amounts of information quickly with minimal energy. He adds: "With these benefits, society will probably shift to being optics-oriented, and as an optics expert, we want to leverage this opportunity."

As the global manufacturing sector continues to evolve, Mabuchi is well positioned as the major conduit between the Japanese high-tech industry and the world. Even with its vast network and strong relationships in China, Taiwan and South Korea, it keeps one eye on the future. As the U.S. and Europe rebuild their domestic manufacturing capabilities, Mabuchi has its sights set westward to grow and secure its manufacturing network.



[www.mabuchist.co.jp/english](http://www.mabuchist.co.jp/english)

# Expanding Globally with Sustainable Innovation

Tensho Electric Industries is set for global growth, leveraging its expertise in plastics manufacturing, expanding into EV components and prioritizing sustainability to meet the evolving demands of multiple industries worldwide. *By Sasha Lauture and Cian O'Neill*



"We want to contribute to lighter and thinner plastic usage within product manufacturing."

Kensuke Fujimoto, President,  
Tensho Electric Industries Co., Ltd.  
[www.tensho-plastic.co.jp/english](http://www.tensho-plastic.co.jp/english)

Tensho Electric Industries, a long-established leader in Japan's plastics industry, is set for expansion under its new president, Kensuke Fujimoto. Founded in 1936, the company specializes in the design, manufacture and sale of plastic products and molds for a range of industries, such as automotives, home appliances, logistics and office equipment.

Having built up decades of know-how in plastic molding and resin technology, Tensho is known for the high-quality products that have enabled it to become a trusted supplier for a wide portfolio of clients. Listed on the Tokyo Stock Exchange since 1961, the company boasts a manufacturing system that supports mass production while ensuring reliability and customer satisfac-

tioned services to its clients while keeping logistical costs low.

"Tensho's strength is that we have a long history of product manufacturing with a sturdy foundation of mold creation and molding technology," Fujimoto states. From resin welding methods such as vibration and hotplate welding, to advanced molding techniques including forming technology, plus emCo and E-Mold, Tensho produces unmatched quality and reliability in both industrial and consumer goods.

Fujimoto, who took office in June 2024, brings experience from his previous role as president of Prime Polymer, Japan's top polypropylene manufacturer. Under his leadership, Tensho is focused on producing lighter, more sustainable plastic components,

and a significant opportunity for Tensho. As automakers restructure production, they increasingly outsource lightweight plastic components—with weight reduction critical for efficiency and range—to specialized suppliers like Tensho.

While automotives remain a key focus, Tensho also creates products for home appliances, office furniture and logistics containers, among others. One highlight product is TenRainScrum, a highly durable rainwater harvesting system that reduces the impact of flooding. "With global warming, there have been sudden thunderstorms and so-called guerrilla rain happening across Japan," the president explains. "In order to protect the land, we created our TenRainScrum product. We think this will be increasingly important and we expect growing demand."

gas reduction target and aim to position ourselves as an environmentally friendly company."

Global expansion is a key part of Tensho's growth strategy. The company recently strengthened its presence in North America by upgrading its Mexican factory and opening a second plant in 2022, focused on producing containers. In China, meanwhile, Tensho aims to partner with molding companies to further expand its presence there. "In the North American markets, there is a growing need for Sanko containers and pallets," Fujimoto adds. "Sanko is our biggest shareholder, and the U.S. market is much larger than the Japanese market, so with the growing demand for these containers and pallets, we wish to supply our plastic products and provide services to American manufacturers and consumers."



Sanko and Tensho's Mexican plant supports sales in America

Sustainability is central to Tensho's strategy. The company recycles excess materials from production by crushing and reintegrating them into the manufacturing process. It has also upgraded its injection molding systems from hydraulic to electric, boosting both productivity and environmental performance. "Being environmentally sound is the biggest theme we currently have," says Fujimoto. "We will introduce a greenhouse

With a strong foundation in plastics technology, a commitment to sustainability and ongoing global expansion, Tensho Electric Industries is well positioned for future growth. Under Mr. Fujimoto's leadership, the company is embracing the opportunities presented by the EV revolution and the growing demand for environmentally friendly manufacturing practices.



TenRain system reduces impact of flooding



TenRainScrum unit

tion. Tensho's deep experience in manufacturing and its six production locations across Japan, including Ryumai Plastic, have allowed it to develop in-house talent and cultivate the expertise to cope with an extensive variety of requests from its customers. Furthermore, Tensho's presence in local markets facilitates expe-

as industries shift from metal to plastic. "Plastics themselves are increasingly moving toward polypropylene, which is lightweight and environmentally friendly. This polypropylene is the core material that we use to manufacture our products," he says.

The global transition to electric vehicles (EVs) represents a signifi-



Modern factory ensures quality



Tensho's variety of containers

# Cleanliness: Key to Semiconductor Precision

Japanese component manufacturer Techno Quartz produces semiconductor parts with a focus on cleanliness, precision and efficiency. The firm's innovative techniques ensure high-quality components for the ever-evolving semiconductor industry.

By Paul Mannion and Sean McBride



"Our role is to provide components quickly, efficiently and cost-effectively."

**Ikunobu Sonoda**, President, Techno Quartz Inc.

The increasing precision and miniaturization of semiconductors has made the need for absolute cleanliness in their production imperative. One of the companies leading the way in this field is Japan's Techno Quartz.

Founded in 1976, Techno Quartz specializes in the production of semiconductor parts and in cleaning processes that can be applied to a wide variety of materials, such as ceramics, silicon and metals.

As a commissioned manufacturer of components for semiconductor equipment, Techno Quartz focuses on three aspects: speed, efficiency and competitive pricing. As company President Ikunobu Sonoda explains: "Whenever we receive a new request, our engineers work with our client's engineers to find the best solution for their purpose and production."

Cleanliness is key to Techno Quartz's production, and the company has developed a liquid particle counter which is embedded in water to count the number of particles that are emitted. This data is given as feedback to the cleansing device.

The company uses its patented diffusion bonding technique to create interior channel patterns inside quartz and encapsulate any other substrates. This unique technology comes with an embedded code which allows producers to extract any necessary information from the quartz.

In addition, Techno Quartz employs dry ice, liquid-borne particle counters and chemical vapor deposition to ensure its components are fully cleansed and operative. The company has production bases in China—as well as maintenance bases in the U.S. and South Korea—and Sonoda reveals Techno Quartz's desire to create a global network of local partners who can manage maintenance when needed.



An overview of Techno Quartz's product offerings

As the company approaches its 50-year anniversary, its dedication to precision components has placed it in a prime position to expand as the semiconductor market goes from strength to strength.

**TECHNO QUARTZ INC.**   
<https://techno-q.com/EN>

# Science Meets Solutions: Inside TRC



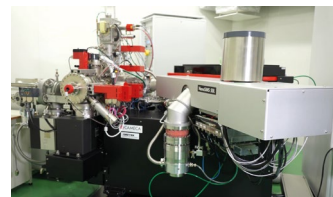
"We don't just use technology—we create it."

**Masanobu Yoshikawa**, President, Toray Research Center

Toray Research Center (TRC) isn't your average lab—it's a high-tech, solutions-driven powerhouse leading the charge in materials analysis and innovation across a vast array of industries.

"Our mission is to contribute to society through advanced technologies," says President Masanobu Yoshikawa, who has overseen TRC's transformation from a small subsidiary of Toray Industries into a globally recognized research center. Founded in 1978, TRC now serves over 2,000 clients around

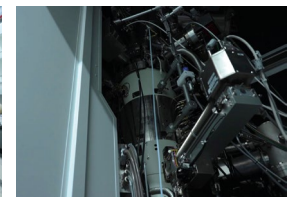
Toray Research Center is pushing boundaries in materials science, making breakthroughs in semiconductors and beyond. By Sasha Lauture and Cian O'Neill



NanoSIMS (SIMS: secondary ion mass spectrometer)



Sample preparation



Atomic resolution analytical electron microscope

the world, spanning sectors from semiconductors to biotechnology, with a remarkable 91 percent of its revenue sourced outside Toray.

One of TRC's biggest advantages is its proprietary technology. "We're not just using the latest devices," Dr. Yoshikawa explains. "We also develop our own tools to solve industry-specific problems." For example, TRC's NanoSIMS device, initially used in geology, has been adapted for semiconductor analysis, offering unrivaled sensitivity down to parts-per-billion levels. In 2022, TRC introduced a state-of-the-art electron microscope with a groundbreaking 53-picometer spatial resolution—making it one of the world's most advanced and unique in its class.

Looking to the future, Yoshikawa's vision is to keep TRC on the cutting edge of research. "Our aim is to be not only an analysis company,

but a true research center recognized globally for innovation," he says. In line with this, TRC is expanding its international reach with a strategic focus on North America, India and Southeast Asia, while building strong partnerships in countries like Germany and China.

Amid global tensions in technology and semiconductor production, Yoshikawa sees TRC positioned at the forefront of advanced materials like silicon carbide and diamond semiconductors. "The 21st century is becoming the age of semiconductors," he asserts. TRC, with its pioneering spirit and relentless pursuit of innovation, is not just keeping pace with the rapid changes in global tech—it's poised to drive key advancements across this rapidly evolving landscape, ready to shape the future of materials science and semiconductor technology.

**TORAY**

Toray Research Center, Inc.

[www.toray-research.co.jp/en](http://www.toray-research.co.jp/en)



# Cosmotec: Expanding into Global Markets



**Taku Sekiguchi,**  
President,  
Cosmotec Corp.

The Japanese manufacturer is pioneering the vacuum component industry with its large range of quality products and its rapid delivery service. *By Cian O Neill*



Close team collaboration



Vacuum components

Founded in Tokyo in 1992, Cosmotec has become the leading ultra-high vacuum component manufacturer in Japan. The company caters to a wide range of quantities, from one-piece to mass production. Rather than customers having to develop their own parts from scratch, they can pull from a catalog of 8,000 standardized products. What's more, Cosmotec provides a distribution service to ensure customers receive its products in a timely manner. Company President Taku Sekiguchi highlights: "E-commerce for parts and components is a very niche field, but with our 30 years of experience, we understand the kinds of products engineering firms require.

Customers can order a certain product and have it in their hands the next day. This service is of huge value to our customers."

Cosmotec also offers tailored solutions for customers with its ability to manufacture and engineer products. Sekiguchi outlines the bespoke process, explaining: "We listen very carefully to their request and what they want to achieve. Given our 30 years of know-how, we draw from our experience and create a unique product that meets the customer's specifications. We first create a prototype, then we ask them to try it out and see whether the results can be achieved. Constant improvements are then made through trial

and error, until we find a product that satisfies the customer."

In 2013, Cosmotec expanded its operations internationally, branching out to the U.S. market by establishing a local office. Based on its success there, the company is now looking to develop similar partnerships in other markets—specifically emerging nations. Sekiguchi spotlights the opportunities offered by the Indian market, with experts predicting that manufacturing will center around India in the next 10 years. Cosmotec is also actively looking for new partnerships with an open innovation model outside of Japan to increase its competitiveness in the global market.

# Transforming the Future of Mobility

Micware is enhancing mobility experiences by creating state-of-the-art IVI and navigation platforms, in line with its motto: 'Making going out convenient, safe and fun.' *By Sasha Lauture and Bernard Thompson*

A Japanese group committed to leveraging artificial intelligence (AI) in its portfolio of top-class products, Micware is at the forefront of innovation in the world of in-vehicle infotainment (IVI) and navigation software.

Based in Kobe, Micware has developed a range of leading-edge IVI systems. Notably, its subsidiary Micware Automotive is responsible for the renowned micAuto IVI brand and has gained recognition as Japan's first tier-1 software provider.

Meanwhile, Micware's naviAZ navigation platform, which is handled by the group company Micware Navigations, integrates seamlessly with mobile devices, making it highly versatile. naviAZ offers differential map updates, voice recognition and a modular design that supports use not only in auto-

mobiles, but also in other mobility scenarios like walking, cycling and boating.

And amid the rise of artificial intelligence, Micware is looking to provide AI-based solutions, as demand for personalized mobility experiences grows. "I'd love to have a world like *Knight Rider*," says Micware Automotive President Tomohiro Kitagawa. "It fits our company's motto: 'Making going out convenient, safe and fun.'"

According to Kitagawa, AI will also play an integral role in future software development: "This technology will continue to grow

and have a significant impact. Software code generation will be developed using AI, allowing mass production with minimal input from programmers."

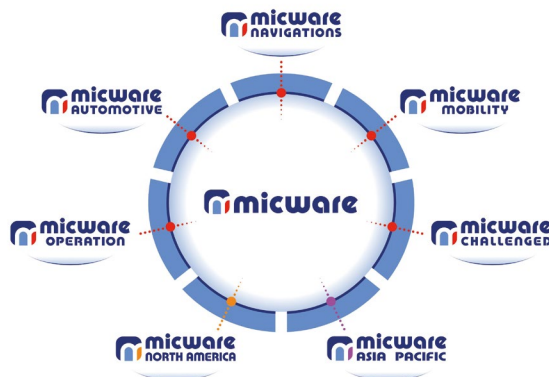
A group with a strong focus on research and development, Micware allo-



**Kenji Narushima,**  
President, Micware Co., Ltd.

ated 64 percent of its sales to R&D in 2023. Such investment has fueled the creation of groundbreaking products such as the Dynamic Street Map & Market, which promises to revolutionize B2C markets through 3D mapping and Web 3.0 integration.

What's more, Micware continues to strengthen its international presence. With bases in the U.S. and Thailand, the group is expanding further into Southeast Asia and North America and seeks partnerships with global automotive software developers. "We're only at the beginning of our expansion," Kitagawa declares.



**micware**   
<https://micware.co.jp/en>



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