

# WITH MATERIALS

mitsubishi materials communication magazine

SUMMER  
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SPECIAL FEATURE

## CLEANLY CREATING METAL AND SOCIETY



# SPECIAL FEATURE CLEANLY CREATING METAL AND SOCIETY

Figuring out how to reduce the environmental burden of the process known as smelting, which creates metal from ore and other raw materials, has been a social issue for many years.

In the 1970s, Mitsubishi Materials succeeded with the practical application of the “Mitsubishi Process,” the world’s first environmentally friendly copper smelting process.

To this day, we have continued with various improvements to cleanly create metals while taking the environment into consideration.

We leverage our proprietary technologies to realize a sustainable society and to solve social issues.

For more information on  
Medium-term Management  
Strategy FY2031, please see  
our website.





How is Mitsubishi Materials able to cleanly create metal resources?

# Through the establishment of an environmentally friendly manufacturing process

When creating metal resources, Mitsubishi Materials contributes to the environment by utilizing all of its proprietary technologies and systems.

Here we will introduce key points regarding Mitsubishi Materials' environmental contributions, such as the collection and processing of E-Scrap, a manufacturing process with low environmental impact through the use of the Mitsubishi Process, the launch of the recycled metal brand, "REMINE," and more, using simple questions.

Is it OK to put E-Scrap into a furnace as is?

**It is first processed through incineration melting in a pretreatment furnace**

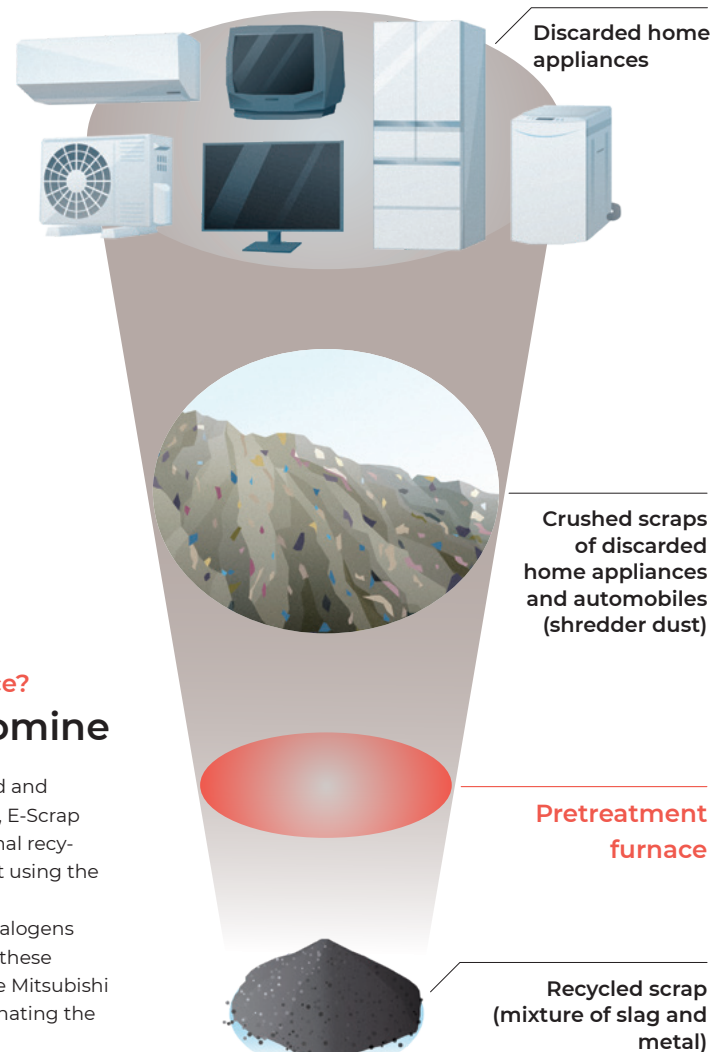
Conventional copper smelting methods were only able to melt finely powdered raw materials, but the Mitsubishi Process has enabled the direct processing of E-Scrap around the size of gravel. E-Scrap larger than the size of gravel is processed using the Mitsubishi Process after being transformed into recycled scrap (a mixture of slag and metal) in granular form through water granulation following incineration melting in a pretreatment furnace. The pretreatment furnace helps to achieve an environmentally friendly process with no fossil fuels as it enables combustion (spontaneous combustion) and melting using only the heat of reaction from combustibles, which E-Scrap itself contains. Mitsubishi Materials handles E-Scrap with various properties through the combination of a pretreatment furnace and the Mitsubishi Process.

What is the role of the pretreatment furnace?

**Eliminating chlorine and bromine**

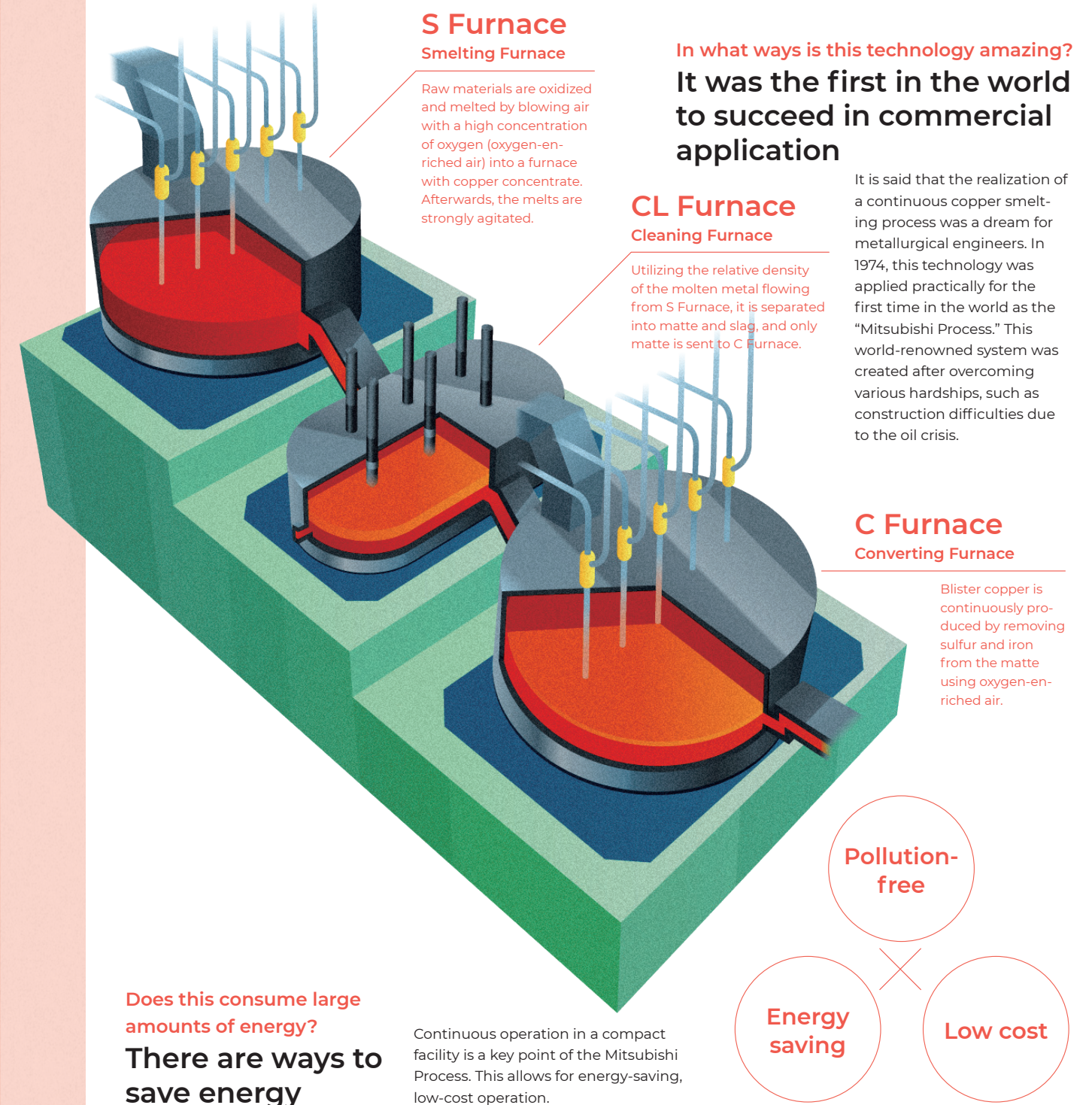
E-Scrap, which contains many combustibles, is incinerated and melted in the pretreatment furnace. Through this process, E-Scrap is transformed into a mixture of slag and metal, and thermal recycling takes place. In-house power generation is carried out using the steam from thermal recycling.

Plastic parts from discarded circuit boards contain the halogens chlorine and bromine. The processing of large volumes of these compounds is the cause of equipment deterioration in the Mitsubishi Process. The pretreatment furnace serves the role of eliminating the halogens chlorine and bromine contained within E-Scrap.



Are there a lot of emissions when creating copper?  
**A pollution-free system has been established**

In conventional copper smelting, sulfur dioxide (SO<sub>2</sub>) gas generated from molten metal would leak out as uncovered ladles (cauldrons) would be used to move molten metal from multiple furnaces. However, in the Mitsubishi Process, a pollution-free system has been established that prevents the leakage of SO<sub>2</sub> gas through the use of enclosed furnaces connected by launders.



In what ways is this technology amazing?  
**It was the first in the world to succeed in commercial application**

It is said that the realization of a continuous copper smelting process was a dream for metallurgical engineers. In 1974, this technology was applied practically for the first time in the world as the "Mitsubishi Process." This world-renowned system was created after overcoming various hardships, such as construction difficulties due to the oil crisis.

Does this consume large amounts of energy?

**There are ways to save energy**

Continuous operation in a compact facility is a key point of the Mitsubishi Process. This allows for energy-saving, low-cost operation.



How is Mitsubishi Materials able to cleanly create metal resources?

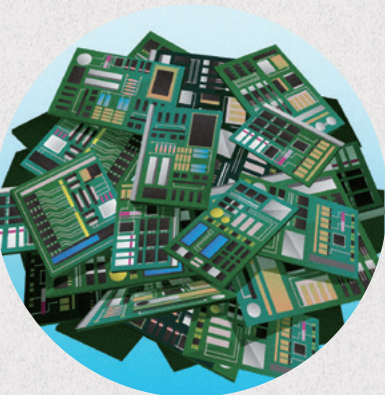
# Through the establishment of an environmentally friendly manufacturing process

Where is E-Scrap collected from?

## World leader in volume processed

It is expected that the volume of E-Scrap handled will increase further due to an increase in the recycling rate of electronics in recent years. Mitsubishi Materials collects E-Scrap not only from Japan, but also from various regions around the world, such as Europe and North America. The volume processed leads the world at approximately 160,000 tons annually.

The E-Scrap recycling process



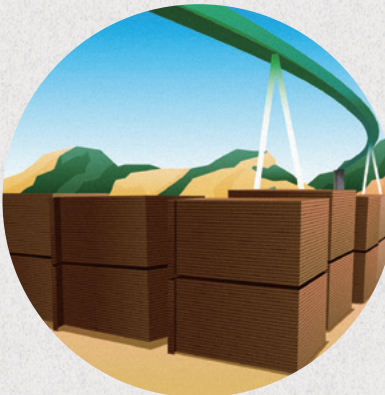
**Collection**  
Collecting E-Scrap from all over the world



**Sampling/analysis**  
Weighing, inspection, sampling, analysis



**Smelting**  
Smelting at Naoshima and Onahama Smelters and Refineries

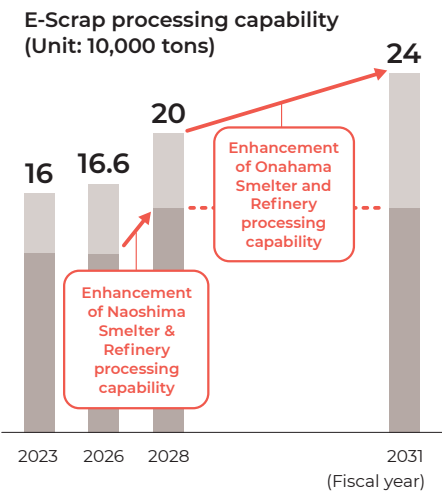


**Resource recovery**  
Recycling into copper and precious metal ingots

Will you increase the volume you collect going forward?

## Our goal is to increase the volume collected to 240,000 tons annually

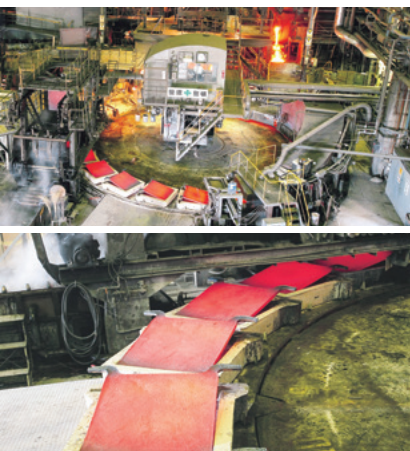
The volume of E-Scrap processed by Mitsubishi Materials accounts for around 20% of the approximately 800,000 tons generated worldwide. In light of the expectation that the E-Scrap market will expand going forward, Mitsubishi Materials is aiming to expand its processing capabilities to approximately 240,000 tons annually by the end of the fiscal year ending March 2031.



Naoshima Smelter & Refinery



Onahama Smelting and Refining Co., Ltd.'s Onahama Smelter and Refinery



How do you prove that you are using recycled materials?

## They are verified by third-party organizations

# REMINE

Mitsubishi Materials launched Japan's first recycled metal brand, "REMINE," which specifies the recycled material content in non-ferrous metal products. REMINE offers reliable non-ferrous metal products, achieved through calculations of recycled material content in compliance with the international standard ISO 14021\* and verification by third-party organizations.

\*International standard that requires the elimination of ambiguous expressions and the disclosure of information necessary for verification regarding environmental information on products

Couldn't you just obtain metal resources from mines?

## For the future, it is necessary to recycle our limited resources

It is possible that supply and demand for metal resources will be out of balance in the future. Copper, in particular, is indispensable as a material that will support decarbonization as it is essential for xEVs and equipment used for generating renewable energy. However, it is predicted that the volume supplied from mines will decrease in the future, so it is necessary to recycle our limited metal resources. From the next page, we will introduce Mitsubishi Materials Group's resource recycling initiatives using examples of home appliance recycling.



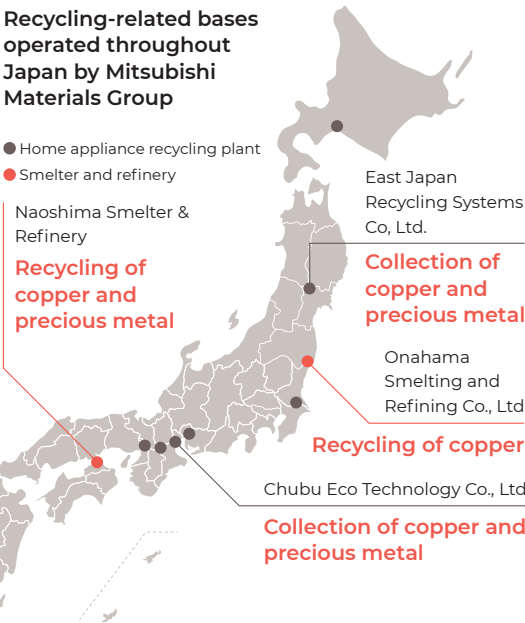
Other than mines, where can metal resources be collected from?

We collect metal resources from home appliances around us to create a society powered by clean energy

To stably supply traceable copper

The need for recyclable materials is increasing amidst the advancement of the transition to a circular economy. In order to respond to this need and provide the added value of traceability, Mitsubishi Materials is accelerating its initiatives with home appliance recycling plants within its Group as well as Materials Eco-Refining Co., Ltd., which performs the role of a trading company.

We will begin this initiative with copper as our first target. The copper is sold to external recyclers after being collected at home appliance recycling plants. Until now, it was not known how copper was recycled and used in the final products and components after being sold to these external recyclers. Mitsubishi Materials will establish the “resource recycling loop,” which recycles the copper at its copper smelters, refineries, and wrought copper plants, manufactures products using it, and again supplies it to society, creating a structure that can stably supply traceable copper.



**Chubu Eco Technology Co., Ltd. (Mie Prefecture)**

**Kenta Toshiyuki**  
Section Manager,  
Production &  
Logistics Dept.  
Chubu Eco  
Technology Co., Ltd.

**Increasing the volume of copper delivered to smelters and refineries by combining the Group's strengths**

Chubu Eco Technology is working to increase the recovery rate of copper in the recycling process for the entire Mitsubishi Materials Group. Copper is used for copper tubing for air conditioners and power cords for various home appliances as well as for motors and circuit boards (discarded circuit boards become E-Scrap). We disassemble home appliances and collect copper and copper components from them.

Our mission is to steadily deliver copper containing components that we have collected to Mitsubishi Materials and establish a resource recycling route for the Group. As we have traditional sales channels outside of the Group, we have not been able to deliver all of the copper to Mitsubishi Materials. Under these circumstances, we have been working with Materials Eco-Refining Co., Ltd. and other companies to steadily carry out initiatives for establishing a recycling structure to further increase the volume of copper that we deliver to Naoshima Smelter & Refinery.

In addition, we have been strengthening our copper collection by proactively proceeding with equipment improvements. For example, we have improved our copper recovery rate by improving the color sorting process.

As Japan has limited natural resources, it is necessary to collect resources, such as metal and resin, from urban mines. We have proactively introduced the latest technologies and fulfilled our role as a place for testing recycling technologies. Through our day-to-day operations, we would like to play a part in a recycling-oriented society and embody our commitment: “For People, Society and the Earth.”

Mitsubishi Materials Group collects valuable metals from used home appliances, such as air conditioners, refrigerators, TVs, and washing machines, and makes them usable again as metal resources. We will introduce two Group companies that play a role in this area through their involvement in the recycling of discarded home appliances.



Picking machine



Automatic screw remover



NIR (near infrared) resin sorting equipment



Copper scrap



**Introducing automatic equipment and reducing the workload to create a safe and secure workplace that can contribute to resource recycling**

Left **Shigeru Sato**  
General Manager, Facilities Engineering Dept.  
East Japan Recycling Systems Co., Ltd.

Right **Ryuichi Sakaguchi**  
General Manger, Recycling Dept.  
East Japan Recycling Systems Co., Ltd.

East Japan Recycling Systems Co., Ltd. disassembles home appliances manually and with machines and collects resources such as metal, but the workload of manually removing and carrying heavy objects was a challenge. By replacing manual labor with robots, we are aiming to enhance efficiency and maintain high productivity.

One task with a significant workload is the disassembly of air conditioner condenser units. On the high end, about 350 compressors, each weighing around 9 kg, are moved manually to the collection containers for this task. In terms of weight transported, this means that approximately a total of 3 tons are carried manually, which is a significant burden. Under an initiative from Mitsubishi Materials' Head Office, we are planning to introduce equipment that automatically disassembles and collects compressors using robots. This automatic disassembly equipment does not only move compressors, but also automatically unscrews the bolts in compressors. The equipment applies image recognition technology from automatic screw removers for flat-screen TVs.

Reducing the workload with this equipment will enable us to carry out work in an even safer manner and further increase productivity.

Nowadays, amidst society's demand for resource recycling, our company hopes to provide value to society by leveraging the recycling technologies we have cultivated. We will carry out our day-to-day work while keeping in mind our commitment of “circulating resources for a sustainable future” and work to accelerate a circular economy.



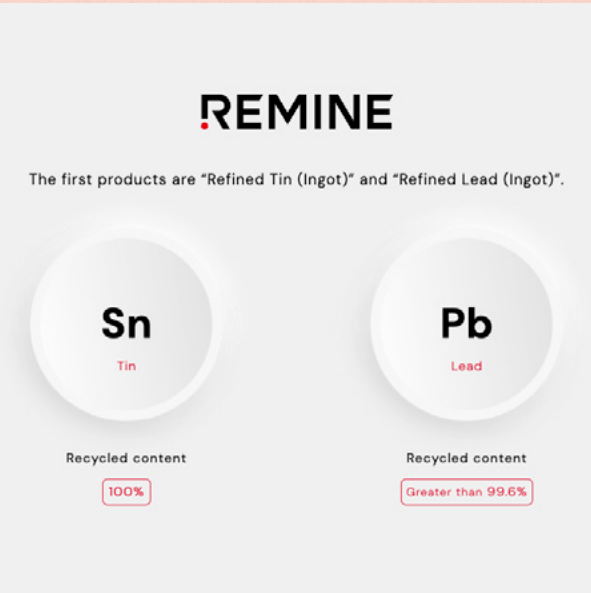
Bird's-eye view of home appliance disassembly line



Why did you launch a new brand now?

# To realize cleaner metal recycling

## Establishment of the REMINE series, a new metal brand



### What is REMINE?

Mitsubishi Materials has launched REMINE series, Japan's first recycled metal brand that displays the content of recycled materials contained in non-ferrous metal products. For the first batch, we released Refined Tin (Ingot) and Refined Lead (Ingot). The REMINE series offers non-ferrous metal products that utilize Mitsubishi Materials' recycling technology, while calculating their recycled material content based on the ISO 14021 international standard. The reliability of these products is verified by a third-party organization.

Trailblazer of REMINE business development

**Saori Koga**  
Assistant General Manager  
Business Development Dept.  
Resource Circulation Div.  
Metals Company  
Mitsubishi Materials Corporation



### We can create new value now as our technology aligns with societal needs

Our company has traditionally manufactured metal products by utilizing recycled materials. This method requires technology and incurs costs because recycled materials vary in type and shape. Additionally, they often require pre-processing to be usable as recycled materials and may contain elements that do not exist in natural resources. We have long developed technology to address these challenges and deliver products to our customers. In planning the launch of REMINE, we believed that now was the opportune moment to create new value by branding recycled metals, as our cultivated technology aligned with current societal needs.

To achieve a sustainable society, ensuring information transparency and traceability for raw materials of products throughout the supply chain will be increasingly important for resource recycling and reducing en-

vironmental impacts. REMINE calculates the content of recycled materials based on clear international standards and ensures high reliability through third-party verification. We are confident that the demand for REMINE will grow, especially in an era where leading companies across various industries—such as electronics, automobiles, and textiles—are committed to utilizing recycled materials.

### REMINExpands and strengthens the recycling loop

I assume that society expects Mitsubishi Materials to expand and strengthen the recycling loop. Conventionally, recycled materials were more reasonable than natural materials and easier to procure. However, in the current era, where there is a global trend toward realizing a circular economy, recycled materials have gained greater value. Countries and businesses scrutinize recycling companies more closely and

seek to know how their own emissions are processed and what types of products are created from them.

In other words, by adding value to products that utilize recycled materials, we can become the company of choice and gain easier access to recycled materials. We are expected to expand and strengthen the recycling loop by increasing awareness of our recycling technology, improving our scrap collecting capabilities, and delivering more recycled metals to society.

While we have successfully launched REMINE, I personally believe it is necessary, as a member of the Business Development Dept., to devise additional methods to enhance its profitability. Given the rapidly changing environment, we will continue to collect information and engage with relevant parties, leveraging our cultivated technical expertise, experience, and both internal and external networks to seek profitability.

Salespersons for REMINE

Left **Tomohiro Takanashi**  
Deputy General Manager  
Sales Dept.  
Metallurgy Div.  
Metals Company  
Mitsubishi Materials Corporation

Right **Emiko Watanabe**  
Assistant Manager  
Lead, Tin, and By-Product Section  
Sales Dept.  
Metallurgy Div.  
Metals Company  
Mitsubishi Materials Corporation



### Ensuring traceability for our customers and those beyond them

We at the Sales Dept. are actively promoting our recycling and environmental initiatives, aiming to have the value of REMINE products recognized not only by our direct customers, but also by customers beyond them. As a result of these daily efforts, Refined Lead is primarily used in automotive and industrial storage batteries, while Refined Tin finds applications as a lead-free soldering material, in chemical products, and for tin plates.

While we have conventionally promoted and sold our refined lead and tin products by emphasizing the use of recycled materials, there was no way to prove this to end-users tracing the long supply chain. However, with our acquisition of ISO certifications through a third-party organization, we can now

demonstrate that our products originate from recycled materials, adhering to clear international standards. Moreover, ensuring traceability will also be easy for our direct customers and customers beyond them. Our products will appeal to customers because they are made from sustainable, eco-friendly, and clean raw materials that contribute to resource recycling and decarbonization.

### Increasing the types of collectable metals to further expand resource recycling

Natural resources are limited. In Japan, where resources are particularly scarce, realizing a circular economy is considered imperative. Stable resource procurement forms the foundation of sustainable economic activities, and in recent years, the significance of recy-

cling and utilizing limited resources has been reaffirmed. Our mission extends beyond strengthening initiatives for resource recycling and reducing environmental impacts through our cultivated recycling technology and contributing to the entire society; we also aim to ensure information transparency and traceability for raw materials in the supply chain. Looking ahead, we believe it is necessary to expand the realm of resource recycling by increasing the types of collectable metals.

Our company has provided society with metal products that were collected using our cultivated smelting technology. In addition to this initiative, we are committed to collecting scraps generated in the supply chain. Our goal is to lead the creation of a resource circulation system that is not confined to our company but involves customers and relevant parties.





## Visiting a Town with MM

Ms. Stride, a woman traveling around the world, visits a town where a Mitsubishi Materials Group hub is located.

### Sanda Plant edition

In this edition, we will introduce the town from where Mitsubishi Materials Corporations' Sanda Plant supports the company's business in electronic materials and components for advanced products.

Sanda Plant operates from Sanda City, a place abound with nature located in southeastern Hyogo Prefecture. The plant currently handles products used in semiconductors and advanced materials, due to it originating from the transfer of Osaka Smelter & Refinery's new materials division to Sanda in 1989.

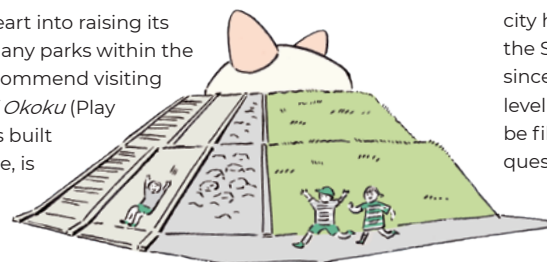
Navigator  
Ms. Stride

A woman in her late twenties who enjoys factory tours and strolls around town.



### Arimafuji Park The largest city park in Hyogo

Sanda City puts its heart into raising its children. There are many parks within the city limits, but we recommend visiting Arimafuji Park. *Asobi Okoku* (Play Kingdom), which was built based on local folklore, is always crowded with children.



Guide

#### Nao Okabe

Materials Characterization Technology Group, R&D Department, Sanda Plant

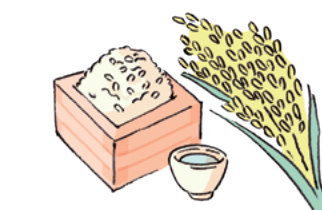
Joined the company in 2011. She operates microscopes and analytical equipment in the R&D Department. Her recommended place to visit is the Kobe-Sanda Premium Outlets, located just 15 minutes from the plant.



### Sanda Celadon Traditional art from the Edo period

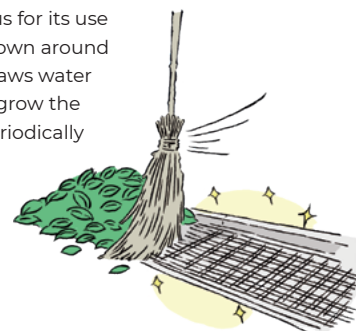


Known as one of the three greatest celadon techniques in the world, Sanda Celadon has been passed down since beginning in Japan in the Edo period. It is characterized by its beautiful blue-green coloration and its unique sense of purity. The same blue-green color covers the outer walls of Sanda Plant.



### Yamada Nishiki The king of sake rice

Yamada Nishiki, famous for its use in Japanese sake, is grown around the plant. The plant draws water from a nearby river to grow the rice, so Sanda Plant periodically inspects and cleans the rain gutters on its grounds and takes great care in managing the quality of the water.



### The Sanda Beer Exam A test for beer lovers?

Kawamoto Komin, a scholar of *Rangaku* (Japan's Western studies through the Dutch language) from Sanda, is known for being the first to brew beer in Japan. In honor of this achievement, the city has been hosting the Sanda Beer Exam since 2017. The highest level exam is said to be filled with difficult questions.



By protecting nature, the plant is building trust with the local community!



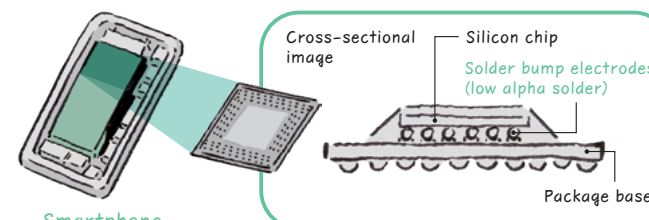
## Welcome to Sanda Plant!

### About Sanda Plant

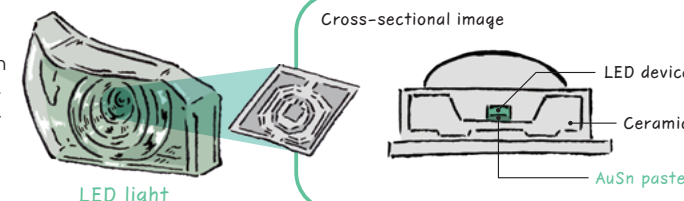
Sanda Plant mainly manufactures precision mounting materials and precision silicon products. Other than mass production functions, the plant also has research, development, and customer support functions. With R&D, manufacturing, and quality assurance teams uniting as one, and with "Cooperation and innovation" as our motto, we are creating state-of-the-art products capable of meeting customers' needs in the rapidly changing market.

### Precision mounting materials in surprisingly familiar places

Low alpha solder drastically reduces the emission of alpha rays, a cause of soft errors. It is mainly used in bonding materials for semiconductors installed in precision machinery. In addition, AuSn paste, a highly reliable bonding material, is used in high-power LED lighting and other devices.

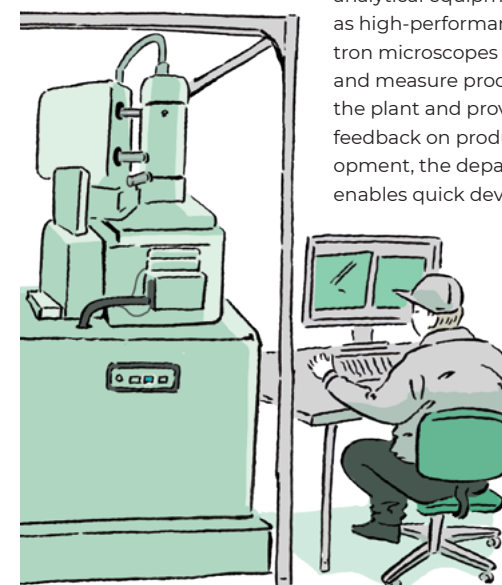


Smartphone



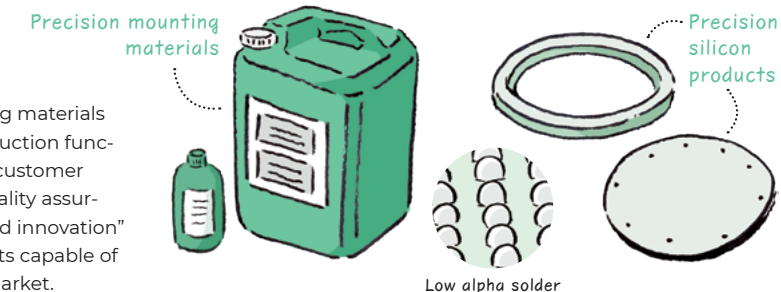
LED light

### The R&D Department is responsible for Sanda's future through development

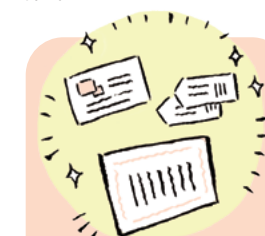


The R&D Department is responsible for new product development at Sanda Plant. It is equipped with the same mass-production prototype equipment as our customers and evaluates various developed products. Using analytical equipment such as high-performance electron microscopes to evaluate and measure products in the plant and providing feedback on product development, the department enables quick development.

## Products being manufactured at Sanda Plant



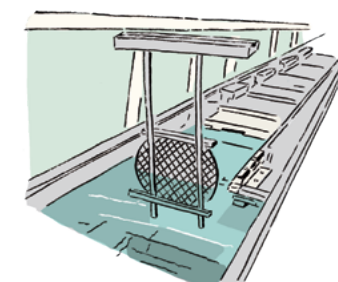
Low alpha solder



Rare B-to-C products in the Group

### Gold card

At Sanda Plant, we use metal rolling technologies to manufacture gold items, such as business cards, playing cards, and bookmarks. We thinly and evenly stretch gold using a metal rolling mill.



Guide

#### Tetsuro Mizuta

General Affairs Group, Administrative Department, Sanda Plant

Joined the company in 2006. He has worked in Sanda Plant since 2018, mainly engaging in general management of the plant's premises as someone in charge of welfare and general affairs. He enjoys going on walks and often refreshes himself by walking along the Muko River near Shinsanda Station and around Goryo Shrine.

### Precision silicon products hold the key to manufacturing semiconductors

It is unacceptable for even the smallest impurity to appear in a semiconductor. Therefore, the same silicon as is used in wafers is used in semiconductor manufacturing equipment. Sanda Plant flexibly processes fine silicon to meet customer demand. Furthermore, the plant has realized thorough quality control using fully-automated cleaning equipment.







“Innovating manufacturing sites from the field of education”

**Rina Suzuki**

Section Manager  
Technical Planning Section,  
Machining Technology Center,  
Research & Development Div.,  
Metalworking Solutions Company

## Solving manufacturing site challenges through customer-centric workshops

In recent years, manufacturing sites have been facing a variety of challenges, including worker retention, skill transfer, and automation, and addressing these issues through operational improvements. While hands-on manufacturing experience is necessary for precise operational improvements, I believe that theoretical and knowledge-based approaches are also essential elements.

At Mitsubishi Materials, we handle cutting tools, which are essential for manufacturing. In the Technical Planning Section, where I work, our main tasks include systematically explaining the phenomena and issues that occur in the use of cutting tools and holding workshops to deepen our customers' understanding of machining. When organizing these workshops, I am mindful of what customers need to understand. For example, I adjust the presentation style and materials to match the customer's experience and knowledge of machining. My mission and fulfillment lie in using these workshops to help customers improve their operations and to promote our cutting tools.

In Medium-term Management Strategy FY2031, Mitsubishi Materials has set the goal of “selling solutions to manufacturing sites.” The Technical Planning Section has been offering the “Cutting Academy”<sup>\*</sup> as a paid service for several years. In recent years, it has become clear that there is demand from companies that have been unable to conduct sufficient in-house training due to the COVID-19 pandemic. Moving forward, we

aim to support solution-based selling by continuing to provide the information our customers need.

The Technical Planning Section is also responsible for internal training and is dedicated to fostering talent. Developing people takes time, but by steadily working on it, we aim to produce individuals who can eventually become true partners for our customers. That is my goal.

## Creating job satisfaction for team members as a new section manager

How can I achieve the best output from the Technical Planning Section? Having been newly appointed section manager in April 2024, this is a challenge that I am currently facing. Our section has 11 diverse members, including new hires, experienced hires, and transfers from other departments. Everyone has different levels of knowledge based on their backgrounds, while personalities, attitudes toward work, and work-life balance also differ. Incidentally, I also have young children, so naturally, I also need to balance my work with parenting responsibilities.

As a new manager, my approach to achieving optimal output is to assign tasks based on each person's aptitude and preferences. I have also adopted a style of forming teams flexibly according to the nature of the work and encouraging members to share their knowledge and help each other. Furthermore, I regularly conduct one-on-one meetings to understand each member's strengths, weaknesses, and aspirations. By respecting these factors

as much as possible, I aim to boost team motivation and create a fulfilling work environment. This is my mission as a manager.

## The courage to embrace and build up your career

Having reached my 17th year with the company, I find myself increasingly approached by younger colleagues seeking career advice. Some are deeply concerned about their careers being interrupted due to childbirth or childcare. I believe everyone carries vague anxieties about the future, and I understand how it feels to go through emotional highs and lows based on upcoming performance evaluations. However, despite having taken two maternity leaves, two childcare leaves, and even a sabbatical, I have continued to work as a section manager. So, to those who are concerned about their careers, I encourage you not to always aim for the fastest way to advance your career but to have the courage to accept yourself in the moment and consider your unique career path without comparing yourself to others.

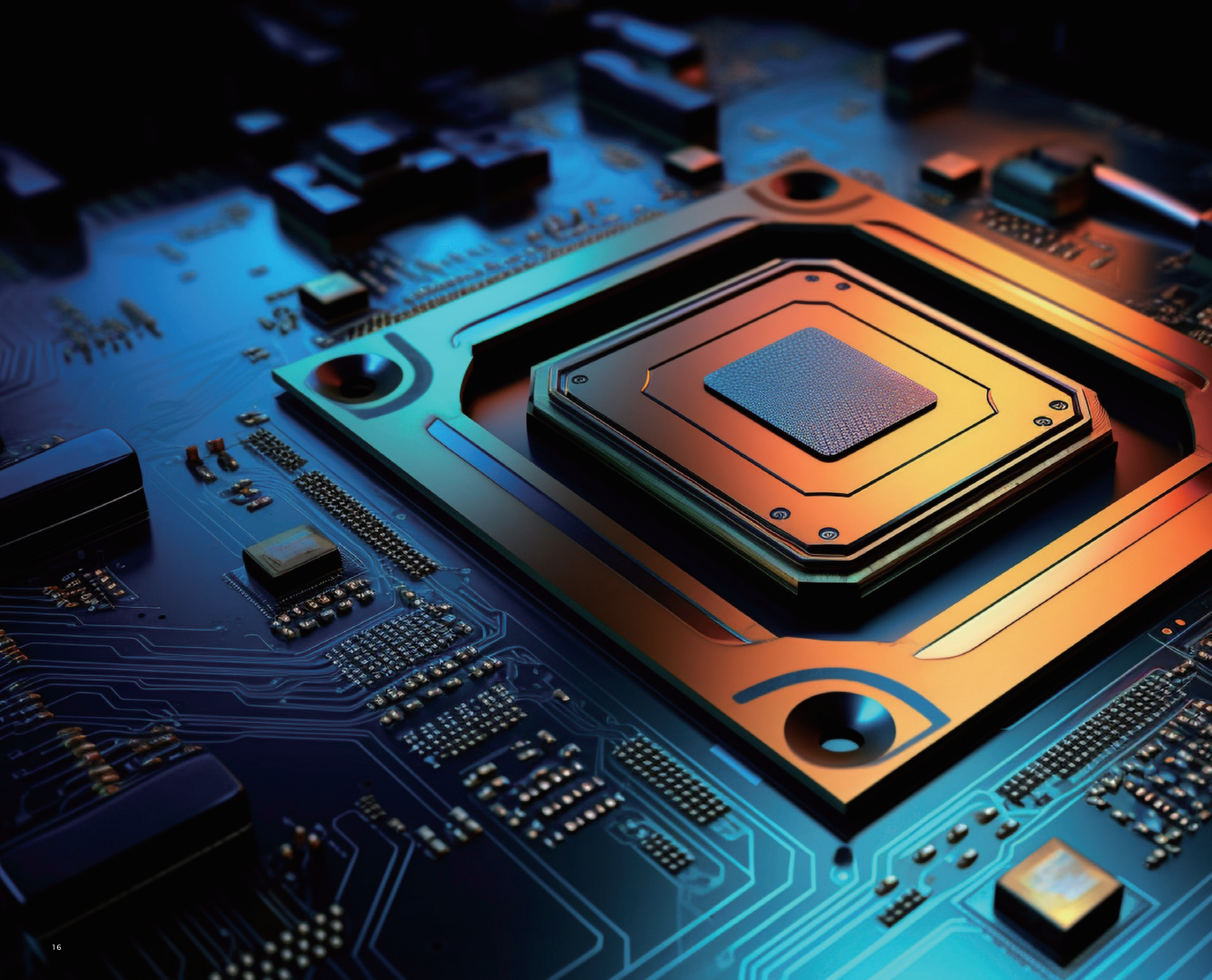
Furthermore, having experienced periods of anguish due to the lack of role models around me, I want to demonstrate a career path that values both life and work. While my choices may not always be the definitive answer, I have persevered and continued working at Mitsubishi Materials to this day, never giving up despite the challenges. I sincerely hope that my career path can become an option for the next generation who will support the company in the future.

Suzuki emphasizes the importance of teamwork. “Teamwork flourishes in a flat workplace,” she explains. “However, since some of our members are shy, I start by sharing my true self to close the emotional distance.”



<sup>\*</sup>Cutting Academy: A series of workshops covering everything from fundamental knowledge of cutting tools to machining techniques.





# The Power of Materials Builds Society

## Semiconductors

**“Low alpha plating chemical”  
that supports various  
manufacturing methods and  
prevents system errors**

Semiconductors are essential for our current lifestyle. In the field of semiconductors, which is evolving at a remarkable speed, the required specifications, characteristics, and materials for the technology are continuing to change. Amidst these circumstances, Mitsubishi Materials provides a low alpha plating chemical as a bonding material for semiconductor devices.

Alpha ray radiation has an adverse effect on the performance of semiconductor devices, causing soft errors and other problems. The key to reducing alpha ray radiation depends on how much we can reduce trace amounts of radioisotopes, which are included in semiconductor materials. We started developing low alpha materials about 30 years ago, resulting in a reduction in radioisotopes and the establishment of measurement and management technology. With a focus on plating chemicals, we provide a number of low alpha products to the industry.

Because plating chemicals are easily compatible with smaller sizes when forming electrodes, there has been an increasing dominance in semiconductor devices, which have become smaller and highly integrated. We will contribute to realizing a prosperous society by making use of the technology that we have cultivated and providing products that will play a part in the evolution of semiconductors.

### PICK UP

#### MUL $\alpha$ S series

Mitsubishi Materials has been developing the low alpha material series, “MUL $\alpha$ S,” for about 30 years. The series is used for bonding semiconductor devices to circuit boards and provides optimal implementation solutions for cutting-edge semiconductor packages that are highly integrated.



## The Secrets of Materials



Exploring the “secrets” of materials and technologies Mitsubishi Materials has developed!

SOZAI FILE NO.10

What type of material is

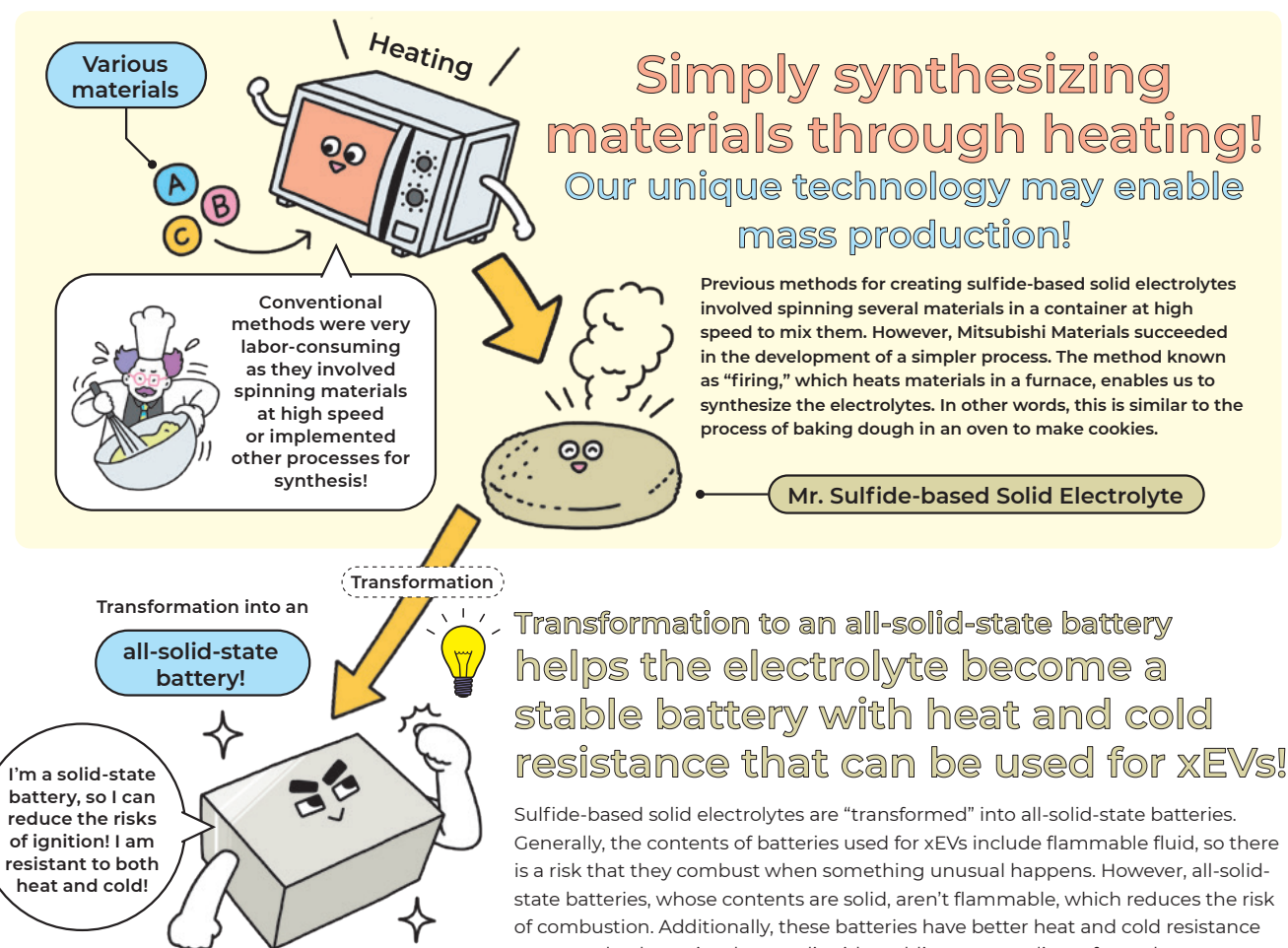
# “sulfide-based solid electrolyte”?

Sulfide-based solid electrolytes, a material from Mitsubishi Materials, are expected to be used as a material in all-solid-state batteries for xEVs (electric vehicles). In this issue, we will introduce our unique technology that was developed to mass-produce these materials.



an expert on materials  
**Dr. Materials**

A doctor who loves materials devoted to research at a Mitsubishi Materials lab.



## Examples of applications



### Toward improved performance and wider use of xEVs

One of the current factors that prevent the widespread use of all-solid-state batteries is the difficulty of mass-producing solid electrolytes. However, it is expected that we will be able to contribute to the improved performance and wider use of xEVs if the proprietary process developed by Mitsubishi Materials can achieve the mass production of high-quality solid electrolytes at low cost.



It is considered that xEVs equipped with all-solid-state batteries aren't only safe, but may also reduce charging time.

# TOPICS

Here are some of the main topics involving Mitsubishi Materials from April to June 2024.

Please take part in the WITH MATERIALS survey /

We would love to hear your honest thoughts and opinions about this issue of “WITH MATERIALS” and what you would like to see covered in the future.

<https://forms.office.com/r/kZWVeBD0jq>



April

## Joint Development of an Industrial Accident Prevention System Using the Sensing Technology of Smart Footwear

Mitsubishi Materials and ORPHE Inc. have agreed to jointly develop the Industrial Accident Prevention System that uses the sensing technology of smart footwear (footwear with built-in electronic components such as sensors) for dynamic state management in factories. This is a service to prevent the occurrence of fall accidents, neglected falls, and lower back pain at factories and other work sites to support the achievement of zero accidents. Our accumulated knowledge of safety and measures against industrial accidents at factories and other sites will be combined with the fall detection algorithms utilizing the gait (characteristics such as posture, movement, and stride length of walking) analysis technology owned by ORPHE to realize the prevention of industrial accidents at factories and other work sites.



Insole-type sensor (industrial accident prevention insole)

April

## Collaboration with Duoc UC, Chile's Technical Institute of Higher Education

Mitsubishi Materials and Duoc UC, a Chilean Technical Institute of Higher Education, have agreed to collaborate in the collection of used electrical and electronic appliances known as E-wastes. In Chile, discussions are underway to implement a recycling law that includes electrical and electronic appliances, and the number of E-wastes collected for recycling is expected to increase in the future. In order for the recycling law to work effectively, it is essential that all residents understand the importance of E-wastes recycling. Under such circumstances, we will contribute to fostering a metal recycling culture in Chile through a partnership with Duoc UC that has campuses in 20 locations in Chile.



Signing ceremony

May

## Agreement for the Acquisition of H.C. Starck Holding GmbH

Mitsubishi Materials Corporation Group (MMC Group) and Masan High-Tech Materials Corporation reached an agreement whereby MMC Group would acquire all shares of H.C. Starck Holding (Germany) GmbH, which is engaged in the tungsten business. As a result of the acquisition, MMC Group will have bases of the tungsten business in four major markets: Japan, Europe, North America, and China. Through collaboration with H.C. Starck, our Group aims to create synergies and increase corporate value by strengthening R&D capabilities and promoting cross-selling, as well as to develop a global tungsten recycling business by leveraging our recycling technologies and capabilities.



Full view of H.C. Starck's main plant (Goslar, Germany)

May

## Completion of the Expansion of a Cemented Carbide Tool Plant in Valencia, Spain

Mitsubishi Materials has completed the expansion of its cemented carbide tool plant in Valencia, Spain, as originally planned and started operations in May. Following the completion of the expansion, the production capacity of inserts at the Valencia plant in Spain will increase by two to five times compared to the previous capacity. We plan to install the latest facilities to the expanded insert plant to enhance the automation of presses, grinding machines, and inspections. We aim to increase our production capacity while utilizing the latest technology to improve our manufacturing sites.



Expanded insert manufacturing plant

May

## Selected as a Noteworthy DX Company 2024 in DX Stocks 2024 for the Second Consecutive Year

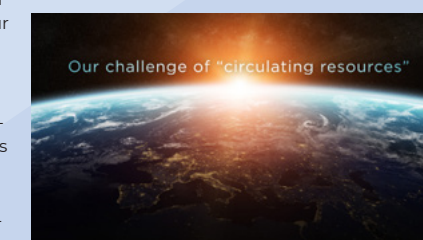
Mitsubishi Materials has been selected as a Noteworthy Digital Transformation (DX) Company 2024 following last year in the Digital Transformation Stock Selection (DX Stock) program run by the Ministry of Economy, Trade and Industry, the Tokyo Stock Exchange, and the Information-technology Promotion Agency, Japan. The selection is in recognition of our DX achievements and efforts to foster a corporate culture. As an important initiative in our business strategy, we are currently operating a business that collects E-Scrap (discarded circuit boards, etc.) from all over the world and recycles them into valuable metals. In December 2021, we launched a new platform called “MEX” (Mitsubishi Materials E-Scrap EXchange) that enables online transactions, realizing a business model that will attract more business partners through DX.



June

## Released a Conceptual Video about Our Commitment

We created a video that conveyed the concept of Our Commitment, “For people, society and the earth, circulating resources for a sustainable future,” and made it available on our corporate website. We hope that you will watch the video to see our efforts to expand resource recycling and enhance the supply of high-performance materials and products with the purpose of realizing Our Commitment.





## Forests

## and Materials



A Materials' Forest viewed from above, with a beautiful contrast between the forest canopy and the ground  
(Bibai City, Hokkaido)

## Changing forest creation with technology while maintaining our commitment

As forest guardians, we face challenges every day—from efficiently identifying the types and quantities of trees in a vast forest to safely monitoring forest conditions in the event of damage from typhoons or other natural disasters. Advanced technologies, such as remote sensing\* using drones and satellites, can provide the breakthroughs to meet these challenges.

For example, drones can provide a bird's-eye view of the vast Materials' Forests from the air, allowing for the safe and efficient assessment of forest conditions. Logistics drones can transport seedlings and other materials with minimal labor. By replacing human “eyes” and “hands and feet,” these advanced technologies significantly reduce the time and labor required for forest management, thereby enhancing the safety of forest guardians.

However, this does not mean that we delegate all aspects of Materials' Forest management to remote sensing and other advanced technologies. By using technology to streamline forest management, we can dedicate more time on the truly important tasks: “visiting the forest, observing it, and listening to its voice” and “thinking about Materials' Forests, considering their needs, and maximizing their potential.” This approach represents our ideal way of creating forests.

\*Remote sensing: Technology that measures the shape and properties of an object from a distance without physical contact