December 2012 ～ March 2013

Tatsuno Corporation

・Research and Development of Toxic Chemical Substance Risk Reducing Platform Technologies / Development of Gasoline Vapor Collection Device using a Dual Membrane System (FY2006-FY2008)

An Innovative Device that Prevents Leaking of Gasoline Vapor

The reason why the smell of gasoline fills the air at a gas station is simply due to the fact that liquid gasoline is gasified and is being emitted into the air. This gasified gasoline is usually referred to as "gasoline vapor". Gasoline vapor is a type of volatile organic compound (VOC), which in turn is a type of toxic chemical substance. With regard to VOC, international efforts have been taking place to reduce the emission thereof. Even in our country as well, the revised Air Pollution Control Act has been put in effect since 2006, and emission regulations have been stipulated with regard to volatile organic compounds (VOC).

Gasoline vapor, on top of its smell, is a cause of air pollution and fires, and also leads to a loss of resources. Gasoline vapor generated in a single day at all of the gasoline stations throughout Japan is equivalent to 22 loads of large sized tanker trucks that hold 20kl each. This means that a great amount of gasoline is being released into the air without being used. If this escaping gasoline were to be used, the value of such would amount to as much as 30 billion yen per year.

With the support of the NEDO project, Tatsuno Corporation, a leading manufacturer of petrol dispensing pumps, has developed and actualized a device that liquefies and collects this gasoline vapor at the gas station. This device is anticipated to be expanded and popularized in the creating of non-smelling, non-polluting, highly safe and fire-preventing, and economical gas stations. As of the end of 2012, while a total of 69 units are being used, the sales of new products such as that integrating the gasoline vapor collecting device with the petrol dispensing pumps for fueling, as well as low-priced models with slightly lowered performance are being planned. Additionally, actions are being taken to develop the product in overseas markets as well.

The Eco Stage L liquefies and collects gasoline vapor that is generated when unloading the gasoline from a tanker truck into an underground tank.

Nozzle collecting the gasoline vapor

Press pump

November 2008

UD Trucks

・Development of High Performance Industrial Furnace (FY1993-FY1999)

Developing an Eco-Diesel Engine with Clean Exhaust Gas

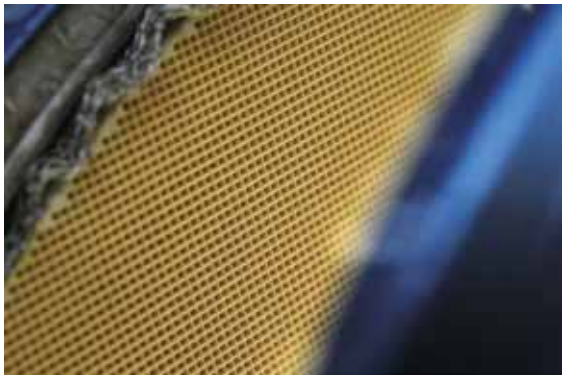
Strict environmental regulations have been imposed on diesel vehicles such as heavy duty trucks and buses due to the large quantities of air-polluting toxic gases they emit. To comply with these regulations, it is essential to reduce both the particulate matter (PM) said to have adverse effects on the human respiratory system as well as nitrogen oxides (NOx) that cause acid rain. Given the trade-off associated with these two substances, as reducing the level of one increases that of the other, development of a new exhaust gas purification device was imperative.

To achieve this, Nissan Diesel Motor developed a urea-selective catalytic reduction (SCR) system, which is based on the approach of minimizing the generation of PM by burning fuel at high temperatures, while selectively breaking down NOx using a purification device so that only nitrogen gas (N_2) is emitted. This urea-SCR system requires the addition of a urea aqueous solution, AdBlue™ (a trademark held by the German Association of the Automotive Industry) to ensure high-efficiency reduction reactions. However, there are major drawbacks to using this in diesel engines. These drawbacks include the need for countermeasures for the change in gas components emitted by the engine, shorter reduction reaction periods, and infrastructures to supply the urea aqueous solution required by the urea-SCR system.

To address these challenges, Nissan Diesel collaborated closely with its NEDO project partners and as a result, as of March 2012 more than 47,000 Nissan Diesel heavy-duty trucks were fitted with the urea-SCR system as standard equipment and are now operating throughout Japan.

Urea-SCR System

AdBlue™ tank next to a diesel fuel tank
The color and size of the AdBlue™ tank filler caps differ from those of diesel fuel tank fillers.



Interior of the reduction unit
The mesh structure increases the contact area and improves reaction efficiency. NOx is removed at the surface of the mesh structure.

October 2010

JAPAN MATEX CO., LTD.

・Urgent Development of Fundamental Technologies for the Practical Reduction of Asbestos (FY2006),etc.

Creation of a Safer Heat-resistant Material as a Replacement for Asbestos

Gaskets are sealing devices that are used to prevent liquids and gases from leaking from the joints of pipes installed in factories and power plants. Traditionally, asbestos has been used in the production of non-metallic gaskets designed for high-temperature conditions. However, given the serious health hazards associated with the use of this material, there is an increasing trend toward completely discontinuing its manufacture and use. One material that is attracting interest as a replacement for asbestos is a material made of exfoliated graphite and clay, which also offers excellent heat resistance.

The problem, however, is that gas may leak from gaskets made of this material when the temperature of the liquid flowing through exceeds 300℃ because of the brittle nature of the exfoliated graphite. For Japan Matex Co., which has been manufacturing industrial products using exfoliated graphite, the use of this material at high temperatures presented a huge challenge.

Amidst this situation, in 2006 NEDO launched the project on Urgent Development of Fundamental Technologies for the Practical Reduction of Asbestos to develop measures for discontinuing the use of asbestos. Together with the National Institute of Advanced Industrial Science and Technology (AIST) and other organizations selected for the project, Japan Matex worked to accelerate research and development by applying technologies it had acquired through its own dedicated efforts as well as collaborative activities with AIST in areas such as materials development, analysis, quality assessment and computer simulations.

As a result of the joint project, Japan Matex was able to start shipping product samples after just one year, well ahead of the projected two-year target shipping date. In 2007, the company launched sales of its exfoliated graphite gaskets and had shipped more than 46,000 gaskets by April 2011. In 2008, Japan Matex was again selected as a member of NEDO' s Innovation Promotion Program. Today, the company continues research and development efforts to improve and refine the design of its products.

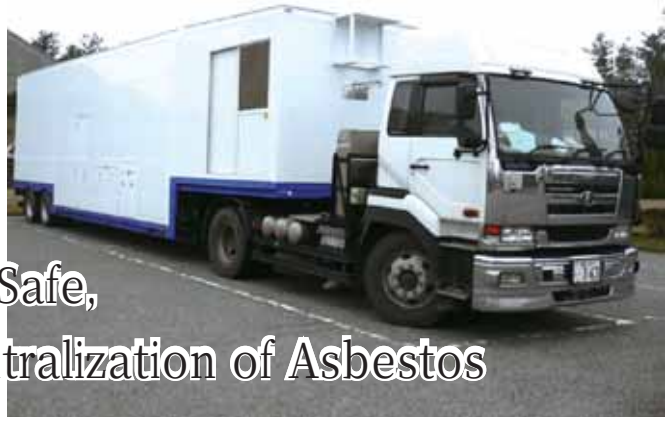
" Clear Matex 8121ND "

With conventional non-abestos gaskets, the gasket material tends to burn and stick to the pipe joint, which is very difficult to remove when replacing gaskets. With the Clear Matex exfoliated graphite gasket, burning is prevented by a coated clay membrane.

November 2011

Hokuriku Electric Power Company

・Urgent Development of Fundamental Technologies for the Practical Reduction of Asbestos (FY2006),etc.



On-site Processing System for Safe, Stable and Highly Efficient Neutralization of Asbestos

Used for various purposes for many years, use of asbestos is now gradually being banned due to the health risk it poses. However, many construction materials and industrial products containing asbestos are still being used, and when disposed of they are mainly buried in landfills. Thus, the safety neutralization of asbestos has become a major issue of our society.

Hokuriku Electric Power Company launched a project to develop a mobile system for on-site neutralization and disposal of insulating materials from the company's thermal power plants,to reduce risks when burying or transporting insulating materials containing asbestos and at the same time provide solutions for the difficulties currently faced in the construction of new asbestos disposal facilities , supported by NEDO, As a result, this development can be applied not only neutralizing asbestos at its own thermal plants, but one that also can be used for asbestos disposal at other large industrial facilities.

Asbestos, the fiber must be thermally processed to neutralize at temperatures above 1,500℃. By using alkaline agents, the melting temperature can be reduced to 1,050℃. Compared with melting at 1,500℃ , this allows power savings of about 25% and at the same time provides a wider choice of furnace materials and system design methods that can be used. Because the system is mounted on a trailer that travels on public roads, Hokuriku Electric Power has also worked to resolve issues such as restrictions in trailer size and weight in accordance with the Road Transport Vehicle Act, and to determining the appropriate weight balance of the system and trailer to prevent overturning. Before using the system, the company applied for asbestos neutralization certification for own three thermal power plants from the Ministry of Environment and successfully acquired certification for the plants after undergoing five technical screenings and other rigorous certification requirements.

Hokuriku Electric Power is now accumulating experience in the safe and stable treatment of insulating materials that contain asbestos through the use of its on-site asbestos melting and neutralization system at own certified plants. The company plans to commercialize the system in the future.
(As of July. FY2012)

Melted and neutralized asbestos

Insulating material for piping. Hollow structure, bulky when packed in a bag.

February 2012

TAISEI Corporation

・Urgent Development of Fundamental Technologies for the Practical Reduction of Asbestos (FY2006),etc.

Asbestos Removal Robot Contributes to Safe and Efficient Workplace Through Remote Control and Automation

Asbestos is a natural mineral fiber that was once used extensively, particularly in the construction and clothing industries, because of its outstanding heat resistance, sound absorbency, thermal insulation properties and wear resistance. In the 1970s and 1980s, however, the International Labor Organization (ILO) and World Health Organization (WHO) announced findings that the fiber could cause cancer and it was widely banned in Europe and the United States. In 1975, Japan started to gradually phase its use out, but large amounts can still be found in buildings constructed in the mid-1970s and earlier.

Today, as these buildings become dilapidated and are condemned for destruction, the safe removal of asbestos during demolition has emerged as an increasingly important issue for the construction industry. Through a project funded by NEDO, Taisei Corporation began developing robots capable of removing asbestos to reduce the risk to workers engaged in the demolition of older buildings. Between 2006 and 2011, the company successfully developed three robots designed for different purposes. The company has also developed a system for recovering asbestos-laden construction materials that have been removed, and is now conducting on-site verification tests.

Once these new robots are put into use, they will not only reduce the risk to those involved in asbestos removal, but will also speed up such work three- to five-fold. It is also anticipated that Taisei ' s system will reduce the disposal of waste by more than 60%. As of April, Taisei was collaborating with asbestos removal companies to put its robots into use as well as on a system designed to use an existing base machine for the robots.

Asbestos-removal robot designed for use in an elevator shaft

Demonstration for stripping and removing of simulated asbestos

December 2011

Panasonic Corporation Home Appliances Company

・Development of Non-fluorinated Energy-saving Refrigeration and Air Conditioning Systems (FY2005–FY2007),etc.

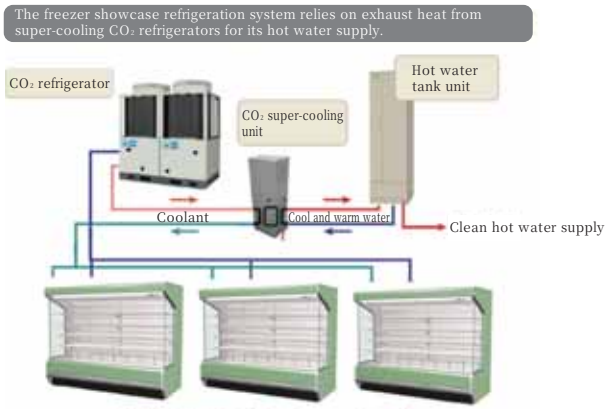
Non-Fluorinated CO_2-cooled Refrigeration System for Supermarket Showcases

Hydrofluorocarbons (HFCs) were developed as substitutes for chlorofluorocarbons (CFCs), which had previously been thought to have no significant effects on the environment but were later implicated in the accelerated depletion of ozone in the Earth's stratosphere. However, in an effort to prevent global warming, reducing the use and emissions of HFCs has become an increasing important goal as HFCs are now known to be powerful greenhouse gases that are many times more potent than carbon dioxide (CO_2) in terms of global warming potential.

Panasonic Home Appliances (formerly Sanyo Corporation) is involved in the development of non-fluorinated air-conditioning systems and has long recognized the importance of using natural coolants such as CO_2. In 2000, the company developed and commercially launched the Eco Cute heat pump water heater, which uses CO_2 as a coolant. Though well-suited for warming applications, CO_2 coolants are difficult to use in freezing/refrigeration applications. They are also particularly unsuited for use in large industrial facilities in terms of size and efficiency.

With support from NEDO, Panasonic began research and development on a CO_2-based refrigeration system suitable for use in supermarket showcases. Applying its unique compressor design and other innovative technologies, the company was able to overcome challenges associated with CO_2 refrigeration and develop a non-fluorinated system that offers both cooling efficiency and energy savings comparable to that of conventional CFC-alternative freezers.

Panasonic Home Appliances began selling the new CO_2-based refrigeration system in September 2010. By April of this year, the system had been installed in 64 supermarkets and convenience stores throughout Japan.



Multi-level open refrigerator showcase

Exhaust heat is transformed into a hot water supply by a super-cooling water heater installed between the CO_2 refrigerator and showcase

Test site: MaxValu Express Rokugodote Ekimae
Refrigerator showcase
Non-fluorinated refrigeration system installed on store roof

February ～ March 2012

Tsukishima Kankyo Engineering Ltd.

・Development of HFC-23 Destruction Technology
(FY1998– FY2001)

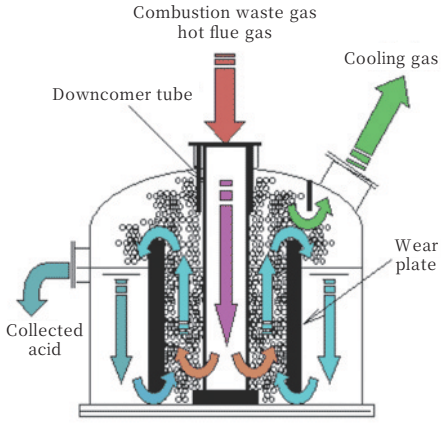
Destruction of HFC-23 Through Burning and Cooling

Today, the use of fluorocarbons in air-conditioners, refrigerators and freezers is becoming more restricted as their emissions are one of the causes in the depletion of the ozone layer, which absorbs harmful ultraviolet (UV) rays that enter our planet' s stratosphere from outer space.

Fluorocarbon substitutes have been developed but are not without their own problems, one of which is that they emit a high level of greenhouse gases. Methods for destroying and treating HFC-23, a particularly potent greenhouse gas, are increasingly sought-after as a means of reducing the potential for global warming.

Tsukishima Kankyo Engineering addressed this challenge through its fluorocarbon destruction system. To destroy HFC-23, which does not decompose easily, the system heats it to temperatures above 1,200℃ using a vortex burner and then uses cold water to instantaneously cool it to 80℃.

The fluorocarbon destruction system is currently in use in Japan, South Korea, and Southeast Asia and is already producing significant results. For example, fluorocarbon destruction systems have been responsible for 31.2% of the HFC-23 destroyed under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC).



Hot gas is instantaneously cooled by the direct contact with the solution.

High-load combustion (vortex burner)

Fluorocarbon destruction system in operation at Asahi Glass

December 2009

Kanto Denka Kogyo Co., Ltd.

・Research and Development of Semiconductor CVD Chamber Cleaning Systems for Electronic Device Manufacturing Using New Alternative Gases as a Substitute for SF_6, PFCs and Other Gases (FY1998–FY2002),etc.

Birth of COF_2: New Clean Gas for Semiconductor Manufacturing with Very Low Greenhouse Gas Effects

Semiconductors and liquid crystal displays are devices indispensable to information processing and electronic devices. The cleaning process is an important step in their manufacturing. Currently, perfluorocarbons (PFCs) that produce greenhouse gas emissions of 7,000 to 23,900 times that of CO_2 are being used as a part of this cleaning process. These PFCs include sulfur hexafluoride (SF_6), hexafluoroethane (C_2F_6) and octafluoropropane (C_3F_8).

The amount of PFC gases emitted is small compared to CO_2, but because even minute amounts can have a major impact on the environment, there is a great demand for the development of cleaning gas with minimal greenhouse gas emissions.

Carbonyl fluoride (COF_2) is a gas that can meet this demand. It was developed by companies such as Kanto Denka Kogyo, which participated in NEDO' s project on Research and Development of Semiconductor CVD Chamber Cleaning Systems for Electronic Device Manufacturing Using New Alternative Gases as a Substitute for SF_6, PFCs and Other Gases.

In addition to containing elemental fluorine indispensable for chemical treatment in the cleaning process, the global warming potential (GWP) of COF_2 is 1, the same as that of CO_2, which enables sharp reductions in greenhouse gas emissions. Through this NEDO project, Kanto Denka Kogyo focused on establishing conditions for safely using COF_2, conducted continuous cleaning tests with COF_2 on production lines, and verified semiconductor device performance as well as cleaning performance.

Prior to the project, cleaning gas development primarily took place overseas. This project resulted in the development of a new, eco-friendly cleaning gas in Japan with very low greenhouse gas emissions.

Further reductions in the price of COF_2 will play a key role in the continued development of this application. Kanto Denka Kogyo is striving to supply COF_2 at a lower price by optimizing operations at its dedicated plants and reassessing their conditions. Moreover, it participates in joint research projects to establish methods for using COF_2 that are suitable for the manufacturing of semiconductors, liquid crystal displays and solar cells.

Semiconductor manufacturing equipment used in verification tests

February 2013

TOSOH F-TECH INC.

・Energy Saving Freon Substituting Substance Composition Technology Development (FY2002-FY2006)
(Development of Technology for Synthesizing of Substituting Substance for Etching),etc.

Mass Production of Freon/Halon Substitute with a World's First Composition Method

Materials having a history of being synthesized that was never mass produced. When looking into the history of development of materials in the past, there are many substances that have taken this path. Reasons for this vary, such as being too costly, or due to not being able to come up with applications. "iodinated- trifluoromethane" (CF_3I) is one of these substances. Although having been composed in the past, it never came into the light of day.

However, from the late 1980's, regulations started being imposed on use of substances such as Freon that destroy the ozone layer, and in the late 1990's, regulations started being imposed on the use and limitations of Freon substitutes and other greenhouse effect gasses considered to cause global warming. Tosoh F-Tech Inc., a leading manufacturer of fire extinguishing halon, focused on this substance, and under the support of the NEDO project, a composition technology for CF_3I using a vapor phase catalyst method was developed for the first time in the world. Later, mass production was realized as well.

Currently, production is taking place at an actual plant, and the gas is domestically being used as an etching gas for surface treatment of semiconductors and as an air duster to blow away dust, while overseas the gas is being used as a fire extinguishing solution. CF_3I is being considered to serve a wide array of purposes as a Freon substitute. In the future, starting with use as a semiconductor cleaning gas, applications in various fields are expected to be discovered.

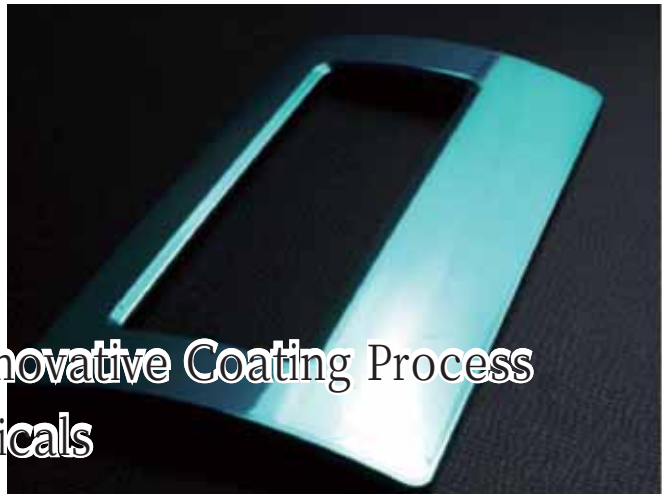
Tanks of CF_3I manufactured by Tosoh F-Tech

Also being sold as air-dusters that blow away dust from precision machines

December 2011

KAMI ELECTRONICS IND CO., LTD.

・Development of Fundamental Technologies for Risk Reduction of Hazardous Chemical Substances/Research and Development of Innovative Coating Devices (FY2007–FY2008)



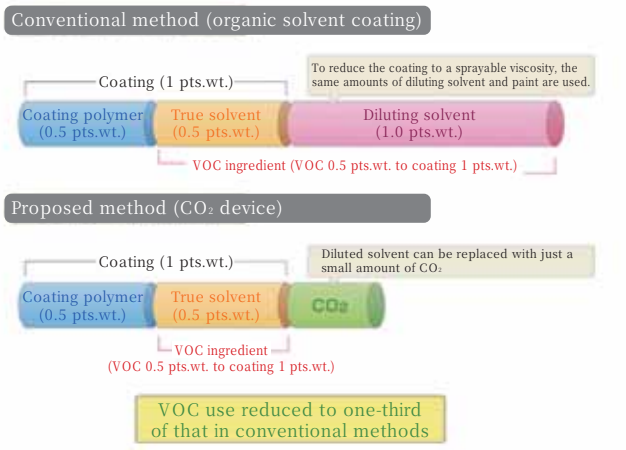
From Tohoku to the World! Innovative Coating Process Reduces Use of Harmful Chemicals

Industrial products such as automobile dashboard components, digital cameras and mobile phones require an excellent design and quality to satisfy consumer preferences. One processing technique that contributes to a products' functionality is coating application. Coatings, such as the paint that gives a product its color, require the inclusion of organic solvents that provide a good finish when diluted.

Organic solvents, however, contain substances that are toxic to the human body and ecosystem, and they can also contribute to air pollution problems such as photochemical smog. In Japan, chemical substances that pose a high risk to the human body and environment, such as volatile organic compounds (VOCs), are highly regulated to ensure their use is managed appropriately and that emissions are reduced.

Taking into account the needs of society, Kami Electronic Industry, a leader in component coating techniques headquartered in Miyazaki Prefecture, is committed to developing innovative coating processes that do not use VOCs. With the support of NEDO and the cooperation of the National Institute of Advanced Industrial Science and Technology (AIST) and the Industrial Technology Institute, Miyagi Prefectural Government (ITIM), the company has developed a coating method that is capable of diluting and spraying paint by using supercritical carbon dioxide (CO_2) instead of organic solvents, thereby reducing the amount of VOC used to one-third of that in conventional methods. Kami Electronic Industry is now using this method in its plants. Several leading automobile interior component manufacturers have also incorporated it into their coating systems as well.

Coating robot



Reduction effects of VOC used in supercritical CO_2 coating method

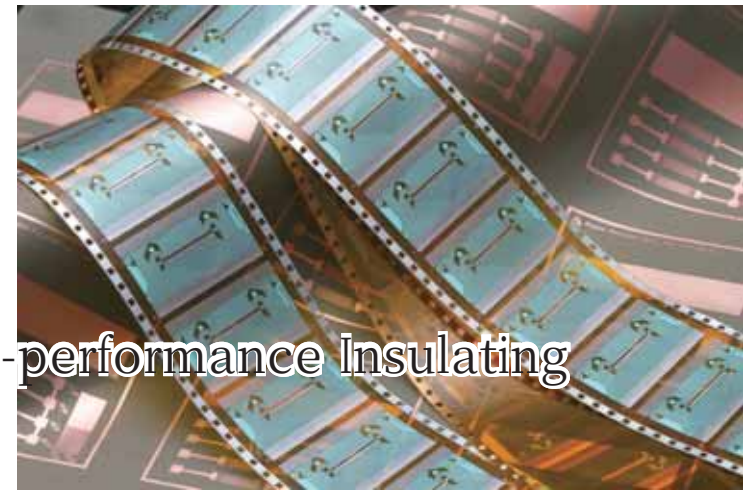
Coated automobile interior component

December 2010

Showa Denko K.K.

・Development of Fundamental Technologies for Risk Reduction of Hazardous Chemical Substances
Development of Resist Materials Using Non-phenol Resin Materials (FY2004–FY2006)

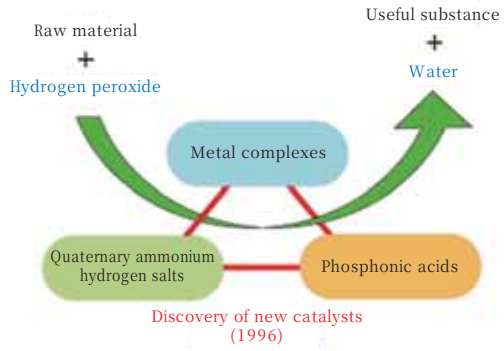
Development of a High-performance Insulating Coating Resin



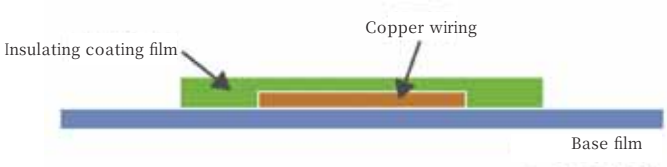
The high performance of insulating coating films for electronic parts and wiring is becoming an increasingly important requirement for achieving compact, lightweight and reliable (long life) features in electronic parts. Generally, epoxy resin is widely used for this insulating coating film. However, the method by which the epoxy resin is produced has two problems. The first problem is that this method involves the use of phenol, which has a negative impact on the environment. The second is that it also incorporates halide. As a result, the insulating protective film that is the final product will inevitably contain organic chlorine compounds, impurities that may contribute to the deterioration of the film's quality.

One means of resolving these environmental and quality problems is Showa Denko' s thermosetting solder resist. Through NEDO projects, which applied techniques developed by Professor Ryoji Noyori (of Nagoya University at the time) and other researchers, Showa Denko worked jointly with the National Institute of Advanced Industrial Science and Technology (AIST) to develop a method for deriving epoxy compounds through the direct oxidation of olefin compounds using hydrogen peroxide as a substitute for phenol and halogen compounds.

Through the repeated review of trial production efforts and evaluation of test results in this industry-academia collaboration, a new insulating coating film with excellent long-term insulating performance was developed. Improving the catalyst and refining the process played a key role in scaling up manufacturing and reducing costs, and the group was able to produce favorable results in a short period of time. Since 2007, when the first products incorporating this new insulating film were launched, the technology has been applied in a number liquid crystal panel manufacturing processes.



Epoxidation reaction of olefin using hydrogen peroxide



Cross-section of printed wiring board
Copper wiring (brown) is formed over base film (purple), and covered with insulating coating film (green)

Halogen-free epoxy resin

August 2013

KOKONOE ELECTRIC CO., LTD.
Ritsumeikan University

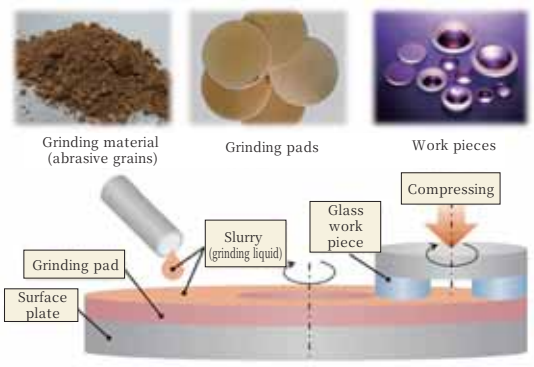
"Rare Metal Substitute Materials Development Project - Development of Technologies to Reduce the Amount of Cerium Used for Precision Grinding and the Development of Substitute Materials"(FY2009-2012)

A Technology that Halves the Consumption of the Rare Earth Element that Is Indispensable for Glass Grinding

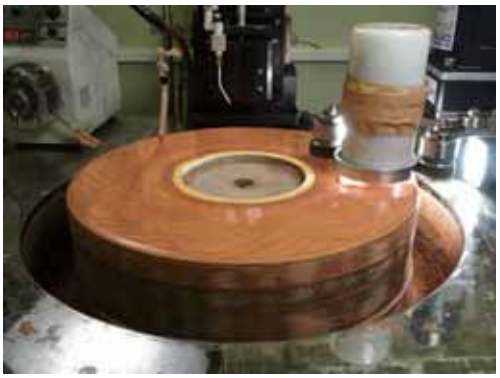
Rare earth elements are natural resources that are indispensable for producing technologically sophisticated products. Because they only occur in certain countries, there is a risk that the supply of them may be interrupted or decrease if a diplomatic problem or other unordinary situation arises.

Cerium, which is one of the rare earth elements, is a material that has been used in Japan for many years for glass surface grinding and other purposes. However, the sharp rises in the price of cerium in 2010 to 2011, during which the prices of other rare earth elements also surged, hurt the glass grinding industry. On the other hand, Ritsumeikan University and KOKONOE ELECTRIC CO.,LTD. which is a grinding tool manufacturer based in Kawasaki City of Kanagawa Prefecture, had formed a joint industry-academia team before this and participated in the "Development of Substitute Materials for Rare Metals" project of NEDO, endeavored to develop a technology to dramatically reduce the consumption of cerium in glass grinding under the project and succeeded in establishing that technology and commercializing a new grinding tool (grinding pads).

The newly developed grinding pad made it possible to reduce the consumption of cerium by one half. This grinding pad was commercialized in 2012, and was adopted by more than 10 companies in a little more than one year from the start of sale. It is expected that more companies will adopt the grinding pad in the future.

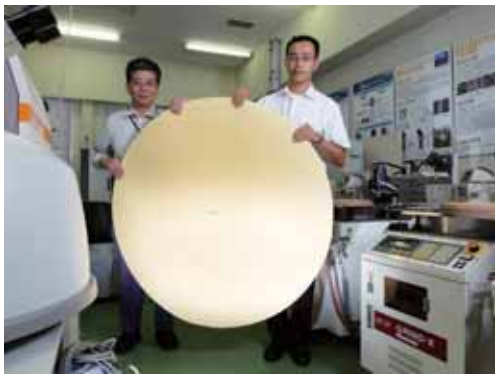


Glass grinding method - The grinding pad holds the grinding material (abrasive grains) and grinds the glass surface.



Grinding equipment with an epoxy pad attached

Grinding pads produced by KOKONOE ELECTRIC CO., LTD. - There are more than 10 epoxy pads that differ in thickness, hardness, density, etc. and more than 10 epoxy-urethane pads that differ in thickness, hardness and density, etc. The customer can choose the most suitable pad for the purpose from among these pads.



Large epoxy grinding pad with a diameter of 1200mm (Professor Tani (left) and Mr. Nomura, head of the development staff of KOKONOE ELECTRIC CO.,LTD. (right))

December 2012

Hitachi Construction Machinery Co., LTD.

・" Strategic Advanced Elemental Robot Technology Development " Project (FY2006-FY2010)

Dual-Arm Construction Machinery, Expected to be Active in Sites of Building Deconstruction

In cities throughout Japan, many of the buildings that were built during the period of high economic growth are reaching their final years of endurance. It is not rare that these buildings do not meet the earthquake resistance standards, and rebuilding is being hurried. Additionally, according to the " Construction Recycling Act ", dismantling operators are obligated to separate construction waste at deconstruction sites and recycle the separated materials. The, separating process is mainly done manually, and is becoming an issue in terms of efficiency and ensuring safety.

From such social background, NEDO has implemented the research and development project for a " Construction Waste Processing Robot System " capable of safely and efficiently dismantling buildings and separating the waste thereof. The project took place in 2006-2010, and as a result, Hitachi Construction Machinery Co., Ltd. developed the " ASTACO NEO ", a construction machine having two arms, and started the sales of this in September, 2012. The two arms are asymmetrical, and are characterized in that the right arm operates as the main arm while the left arm acts as an assisting arm. A 10-13 ton attachment designed for excavators can be mounted on the end of the right arm, while the left arm is capable of being equipped with a 4 ton attachment. The array of attachments needs to grab objects with a " grappler ", cut steel frames, etc. with a " cutter ", crush concrete or asphalt with a " pressurized crusher ", and carry gravel or waste with a " bucket ", and these can be interchanged according to needs.

Prior to sales, the machine was active in Minami-Sanrikucho and the city of Ishinomaki in Miyagi Prefecture, both of which are affected regions of the Great East Japan Earthquake, and was able to gain an operation record. The machine is scheduled to continue being active in dismantling work of buildings and at scrap processing sites, etc.

In a dual-arm machine where one arm crushes or excavates while the other arm supports, the loads on each of the arms greatly differ. (photo taken of a proto type)

A cargo container drifted by the tsunami and blocking a road in the city was disassembled and separated on the spot to be transported. (Ishinomaki City)

Metal scraps from construction structures and foundations complicatedly intertwined with each other were finely cut and separated to be transported. (Minami-Sanrikucho)

March 2009

JFE Engineering Corporation

・Research and Development on Advanced High-temperature Air Combustion Control Technology (FY1999–FY2003)

Achieving More Efficient, Cleaner Waste Incineration with New Technology

The greater part of the municipal waste in Japan is treated through the use of stoker furnaces, where waste is placed on fire grates and burned. In response to the need for waste incinerators with higher energy recovery efficiency and lower pollution levels, JFE Engineering Corporation developed a new type of stoker furnace.

The new stoker furnace combines a combustion system capable of stable combustion through the equalization of air blowing in, a furnace shape that effectively mixes unburned and burned gases produced during the incineration process to reduce the discharge of toxic gases and control technology that achieves stable combustion via a fuzzy control system.

The company has also completed development of its Hyper 21 Stoker System as part of the Research and Development on Advanced High-temperature Air Combustion Control Technology by combining high-temperature air blow and exhaust gas recirculation technologies.

To realize high-efficiency energy recovery, it is important to reduce the air ratio. However, if the value is too small, incomplete combustion occurs, resulting in the discharge of a considerable amount of toxic gases. With the new technology that has been developed, blowing in high-temperature air increases the stability of combustion at low-air ratios, thereby minimizing the production of toxic gases.

In April 2009, the Kunisaki Clean Center was completed in the eastern part of Hyogo Prefecture and the Hyper 21 Stoker System was put to practical use for the first time at the facility.“ We have adopted stringent, high-level environmental standards, in view of standards required by municipal governments throughout Japan and in Europe, ”says Tsunekazu Moriyoshi of JFE Engineering. He added,“ Our new technologies will enable us to achieve our objective of adhering to these standards. ”

Today, the Hyper 21 Stoker System is currently in operation or under construction in ten plants in Japan. By evaluating feedback on the actual performance of these furnaces, JFE Engineering will continue its efforts to develop even more efficient and cleaner waste disposal techniques.

Kunisaki Clean Center, the first facility to install the Hyper 21 Stoker System
Two furnaces are able to treat 235 tons of waste per day.
Recovered heat from furnace is used to generate power and heat water.

Control room at the Kunisaki Clean Center

Inner wall of a furnace