

# JAPAN

## Chemicals for a better world

Behind the scenes, Japanese chemical companies invest heavily in innovation and R&D to produce next-generation materials that make everyday products greener and more energy efficient

Sony's Compact Disc, the Walkman, the Nintendo Gameboy, Nikon's digital SLR camera, the Toyota Prius, 3D-printers, bullet trains, robots... the list of Japanese technology and innovations over the past few decades could go on.

But while household names like Sony, Nikon and Toyota may typify Japanese innovation, working behind the scenes are Japan's 'silent heroes': the companies behind innovative chemical products, which help to make everything, from air conditioning and thermal insulation units, to light bulbs, construction paints and LEXUS cars, more energy efficient and less harmful to the environment. Through their continuous investments in R&D and innovation, these companies have positioned themselves at the forefront of pertinent issues such as climate change and food security.

"The advances in chemistry make the world a better place for everyone. Our mission is to give shape to the unlimited possibilities of chemistry for our customers, and as such, we are responsible for supplying innovative products all over the world," says Takao Ando, President and CEO of Sanyo Chemical Industries.



By supplying essential materials to fields such as automotive and electronics, the chemical industry is the backbone of Japanese manufacturing, employing some 860,000 people and making up 14 percent of the shipment value of all manufacturing industries. It also accounts for 22 percent of the manufacturing sector's total spending on R&D, which has helped to make Japan's chemical industry a world leader.

"In terms of competitiveness our main strategy is to produce high-end-value products. In order to create this excellent market position, we put a large portion of the workforce into the R&D sector. Thirty percent of our employees are involved in R&D," says Mr. Ando, whose company develops materials for the health, petroleum, automotive, plastic, textiles and construction industries, amongst others.

"We are currently focusing our efforts on medical applications. This is something new and different from what we have created so

far and was made possible after we were approved as a medical device business operator in 2011."

One special feature of Sanyo Chemical's R&D is, what it calls, 'The NeeSeeds-Oriented' approach – a combination of needs-oriented R&D and seeds-oriented R&D.

"We achieve diverse performance by combining the needs with multiple seeds (existing technologies, products and know-how)," says Mr. Ando. "A technique developed to meet a certain need is combined with another technique to create another new seed technology for new products. The 'NeeSeeds-Oriented' approach has helped us to broaden our range of technologies to as many as 3,000 different types of products.

If you're the owner of a LEXUS, you'll be more familiar with one of these 'NeeSeeds'-developed products than you think. Sanyo Chemical's specially developed polyurethane is used to make the leather-like material that covers

LEXUS' instrument panels in its vehicles, which is far superior to the PVC the U.S. car company used before, according to the Sanyo Chemical president.

"The superior polyurethane powder, developed by a mixture of our various seeds and new technologies, has the benefits of being soft and pleasing to the eye by resembling genuine leather with thread stitching," says Mr. Ando.

"Lexus used to adopt PVC for instrumental panels, but now it uses our polyurethane materials. The benefits of switching from the use of PVC to polyurethane are the lightweight properties, the leather-like texture, and the lower melting temperature, which saves the processing energy and contributes to the car's performance."

Sanyo's polyurethane material is a small touch, but one which, aside from being pleasing to the eye of a LEXUS luxury car owner, also helps to make the vehicle lighter and more energy efficient, and thus helping to reduce its CO2 emissions.

Another company helping to lower emissions is KH Neochem, whose high-performance materials can be found in a range of consumer products, from cars, TVs and laptops, to food and drink packaging, paints and cosmetics.

The company is also a leader in the production of materials used to produce R32 refrigerant lubricant, which is used in air conditioning units. R32 is a much environmentally friendlier alternative to the current standard R410A lubricant and its predecessor R22, an

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"It is essential for companies to be environmentally friendly. We are proud to be indirectly contributing to the protection of the ozone layer and global warming reduction"

Keiichi Asai, President and CEO, KH Neochem

ozone-depleting substance which is now being phased out in the U.S. "R22 is being eliminated because it has a significant impact on ozone deterioration," says Keiichi Asai,



"We embrace globalization not only for profit margin but to educate employees and to create quality products all over the world. Our mission is to give shape to the unlimited possibilities of chemistry"

Takao Ando, President and CEO, Sanyo Chemical

President and CEO of KH Neochem. "The current standard refrigerant R410A does not deteriorate the ozone layer. However, R410A has

a high GWP (Global Warming Potential) rate of 2080, which is even higher than R22 with 1080 GWP. R32, is mainly being introduced in Japan. R32 refrigerant's GWP rating is 675; a third less than R410A.

"One of our strengths is that we produce raw materials for synthetic base chemical lubricants for R32. And are proud to be indirectly contributing to the protection of the ozone layer and global warming reduction with the production of these products."

The middle classes in developing countries are growing, and so to are their demands for home appliances such as air conditioning, particularly in warmer countries. The use of "greener" refrigerant lubricants like R32 will be imperative in order to mitigate environmental impact.

"With the expected growth of the middle-class segment, this type of refrigerant might be used even more," adds Mr. Asai. "In 2016 about 90 million air conditioners were produced for residential use and this is expected to increase to 113 million in 2025, so there is a big opportunity for business in this market."

From small enterprises to large conglomerates, Japan has already

made great strides in energy efficiency, and is ranked second in the world (level with Italy and behind Germany) on the International Energy Efficiency Scorecard, a survey conducted by the American Council for Energy-Efficient Economy (ACEEE).

Japan's chemical companies are leading the charge, not just by producing greener products, but also ensuring the production processes to make these products adopt the best technologies in order to increase energy efficiency.

"One of the environmental concerns that we are successfully addressing is in the field of energy saving. Our results show that the energy we use to make one ton of product per year has been continuously declining," says Mr. Yuji Fukuyama, President and CEO of Honshu Chemical, which produces specialized materials for the automotives, IT and healthcare industries.

"Our core generation system enables us to make and supply our own electricity. We concentrate on reducing such things as air consumption, waste water, waste disposal and gas and we have excellent control on water temperature. The software system that we use enables us to plan production and energy use so usage is kept to a minimum and high levels of production efficiency are maintained."

Like Sanyo Chemical, Honshu Chemical produces state-of-the-art materials used in cars to increase energy efficiency, as well as the vehicle's aesthetics. It also makes materials for optical lenses which will be used in autonomous vehicles and eco-vehicles.

"Speciality bisphenol is used in the engineering of plastics which are extremely hard, similar to the hardness of metal or iron. However, unlike these metals they are lightweight – leading to high fuel efficiency – and have a higher heat resistance. The plastic is much easier to use than metal and so it is possible to make very unique cardoor designs," explains Mr. Fukuyama.

"With the introduction of eco-cars and driverless cars, the next step will be to introduce high-performance lenses and cameras that will be used in these types of vehicles. We would like the overall target of our companies to be capable of providing more reliable and efficient products for the customer.

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