

Background

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Heraeus in Greater China Value creation in China, for China

Greater China—Mainland China, Taiwan, Hong Kong—is one of the most important markets for the Heraeus Group. The technology group has been active in the region since 1974, and its portfolio includes products and services along the entire value added chain for precious metals—refining, processing, recycling, trading—and products for the optical fiber industry. In 2017, business with Greater China represented approximately 30 percent of the Group’s revenues excluding precious metals, at 2.2 billion euros. The share for all of Asia amounts to 43 percent.

The first Heraeus sales office for precious metals in Greater China was established in Hong Kong in 1974. Additional sales offices followed, along with factories in China and Taiwan, regional research and development centers in Shanghai and Taipei, and an application center in Shanghai. Today, the region is one of the company’s most important markets. The Greater China Regional Headquarters in Shanghai, which opened in 2014, is now responsible for 2,600 employees in 10 locations, working for about 20 Heraeus companies. The highlight, and flagship for the Heraeus Group, is the world’s most advanced precious metals factory, which opened in September 2018 in the eastern Chinese city of Nanjing. With a strategic investment of 120 million USD including expansion, Heraeus is extending the base for its further business in China and consolidating its position as a trader, processor and recycler of precious metals for China’s growth industries. The recycling capacity will be increased to 3,000 tons, while its chemical production capacity will be increased three times. The factory is designed for growth, and its capacities can be expanded. This puts Heraeus in close proximity to the customer, well prepared for continuing to tap the business potential of the Chinese marketplace, now and in the future, and to support the economic development of its customers both locally and globally.

In 2018, China’s economic growth is expected to reach 6.6 percent (compared with 2.9 percent in the US and 2.2 percent in the eurozone). With a population of approximately 1.4 billion people, China offers an enormous domestic market, where the standard of living is steadily rising, spurring consumption and the demand for goods. A focus on sustainability and green growth is codified in China’s 13th five-year plan. The country’s growth industries need precious metals to cover the demand from industry and the demand resulting from the requirements of the current five-year plan. The Chinese precious metals market corresponds to 155 billion euros and 3.5 million jobs. And it is still growing.

China is the world’s largest producer of gold and consumes about one third of global gold production, with the trend rising. Even if China keeps gold production constant, it will exhaust its own supply of gold in less than 20 years. In 2017, the Chinese economy consumed approximately 29 percent of the platinum used worldwide and approximately 23 percent of palladium. Because the country can cover its precious metal needs except gold only through imports, and its own gold is running out, precious metal recycling is increasingly important for China. By recycling valuable raw materials, China can conserve resources, lower its energy consumption, reduce imports of precious metals by 20 to 30 percent and lessen its dependence on external sourcing.

For Heraeus, the world’s largest precious metals recycler and a leader in the processing and trade of precious metals, China will continue to hold a pivotal position.

Key markets and core themes of the 13th five-year plan

Information technology / telecommunications: The Chinese ICT market, at 8.5 percent, is one of the world’s fastest growing sectors. Heraeus supports the further development of industrial products for the semiconductor industry, materials for touch panels and displays and new applications such as 3D metal printing. For example, Heraeus produces synthetic quartz glass that Chinese companies use to manufacture fiberglass cables. Quartz glass of highest pureness forms the foundation of

telecommunications fibers that are used in major infrastructure projects in China's cities to connect the country via fast internet. Out of a hollow Heraeus quartz glass cylinder weighing 200 kg customers produce a glass fiber of more than 7,000 km. Heraeus supports the production of the newest generation glass fibers with most advanced products.

Semiconductor industry: Semiconductor process technology requires multiple thermal processes that dry or heat during the production of microchips, such as those used in smartphones. It is important in this process to avoid impurities, even the tiniest trace impurities during manufacturing will result in a defective microchip, which is then unusable. With black.infrared Heraeus Noblelight meets these demanding requirements of the semiconductor production. The combination of design and emitter technology is a breakthrough for efficient, ultrapure heating processes under vacuum conditions.

Renewable Energies: China was continuously rising its investments in renewable energies, the consequences being that the price for renewable energies has heavily dropped down, more advanced technologies have been developed and the quality of air in areas of high population density like Beijing has improved a lot. The costs are supposed to drop down by another 50 percent till 2020. Products and services of Heraeus may contribute to reach a third of this target. Heraeus is one of the key suppliers for the high-powered Chinese photovoltaics industry. The main product is silver metallization paste. The conductive paste provides a more efficient contact between the wafer and the current-carrying conductor, boosting the efficiency of solar cells. Heraeus holds the world record for the efficiency of PERC cells, at 23.7 percent. In its R&D centers in Shanghai and Taipei, Heraeus develops customized application solutions and local innovations in order to supply the world's largest PV market and expand its cooperation with Chinese companies in the PV industry. The researchers focus on reducing the silver content of the conducting pastes while boosting efficiency. For wind power plants, Heraeus for example provides platinum sensors for temperature control, for hydro plants and fuel cells innovative coated membranes and catalysts.

Mobility: Stricter emissions standards worldwide require the use of catalysts for exhaust emissions control in cars, trucks, motorcycles and ATVs, as well as for other devices with combustion engines outside the mobility industry. Heraeus offers precious metals compounds and solutions for coating catalyst supports for emissions catalysis. With about 25 million cars and 4 million trucks produced last year, China is the world's largest producer of automobiles, and still growing. More than 28 million of these new vehicles in one production year have a catalytic converter. The precious metal needs for the production of catalysts and the potential for subsequent precious metal recycling are correspondingly high. Heraeus delivers e.g. platinum-based sensors for exhaust systems and is also the supplier of important high-performance electronic components for the rapidly growing electric and hybrid vehicle sectors. Heraeus improves battery technology and boosts the energy storage by 20 percent.

Emissions analysis: The increasing sense of environmental awareness around the globe is demanding higher standards for environmental monitoring. One of the major monitoring areas is air quality monitoring, which requires highly accurate measuring instruments. Heraeus Noblelight has developed an easy to use, plug & play light solution based on NOx light technology, for very accurate measurement of NOx and other pollution gases. With this solution high accuracy, fast and real-time NOx measurement can be taken.

Electronics: For Greater China's rapidly growing electronics industry, Heraeus produces such things as assembly materials and bonding wires made of platinum, gold, aluminum and copper—and is one of the largest manufacturers of contact materials for China's semiconductor industry. The company develops material and system solutions for printed circuit paths, such as for displays and touchscreens. In collaboration with the Industrial Technology Research Institute (ITRI, Taiwan), Heraeus has developed improvements for the mass production of conductive coated films. With these conductive coatings, manufacturers produce flexible, curved, or three-dimensional touchscreens with improved

functionality, as well as wearable functional apparel, for example. Heraeus is currently working on the solution for a foldable display screen.

Metallurgy: Platinum-based temperature sensors from Heraeus optimize temperature/energy management in real estate projects.

Agriculture: The production of fertilizers releases nitrous oxide (NO₂), a greenhouse gas more than 300 times as harmful as CO₂. Two-step catalyst systems from Heraeus reduce these emissions by as much as 95 percent. The systems consist of platinum gauzes (primary step) and heterogeneous catalysts (secondary step). They can be upgraded in existing facilities.

Medical components: The population of China is aging. The longer people live, the more they use medical services. Heraeus offers a broad spectrum of products for the medical components industry, including components for heart stimulation (such as pacemaker components), for the peripheral vascular system and for palliative care and cancer therapies. Heraeus Medical ranks among the leaders in the fields of bone cement and biomaterials for elective orthopedic interventions and for trauma surgery.

Water and air treatment systems: In advanced water power plants special UV lamps highly contribute to environmentally-friendly disinfect drinking water without chemicals. UV lamps of Heraeus Noblelight inactivate microorganisms like bacteria, viruses, and parasites, or help to destroy health-damaging chemicals. The technology is also used to treat coolants or to recycle industrial wastewater to save resources. In air conditioning and air ventilation systems of buildings UV systems from Heraeus provide clean and germless air, for example in airports and hospitals. In the treatment of exhaust air UV light is applied to minimize the content of pollution within the emissions. For example, solvents and organic components are destroyed. UV technology is also used to neutralize odors of the exhaust air, meeting regulatory requirements and saving environment.

Precious metals used for industrial processes: The Heraeus product portfolio includes its business with precious metals for industrial use. This includes trading, producing, and recovery and recycling of industrial precious metal products. Heraeus is the only company in China permitted to lease precious metals for industrial purposes.

Precious metal coatings: Heraeus produces precious metal coatings with gold and platinum for valuable decorations, such as finishes on high-quality porcelain, glass and tiles. The precious metals content varies from less than five percent to 100 percent. Printed conductive precious metals coatings are used for industrial applications.

Precious metals recycling: As China's demand for precious metals grows, so does its dependence on the relevant imports. For economic and ecological reasons, and to reduce the dependence on imports, precious metals recycling is becoming more important. In the eastern Chinese city of Nanjing, Heraeus operates the world's most advanced recycling factory for precious metals.

Outlook

Heraeus expects sustained dynamic growth for the Chinese market. A growth rate of 6.5 percent to 7 percent would double the gross domestic product within about ten years. The Chinese government is relying on sustainable and green growth. The trend is toward even more stringent emissions limits, in order to improve air quality and the quality of life for the country's people. The technological implementation will further increase the need for precious metals. To reduce emissions of traffic means, households, and industry, precious metals are needed. A fact strengthening the pressure for precious metals recycling in the region with poor precious metals resources. At the same time, the Chinese government will tighten the compliance requirements for those along the value added chain

for precious metals: The origin of the precious metals must be traceable and the source clean. Heraeus holds the prerequisites to take advantage of that business potential. Heraeus regards sustainability, environmental protection and resource conservation as fundamental values for long-term success. The company meets the LBMA Good Delivery and the Responsible Jewelry Council compliance standards, is certified under ISO 9001 and 14001, and is approved for processing hazardous wastes. The supply chain is tight, the material is traceable, and the manufacturing processes are state of the art. Heraeus ranks first in the world for precious metals recycling, with decades of expertise as well as on-site capacity for expansion. Every production site complies with strict EHS (Environment, Health, Safety) standards, or the company's own standards if these are more stringent. With its products and services, Heraeus is supporting China's growth and sustainability strategy. Its internationally expanding customer base depends on and values the global Heraeus production and logistics network in all the relevant time zones.

About Heraeus

A globally leading technology group, Heraeus is headquartered in Hanau, Germany. Founded in 1851, it is a family-owned portfolio company which traces its roots back to a pharmacy opened by the family in 1660. Today, Heraeus combines businesses in the environmental, energy, electronics, health, mobility and industrial applications sectors. In the 2017 financial year, Heraeus generated revenues of € 21.8 billion. With approximately 13.000 employees in 40 countries, the FORTUNE Global 500-listed company holds a leading position in its global markets. Heraeus is one of the top 10 family-owned companies in Germany.

With technical expertise, a commitment to excellence, a focus on innovation and entrepreneurial leadership, we are constantly striving to improve our performance. We create high-quality solutions for our clients and strengthen their long-term competitiveness by combining unique material expertise with leadership in technology.

Media Contact

Michael Schattenmann
Heraeus Holding GmbH
Heraeusstraße 12-14
63450 Hanau, Germany
Phone: +49 (0) 6181.35-4081
E-mail: michael.schattenmann@heraeus.com

Media Contact China

Kevin Libin Chen
Manager Communications
Communications & Marketing
+86 (21) 3357-5261
Kevin.Chen@heraeus.com