Strategy for Realizing the Long-Term Vision

As a leading global manufacturer, Resonac is driving the advancement of semiconductor technologies with its strength in materials. Our front-end and back-end semiconductor materials are key technology contributing to people’s happiness while protecting the environment through semiconductor manufacturing processes and end products.
Business Strategies: Semiconductor and Electronic Materials

Competitive Edge (Semiconductor Materials)

Operating Environment Outlook and Resonac’s Strategy
Affected by the rapid deterioration of the global economy and declining consumer demand in 2022, the semiconductor market is experiencing a temporary decrease in demand. However, we expect that technological innovation and market growth are likely to continue in line with the advancement of society’s digitalization. Moreover, the importance of semiconductors as specified critical materials designated by the Economic Security Promotion Act is increasing, and countries are making major efforts and introducing regulations to secure the supply of semiconductors. We view these developments as both a risk and an opportunity for us.

Risks include the potential for increases in raw material, energy, or logistics costs or supply chain disruptions as a result of geopolitical risks. Resonac is striving to develop a resilient supply chain management system designed to facilitate the swift detection of risks and the stable supply of products to customers and is making steady progress step by step.

There will be opportunities to capture new demand. In the future, along with changes in the supply chain, changes in the business formats of players and the entry of new manufacturers are expected, and uncertainty and complexity will increase. Capitalizing on a lineup that encompasses a wide variety of front-end and back-end semiconductor materials and the high market share, and the broad customer network built on those strengths, as well as the JOINT2 consortium activities, which aim to establish advanced semiconductor mounting technology through co-creation with industry peers, we will quickly identify changes and create high-value-added products that meet the needs in order to develop highly competitive operations.

Semiconductor Material Technology Trends
As semiconductors are endowed with more sophisticated functions, there is a rising need for more minutely detailed circuit patterns to be etched through front-end wafer fabrication processes. Meanwhile, in back-end processes, which generally entail mounting chips made from individual wafers onto substrates, the number of components included on chips and in electronic components is increasing at a rapid pace, creating a rising need for new package structures that use 2.xD and 3D mounting technologies to achieve higher mounting density.

These trends are boosting demand for Resonac’s existing highly functional, high-share materials as well as for the new cutting-edge materials under development.

In front-end processes, we facilitate customers’ development activities with our CMP slurry (nanoceria slurry) capable of creating precise circuit patterns with 2 nm nodes as well as with our precision etching gases and high-purity solvents. At the same time, we assist production activities around the world with back-end process offerings such as photosensitive dry film, copper clad laminates, and die bond film supported by superior functionality and strong supply capabilities. (See the figure below.)

Moreover, the JOINT2 consortium is collaborating on substrates, materials, and equipment to help resolve customer issues and accelerate development. Specifically, we are conducting collaborative evaluations with several leading semiconductor manufacturers on 2.xD/3D packages.

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*Shares of HDM (HD Microsystems, Ltd.) in the buffer coat and photosensitive insulating material markets.

Note: The above global share figures for products are based on Resonac’s estimates.
Business Strategies: Semiconductor and Electronic Materials

Competitive Edge (Device Solutions/SiC)

Society Realized by Power Semiconductors
Power semiconductors control and convert electric power and are used in all types of devices that are powered by electricity, everything from industrial equipment to familiar home appliances. With less power loss and heat generation than conventional silicon-based power semiconductors, SiC power semiconductors are key devices that contribute to energy conservation, achieving both voltage characteristics and conversion efficiency. GaN power semiconductors are also attracting attention. Although, as a material for power devices, GaN has properties superior to those of SiC in some respects, there are still issues to be resolved in terms of high current capability: SiC power semiconductors resolve this issue and are also cost competitive. The market for SiC power semiconductors is expanding rapidly as they are widely used in various applications, such as electric vehicles (EVs), renewable energy, high-speed charging stations for xEVs, and railcars.

Resonac's Contribution to SiC Power Semiconductors
Resonac is the world's largest independent supplier of SiC epitaxial wafers, which are key materials for SiC power semiconductors. As a manufacturer specialized in epitaxial wafers, we aim to be an optimal co-creation partner capable of providing epitaxial wafers tailored to various customers and their respective SiC devices. Our SiC epitaxial wafers have been used for various applications owing to their high quality, including industry-leading low levels of surface-defect density and basal-plane dislocation.

Attractiveness of SiC Power Semiconductors

1 Compactness and weight reduction SiC power semiconductors have high withstand voltage and excellent thermal characteristics. Compared to conventional silicon-based power semiconductors, SiC power semiconductors enable compact design and contribute greatly to weight reduction of electric units.

2 Extended cruising range It is known that the cruising range of vehicles using SiC power semiconductors is extended due to the combined effect of weight reduction and battery performance improvement (loss reduction), making SiC power semiconductors key devices for the diffusion of electric vehicles.

Resonac's business model as a manufacturer specialized in epitaxial wafers

As a manufacturer specialized in epitaxial wafers that does not handle SiC devices, attract device manufacturers that manufacture substrates and epitaxial wafers in-house as customers.
Business Strategies: Semiconductor and Electronic Materials

Establishment of a Database for Centralized Management of Semiconductor Supply Chain Information to Reduce Risk and Improve Efficiency Throughout the Semiconductor Supply Chain

While demand for semiconductor materials is expected to remain robust as digitalization of society advances, the supply chain is unstable owing to the combination of diverse issues, including environmental problems, recent constraints on production and logistics, and geopolitical risks.

In these circumstances, we have been building a supply chain system in the Indo-Pacific area to ensure stable supply of semiconductor products and maintain and strengthen competitiveness. We expect centralized management of supply chain information from suppliers to customers on a common platform will enable us to respond quickly to customer needs and shorten lead times, such as through early detection of risks and optimization of operations at each site. In addition, it will enable us to promptly respond to the increasing number of requests from customers and other parties in recent years for assurances regarding the non-presence of environmentally regulated substances and the absence of human rights abuses, such as forced labor.

This initiative was adopted under the Ministry of Economy, Trade and Industry subsidy program for overseas market survey projects for building resilient supply chains for fiscal 2021. Resonac took part in the Japan-Malaysia Public Private Industrial Policy Dialogue held in Kuala Lumpur, Malaysia, in April 2023 and gave a presentation on its efforts to strengthen the supply chain for semiconductor materials. We are making steady progress with the establishment of a global supply chain management system step by step and we plan to expand it in the future to reduce risk and improve efficiency throughout the supply chain.

Goals to be achieved through introduction of a global supply chain management system

Conduct data-driven business operations and decision-making by centrally managing and sharing data, analyzing the accumulated data, and implementing actions based on the analysis results.

1. EDI (Electronic Data Interchange): Suppliers' termination of provision of products and services
2. PCN (Product Change Notification): Notification on changes of product specifications and process changes

Introducing Advanced HD Media Technology to the Market ahead of Competitors as the World’s Largest Manufacturer Specialized in HD Media, Making a Significant Contribution to Development of the Data Economy

With the spread of cloud services and the increase in video content, the amount of data generated and stored continues to increase dramatically worldwide, and data centers to store data require larger-capacity hard disk drives (HDDs). Resonac is a supplier of HD media, key components that determine the storage capacity of HDDs. For 35 years since we started our business in the late 1980s, we have continued to lead the world in providing and mass-producing HD media while always co-creating new technologies with our customers.

As a newly integrated company, Resonac will continue pursuing further technological innovation to realize higher-capacity HDDs and support the growing data economy.