Promotion of Creation and Co-Creation of Innovation with Vacuum Technology as the Core

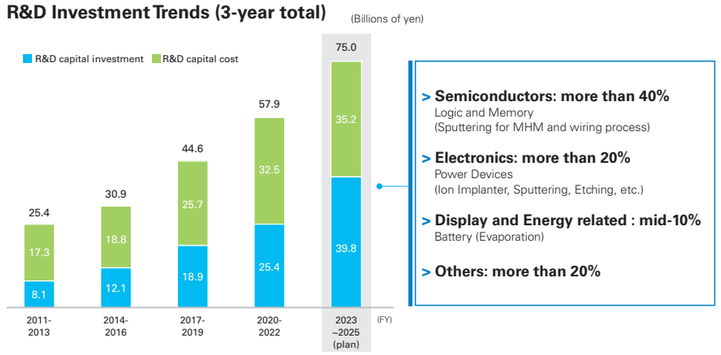
Development Policy

ULVAC is advancing innovative research and development with a focus on vacuum technology, aiming to realize a sustainable society. In recent years, as development investments are being made worldwide in advanced semiconductors and electronic devices, we believe that co-creation with our customers is extremely important. The core of this co-creation is the Research & Development Headquarters. The Development Headquarters consists of three departments: the Institute of Advanced Technology, which is responsible for researching and developing technologies to realize growth drivers; and the Software Development Department, which conducts essential software development to enhance the added value of our equipment. Furthermore, at the Future Technology Research Laboratory, we are tackling themes expected to be next-generation technologies and exploring new areas where vacuum technology can make a contribution. By collaborating with relevant departments and group companies, we plan and devise development strategies, promoting research and development across the entire group, with the goal of maximizing research and development resources and achieving the greatest possible results.

Research and Development Investment Policy

ULVAC is aiming to strengthen three semiconductor sectors—logic, memory, and power devices—that are expected to be drivers of growth. In the fields of logic and memory, ULVAC is developing equipment aimed at entering other processes based on its achievements in the Metal Hard Mask process in the cutting-edge logic sector, as well as advancing the development of improved film deposition process performance. Additionally, in the memory field, as miniaturization and high-level stacking progress, ULVAC is advancing the development of equipment and film deposition processes, aiming to enter other processes in DRAM and 3D NAND flash memory. In the power device sector, which is gaining attention for its contribution to energy efficiency, ULVAC is focused on the development of ion implanters. In the fields of logic and memory, the difficulty of manufacturing technology is rapidly increasing. Therefore, to capture the market, closer joint development with leading semiconductor manufacturers is essential more than ever. In response to this situation, the Technology Center PYEONGTAEK was established in August 2024 to further strengthen our development base in South Korea. The purpose of the Technology Center is to accelerate product and technology development near our customers and enhance collaboration and technical support.

R&D Investment Trends (3-year total)



Overview of Technology Center PYEONGTAEK

Location:	1029, Yulbuk-ri, Cheongbuk-eup, Peyongtaek-si, Gyeonggi-do
Established:	August, 2024
Site area:	Approximately 11,550 square meters
Building area:	Approximately 13,168 square meters (including clean room area of approximately 2,008 square meters)
Investment amount:	Approximately 6 billion yen

Creation and Co-Creation of Innovations in Growth Areas

At the Institute of Advanced Technology , we are focusing on the development of thin film formation and processing technologies that utilize vacuum technology, which are essential for manufacturing devices such as cutting-edge logic, memory, power devices, and batteries, positioned as drivers of growth. Plasma technology is one of the key cutting-edge technologies, and as devices become more advanced, the importance of plasma measurement technology has increased. ULVAC and the National University Corporation Tokyo University of Science, referred to hereafter as the Institute of Science Tokyo, have established the "ULVAC Advanced Technology Collaborative Research Cluster" at the Ookayama campus. The Institute of Science Tokyo, has initiated a collaborative research project aimed at enhancing the performance of devices using plasma processes by combining its plasma measurement technology with AI technology. "By collaborating across different research fields, we aim to produce new research outcomes that cannot be achieved through individual joint research efforts." We will continue to deepen this collaboration. By leveraging inter-organizational collaboration, we will not only strengthen joint research but also enhance broader connections, including human resource development, to contribute to the future growth and technological innovation of both ULVAC and Institute of Science Tokyo.

In 2022, ULVAC proposed the "lithium metal anode production technology" for the "Development of Next-Generation Battery Materials Technology," which is part of the "Green Innovation Fund Project/Development of Next-Generation Batteries and Next-Generation Motors" by the New Energy and Industrial Technology Development Organization (NEDO). The proposal was successfully accepted as one of the projects under this initiative. ULVAC is committed to leveraging its core vacuum technology to introduce innovative new technologies aimed at addressing societal challenges.

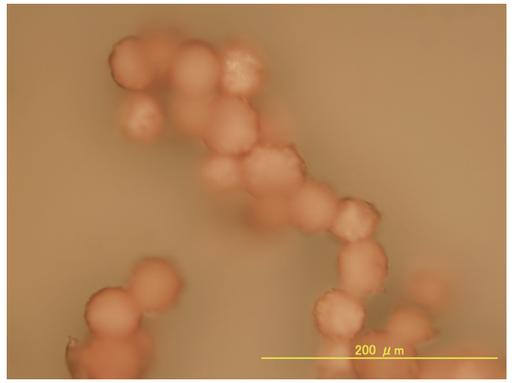
Creation and Co-creation of Innovations in Future Areas

ULVAC has established the "ULVAC-Osaka University Joint Research Laboratory for Future Technology" within Osaka University, advancing the creation of innovations through industry-academia co-creation.

To support the future information society, innovation surpassing the limits of current semiconductor technology is necessary. We are researching "Photonics-spin convergence semiconductor devices," which integrate the degree of freedom of spin with optoelectronic elements. This research leverages vacuum deposition technologies to innovate new processes and materials for the semiconductor industry.

In the medical field, we are exploring the societal contributions of vacuum technology, specifically focusing on developing circularly polarized light sources through vacuum deposition technology and preserving biological cells using vacuum drying technology. Circular polarization is anticipated to have diverse applications, including in pathological diagnostics and next-generation displays. In collaboration with the Faculty of Medicine at Osaka University, we are advancing research on cancer cell detection technologies. Furthermore, we are developing a technique using vacuum drying technology to store living biological cells in powder form. This method, which includes powdering blood, is expected to enable long-term storage and immediate usage, contributing to the advancement of medical technology.

For details Website >>
Refer to Japanese web site



Lyophilized red blood cells

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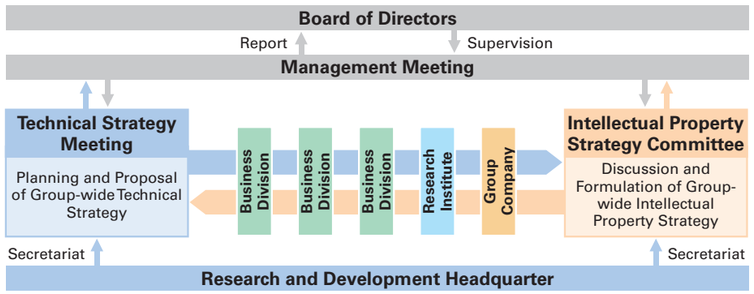
Research and Development, Intellectual Property Governance

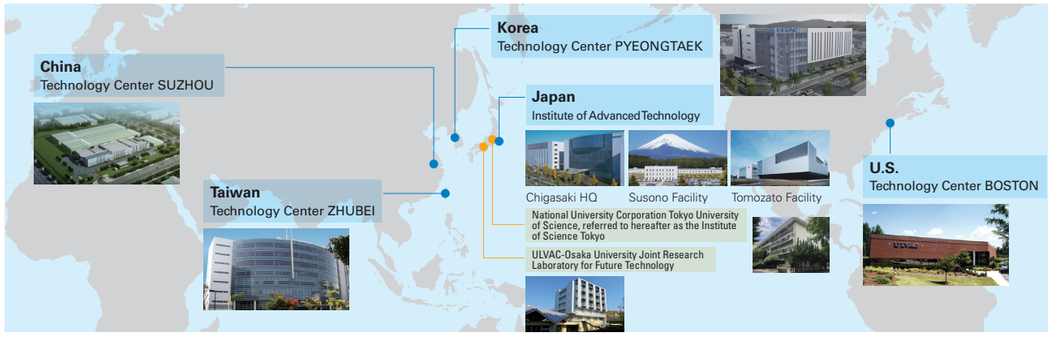
At ULVAC, we regularly hold two meetings that serve as cross-functional roles within the group's overall research and development structure. The "Technology Strategy Meeting" handles the planning and formulation of overall technology strategies, while the "Intellectual Property Strategy Committee" focuses on discussions related to intellectual property strategies, aiming for integration across business, development, and intellectual property. The discussions from these meetings are reported to the Board of Directors through directors and executive officers, where they are overseen.

By unifying the group's overall research and development structure, we aim to create sustainable differentiated products and new technologies, acquire intellectual property, and accelerate development. This will allow us to provide cutting-edge products and technologies in a timely manner that meet customer demands. The Development Headquarters will play a central role in releasing advanced technologies that can quickly address social challenges and contribute to society.

Research and Development & Intellectual Property Governance Structure



Research and Development Bases



Technology and Intellectual Property Symposium

ULVAC holds the "ULVAC R&D Conference" as an initiative to share research and development results, foster new ideas, and create synergies. This event involves not only ULVAC's development departments but also overseas development departments, business units, and group companies. Participants deepen their understanding and engage in discussions on research and development relevant to ULVAC's future business operations.

Oral presentations provide a platform to share recent information and technologies related to key growth areas, utilizing online platforms to disseminate knowledge across the group. Additionally, during the poster sessions, an environment conducive to face-to-face discussions is created, facilitating active exchanges of ideas across a wide range of technological fields.

By sharing knowledge and technology, including market and customer information, technical challenges faced, and ideas to solve them, we aim to "contribute to the development of industry and science by comprehensively utilizing vacuum technology and its related technologies."

Intellectual Assets

For over 70 years, ULVAC has been building on its foundation of vacuum technology, accumulating expertise and know-how across various fields, and expanding the circle of co-creation. By comprehensively utilizing these intellectual properties, one of ULVAC's strengths is its ability to offer new solutions to complex social and technological challenges. In the future, to meet the increasingly complex needs of society and continue providing truly valuable technologies and products, ULVAC will make intellectual property investments across a broad range of areas, not only in growth areas but also in future fields. We will acquire attractive intellectual property rights and continue to expand the circle of co-creation. We will acquire attractive intellectual property rights and continue to expand the circle of co-creation.

In the intellectual property department, we are advancing IP activities in alignment with business and corporate strategies, focusing on both growth areas and future areas. In growth areas, we strengthen and maintain product competitiveness through strategic acquisition of intellectual property rights. In future areas, we aim to expand into new growth sectors by acquiring rights applicable to a wide range of technologies and industries, without being limited by existing businesses. To execute such intellectual property activities, the intellectual property department is strengthening its collaboration with business and development departments across the entire value chain, from product planning to after product launch.

At the product planning stage, we support research and development investment decisions by visualizing market trends and technological challenges through IP landscapes and analyzing both our own and competitors' positions. In the development planning stage, following product planning, the business, development, and intellectual property departments collaborate to create an "Intellectual Property Design Document."

In the Intellectual Property Design Document, we design the intellectual property portfolio by backcasting from the desired future state of the business. When designing the IP portfolio, considerations include the utilization of owned technologies, the value chain, business models, co-creation with external partners, the potential for expansion into other fields, and the resolution of social challenges such as ESG issues. At the development execution stage, we implement strategic rights acquisition based on the Intellectual Property Design Document. Additionally, to respect third-party rights, we conduct infringement investigations in line with the progress of development. After product launch, we strengthen, maintain, and utilize the acquired intellectual property rights according to the business environment, ensuring that these rights contribute to the sustainable competitiveness of the products.

Through these activities, we will expand the circle of co-creation based on attractive intellectual property centered around vacuum technology, and continue to be a field of potentiality for the future.

Intellectual Property Activities Aligned with Management and Business Strategy