

**ULVAC Festival 2016
attended by 6,000 people**

— ULVAC, Inc.

On November 12, 2016, ULVAC Inc. held the ULVAC Festival 2016 at its Chigasaki head office and factory as our gratitude to all ULVAC employees, their families and local residents. During this festival, which was being held for the first time in six years, we organized various events to entertain visitors based on the theme of “From Chigasaki with Love.”

As well as various fair stalls and employee-run refreshment stands being available, a wide variety of events were held on the day of the festival, including the following: factory tours; vacuum experiments; concerts, cheerleading performances and other stage

events performed by company music bands and local junior and senior high school brass bands; a Shonan Bellmare soccer workshop; product exhibitions by Japanese and overseas ULVAC Group companies; a rice cake pounding ceremony; and workshop events run by the Chigasaki Fire Station. Every one of these events was packed with visitors.

Thanks to fine weather on the day, the festival was attended by more people than we expected and it ended without problem thanks to the generous support and cooperation of the participants and co-sponsoring organizations.

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**ULVAC awarded the FY2016 Kanagawa
Global Environment Award in the Global
Warming Prevention Planning category**

— ULVAC, Inc.



ULVAC, Inc. received the FY2016 Kanagawa Global Environment Award, which is sponsored by Kanagawa Prefecture and the Kanagawa Global Environmental Conservation Promotion Association. The Kanagawa Global Environment Award system is designed to praise and recognize the contributions of organizations and individuals who are engaged in global environmental conservation activities. Such activities include practical programs that are based on the initiatives stipulated in “Our Environmental Action Declaration: Kanagawa Ten Environmental Actions” as well as outstanding programs that have been developed based on the Kanagawa Prefectural Ordinance to Prevent Global Warming and the Kanagawa Prefectural Ordinance to Promote Use of Renewable Energy. Awards are available in four categories: Global Environmental Conservation; Global Warming Prevention Planning; Greenhouse Gas Emission Reduction



● New Products

ULVAC, Inc.

NA-1500, a dry-etching system compatible with 600-mm square substrates for high-density packaging, launched



ULVAC, Inc. has developed the NA-1500, a dry-etching system that is compatible with 600-mm square substrates for high-density packaging. This system is designed to support a uniform descum process* for large square substrates.

In recent years, high-density packaging technologies have attracted attention in the semiconductor manufacturing industry, because improving the quality of high-speed, large-capacity data storage for the rapidly expanding large-capacity information device market requires the miniaturization of wire patterns to reduce wire resistance and eliminate stray capacity.

Also, as smartphones and other mobile devices acquire ever more functionality and

become even slimmer, IC packages mounted on substrates are required to have more pins and to be thinner. Fan-Out Wafer Level Packaging (FO-WLP) was developed as a packaging technology that meets these requirements. The mass-production of products using this technology was launched in 2016.

As the next step toward lowering FO-WLP production costs, packaging companies are now working to reduce the size of substrates from 300 mm in diameter to approximately a 600-mm square (panel level packaging) and to increase the area ratio to approximately five times the previous level. Doing this will help to achieve a dramatic reduction in costs.

There are many Φ200- or 300-mm dry-etching systems on the market at present, but a system capable of performing a uniform descum process or titanium-etching for 600-mm square substrates had yet to be developed. Responding quickly to market needs, ULVAC developed a dry-etching system for the mass-production of packaging substrates and quickly released it for sale.

As the IoT continues to develop, there is a growing need to further reduce the size of electronic parts, to make them thinner, and to minimize their power consumption. Consequently, technologies for the manufacture of high-density packaging substrates will continue to become ever more important.

* Descum process: Eliminates the scum pro-

duced by light-sensitive resin photolithography.

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ULVAC, Inc.

S-QAM series of complex sputtering systems for R&D launched



ULVAC, Inc. has developed its S-QAM series of complex sputtering systems for R&D with the aim of delivering maximum performance at a minimal cost. Sputtering is a vacuum deposition method that is used in the manufacture of semiconductors, electronic parts and

Notice of Office Relocation

ULVAC Inc. Tokyo Office & ULVAC EQUIPMENT SALES, Inc. Head Office

ULVAC, Inc. Tokyo Office and ULVAC EQUIPMENT SALES, Inc. Head Office moved to the following address in March 2017.

Start of operations: March 21, 2017

New address:

5th floor, Shinagawa Front Building, 2-3-13 Konan, Minato-ku, Tokyo, 108-0075

ULVAC, Inc. Tokyo Office

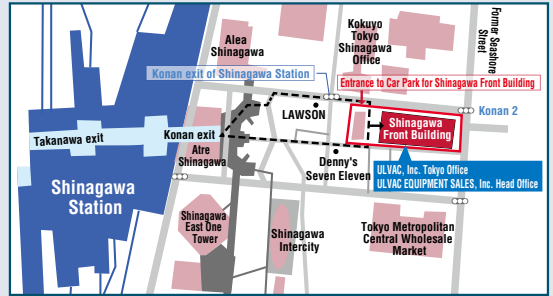
New phone no.: +81-3-5769-5005

(Finance Department)

ULVAC EQUIPMENT SALES, Inc.

(Head Office)

New phone no.: +81-3-5769-5511



- 3 minutes' walk from the Konan exit of Shinagawa Station
- 5 minutes' walk from the central ticket gate of JR Shinagawa Station
- 8 minutes' walk from the ticket gate of Keikyu Shinagawa Station

Technologies; and Kanagawa Smart Energy Planning. ULVAC received the award in the Global Warming Prevention Planning category.

For this award, the following ULVAC initiatives were highly regarded: our shutting down of clean rooms and R&D facilities as standard practice on non-business days and during the night at our Chigasaki head office and factory, which is our center of research and development for vacuum systems and other related equipment; our development of various energy-saving measures, including the improvement of facility management efficiency by integrating office areas, the visualization of power consumption for each department, and the creation of an energy-saving manual that summarizes methods and assessment approaches for reducing energy consumption for R&D equipment; and the reduction of CO₂ emissions for FY2014 by approximately 37% within five years compared to standard emissions (FY2009) by replacing the mercury lights in our clean rooms with LED lights and by installing solar panels and other equipment.

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A record 10.5 million hours without accident (Class-4 Accident-Free Operations Record)

— ULVAC, Inc.

On January 18, 2017, ULVAC, Inc. managed to go a record of 10.5 million hours with-

out the occurrence of an accident that would require a facility shutdown at its Chigasaki head office or factory and was awarded a Class 4 Accident-Free Record Certificate by the Ministry of Health, Labour and Welfare on March 13, 2017.

An Accident-Free Record Certificate (officially called a "Ministry of Health, Labour and Welfare Certificate of No-Accident Record") is awarded to companies in various industries depending on the number of hours worked without an accident. In ULVAC's industry, five types of certificates are available: companies are awarded a class-1 certificate for going 3.1 million hours without an accident, a class-2 certificate for going 4.7 million hours, a class-3 certificate for going 7 million hours, a class-4 certificate for going 10.5 million hours and a type-



5 certificate for going 15.8 million hours. On this occasion, ULVAC managed to clear the number of hours required for a class-4 certificate.

We will continue to make steady efforts to ensure work safety with the aiming of achieving a class-5 accident-free record of 15.8 million hours.

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displays as well as automotive parts and building materials. In the R&D processes carried out prior to full-scale production, small-sized sputtering systems are often used to perform basic development and create testing conditions.

ULVAC has a wealth of experience in developing sputtering systems for R&D. In addition to our conventional CS series and QAM series, we have also responded to customer needs by expanding our product lineup to include the S-QAM series of systems for 20-mm square substrates with a focus on ease of use in R&D.

Features:

1. Reduction in target material cost
Equipped with the world's smallest cathode at just 1 inch
2. Flexible deposition conditions
 - (1) Equipped with up to six types of cathodes
 - (2) Variable substrate-cathode distance
 - (3) A rich lineup of high-temperature heaters
3. Greater ease of use
 - (1) Automatic control available as a standard feature
 - (2) Data logging available as a standard feature
4. Super-compact design

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ULVAC-PHI, Inc.

PHI 5000 VersaProbe III : Multi-technique X-ray photoelectron spectroscopy (XPS) that offers greatly improved spectroscopic performance

ULVAC-PHI, Inc.'s VersaProbe series has been the world's most widely used XPS instruments since having been launched to the market. This time VersaProbe III has successfully improved their sensitivity performance of not only micro but also large area analysis, which is three times higher than previous models. VersaProbe III can also provide ultimate depth resolution thanks to its high-precision angular acceptance mechanism. A well-conceived multi-technique capability combined with diverse range of options and automated technol-

ogy can provide superior and high throughput outcomes.

Features:

1. High-sensitivity microprobe analysis using a focused X-ray technology
2. High-sensitivity and multi-channel analyzer
3. Reliable automated technology
4. Turnkey dual beam charge neutralization
5. Easy-to-use navigation and automatic measurements
6. High depth-resolution with a low-energy argon gas cluster ion gun

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Full-scale production of large-scale manufacturing equipment for FPD/PV panels in Suzhou, China

— ULVAC (SUZHOU) Co., Ltd.



ULVAC (SUZHOU) Co., Ltd., which has its head office and factory in China's Suzhou city, has begun full-scale local production of large-scale manufacturing equipment for FPD/PV (solar battery) panels in China. The company held a ceremony on July 18, 2016, to commemorate the start of production.

The commemoration ceremony was attended by more than 200 people, including local government staff, representatives of Chinese panel makers, solar battery manufacturers, the local media and suppliers.

Hisaharu Obinata, the then President and CEO of ULVAC, made the following opening address at the start of the ceremony:

“With the size of glass substrates having increased to G8.5 and G10.5, China has grown to become the largest FPD manufacturing in the world today. To support the further growth of the FPD industry in China, it is essential to localize the production of manufacturing equipment and the procurement of materials. This

is also the policy of the Chinese government. ULVAC has made the decision to start manufacturing large-scale G8.5 systems in China, and today we celebrate the first step on the path to achieving that.”

The production in China of large vacuum systems that offer the same high quality as Japanese-made products was urgently needed to increase the future size of the Chinese market. Our quick achievement of this goal has led to interested parties having great expectations for future developments.

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Presented with the Shanghai Vacuum Science and Technology Progress Award at a technology competition sponsored by the Shanghai Vacuum Society

— ULVAC (SUZHOU) Co., Ltd.



In December 2016, ULVAC (SUZHOU) Co., Ltd won the second prize of the Shanghai Vacuum Science and technology progress award which is sponsored by the Shanghai

Vacuum Society. The prize was awarded for the Esz-R, a high vacuum evaporation system that the company developed for the field of LED and power devices independently. Esz-R received high praise for its design concept of the lift-off evaporation characteristics. At the same time, it has the characteristics of low production cost and large output. In the future, ULVAC (SUZHOU) Co., Ltd will continue to improve the performance of this system to expand sales in other fields such as semiconductors.

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Choong Ryul Paik, the Managing Executive Officer of ULVAC, nominated as a NAEK member

— ULVAC, Inc.

Choong Ryul Paik, Managing Executive Officer of ULVAC, was nominated as a member of the National Academy of Engineering of Korea (NAEK), which is equivalent to the Japan Academy, on January 1, 2017. This nomination was made in recognition of Paik's



Choong Ryul Paik (left)

contributions to the domestic production of semiconductor and LCD manufacturing systems and the development of the vacuum industry. NAEK members include celebrated

ULVAC-PHI, Inc.

PHI Quantes : Dual Scanning X-ray Photoelectron Microprobe opens up new fields of application

ULVAC-PHI, Inc.'s PHI Quantes is X-ray Photoelectron spectroscopy (XPS) that has been equipped with two monochromatic X-ray sources to allow for high sensitivity analysis of microscopic areas as well as large areas: one is a source for hard X-ray (Cr K α) and the other is a source for soft X-ray (Al K α). Two monochromatic X-rays are available to be switched by automatically through the analysis software easily and an analysis point or area is precisely same between two sources.

PHI Quantes inherits the core technology of PHI Quantera II that has been developed over the years to provide a range of features, such as automated analysis, sample transfer, dual beam charge neutralization and high-level data processing.

PHI Quantes can open up new fields of XPS application that go beyond past common knowledge on XPS.



Features:

1. Equipped with a hard X-ray source
2. Equipped with dual monochromatic X-ray sources
3. The same area can be easily measured using two X-ray sources
4. Turnkey dual beam charge neutralization
5. Automated analysis by pre-defined procedures.
6. High voltage proof analyzer
7. Offers an expanded scope of application with two different energy ray sources; difference in depth of information
8. Unique feature: quantitative and qualitative analysis using Cr X-ray

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ULVAC CRYOGENICS INCORPORATED

Comprehensive in-house manufacturing leads to the development of the 4K-GM freezer, which offers high-reliability, outstanding performance, and low noise and vibration levels

Developed by ULVAC CRYOGENICS INCORPORATED, the 4K-GM Freezer is used in a wide range of industries, including medical care, analysis and semiconductors.



As the most inexpensive, simple and reliable means of obtaining cryogenic temperatures of around 4K (approximately minus 269°C), this freezer is used

not only in the conducting of scientific research on phenomena in cryogenic temperature areas, but also for the performance of MRI and NMR spectroscopies that require high magnetic fields and the cooling of superconducting magnets in silicon single-crystal pulling systems.

Conventionally, liquid helium was used in great quantities as a cryogen (and released into the atmosphere in most cases) to cool materials to cryogenic temperatures. However, a serious shortage of helium supplies in recent years has created a rapidly growing demand for 4K-GM freezers, which do not require liquid helium as a cryogen.

ULVAC CRYOGENICS INCORPORATED used to manufacture GM freezers designed to cool cryogenic pumps, but the company started selling cryogenic application equipment and providing related services in 2009. At the same time, it also started selling GM freezers as a stand-alone freezing system.

The company had been selling two models of 4K-GM freezers—the UR4K03 and the UR4K10T—but it has now developed and released two new models to further expand sales: the UHE10 and the UHE15.

Taiwan Local Report

Participation in the Japan-Taiwan Seminar of Industry-Government-Academia Collaborations

Reporter: Stanley Wu,
Vice President of ULVAC TAIWAN INC.



On November 11, 2016, I participated in the Japan-Taiwan Seminar for the Promotion of Industry-Government-Academia Collaborations, which was sponsored by the Taipei Cultural Representative Office in Japan. This seminar was held to provide representatives of Japan and Taiwan with an opportunity to discuss the actual operation, future vision, and future hopes regarding the promotion of industry-government-academia collaborations at universities.

ULVAC TAIWAN INC. has been actively engaged in joint research with Taiwanese universities since the time when it was still called ULVAC Research Center TAIWAN, Inc. We have also maintained friendships with laboratories in Taiwan in recent years. In response to a request from Mr. Xie, who is currently the president of the Taipei Economic and Cultural Representative Office in Japan (a former prime minister, his standing is equivalent to that of an ambassador), ULVAC TAIWAN INC. introduced an international industry-academia collaboration project developed by ULVAC, Inc., a global company, in Taiwan.

On the day of the seminar, Mr. Guo, vice president of the Taipei Economic and Cultural Representative Office, gave an address. In addition, Tateo Arimoto, a senior fellow of the Japan Science and Technology Agency's Research Institute of Science and Technology for Society, delivered a lecture.

Furthermore, Mr. Manabu Tsujimura, Director and Senior Corporate Executive Officer of Ebara Corporation, and Professor Chen of the National Taiwan University of

Science and Technology presented case studies to share the experience gained through industry-academia collaboration projects conducted at the University of Tokyo, the Tokyo Institute of Technology, and Tsukuba University. The idea of industry-government-academia collaborations between Japan and Taiwan is not necessarily a hotly debated issue, but the 70-seat conference room was packed on the day of the seminar. I was surprised that so many people were interested in deepening the relationship between Japan and Taiwan.

The bond between Japan and Taiwan is one of the strongest in the world, and we have always cooperated closely with each other during large-scale earthquakes.

I believe that maintaining business partnerships between Japan and Taiwan is essential if we are to further develop and globally advertise our high-tech consumer product export businesses for overseas markets as well as social life technologies. To this end, we aim to promote mutual cooperation based not only on emotional ties, but also on our ability to identify with each other due to the fact that we face similar issues, including population aging, natural disasters and an island nation environment.

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businessmen, scholars and researchers who are engaged in activities related to the development of Korea, such as policy consultations and proposals, international cooperation projects and programs for the promotion and dissemination of engineering technologies. Attended by policy committee members of the ruling and opposition parties, policy experts and news reporters, a policy forum is held each year in Korea's Diet

Building to provide NAEK members with a platform to explain their policy plans and discuss them with those in attendance.

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ULVAC CRYOGENICS INCORPORATED
Improving efficiency in the supply of liquid nitrogen
Developing a liquid nitrogen generator

The liquid nitrogen generator developed by ULVAC CRYOGENICS INCORPORATED, a specialist manufacturer of cryogenic systems, is indispensable for devices and containers that require cryogenic environments, such as the cell preservation containers used in bioscience, superconducting magnets and scanning electron microscopes. These devices and containers require a periodic supply of liquid nitrogen, which conventionally took enormous amounts of time and effort in terms of its management and handling.

As the liquid nitrogen generator can be connected to liquid nitrogen preservation containers, it makes the supply of liquid nitrogen easy. Equipped with backup power sources, the generator is capable of supplying liquid nitrogen without a power supply even in the event of a disaster.



Principal uses:
Used in private companies and university laboratories to cool cryopreservation containers for cells, tissues and vaccines

- iPS cells
- Preservation of artificial insemination samples for stockbreeding
- Tumor cells, tissues and cultured strain cells
- Sperm and fertilized eggs
- Lymphocytes, blood platelets, bone marrow and white blood cells
- Animal organs and neural cells
- Bacteria and viruses
- Plant seeds

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■ Japan

- ULVAC, Inc.
- ULVAC TECHNO, Ltd.
- ULVAC KYUSHU CORPORATION
- ULVAC TOHOKU, Inc.
- ULVAC KIKO, Inc.
- ULVAC EQUIPMENT SALES, Inc.
- ULVAC CRYOGENICS INCORPORATED
- ULVAC-PHI, Inc.
- TIGOLD CORPORATION
- ULVAC COATING CORPORATION
- Nisshin Seigy Co., LTD
- ULVAC Human Relations, Ltd.
- SHINKU CERAMICS CO., LTD.
- FINE SURFACE TECHNOLOGY CO., LTD.
- Reliance Electric Limited
- SHOWA SHINKU CO., LTD.

■ China

- ULVAC (China) Holding Co., Ltd.
- ULVAC (NINGBO) Co., Ltd.
- ULVAC (SUZHOU) CO. LTD.
- ULVAC Orient (Chengdu) Co., Ltd.
- ULVAC Automation Technology (Shanghai) Corporation
- ULVAC Tianma Electric (Jingjiang) Co., Ltd.
- ULVAC Vacuum Furnace (Shenyang) Co., Ltd.
- ULVAC (Shanghai) Trading Co., Ltd.
- ULVAC Materials (Suzhou) CO., LTD
- ULVAC Opto-electronics Thin Film Technology (Shenzhen) Co., Ltd.
- ULVAC CRYOGENICS (NINGBO) INCORPORATED
- ULVAC NONFERROUS METALS (NINGBO) CO., LTD.
- ULVAC Research Center SUZHOU Co., Ltd.
- Hong Kong ULVAC Co., Ltd.
- ULVAC VACUUM EQUIPMENT (SHANGHAI) CO.,LTD.

■ Taiwan

- ULVAC TAIWAN INC.
- ULTRA CLEAN PRECISION TECHNOLOGIES CORP.
- ULCOAT TAIWAN, Inc.
- ULVAC AUTOMATION TAIWAN Inc.
- ULVAC SOFTWARE CREATIVE TECHNOLOGY, CO.,LTD.
- ULVAC Materials Taiwan, Inc.

■ South Korea

- ULVAC KOREA, Ltd.
- Ulvac Korea Precision, Ltd.
- Pure Surface Technology, Ltd.
- ULVAC CRYOGENICS KOREA INCORPORATED
- ULVAC Materials Korea, Ltd.
- UF TECH, Ltd.

■ Southeast Asia

- ULVAC SINGAPORE PTE LTD
- ULVAC MALAYSIA SDN. BHD.
- ULVAC (THAILAND) LTD.

■ North America

- ULVAC Technologies, Inc.
- Physical Electronics USA, Inc.

■ Europe

- ULVAC GmbH