Development of the world's first Resonance Shear Measurement System (RSM-1) for the evaluation of viscosity, friction and lubrication properties at nano-scale thickness

—— ULVAC-RIKO, Inc.

ULVAC-RIKO, Inc. (Pres. Dr. Yoshikazu Ishii) introduce the world's very first Resonance Shear Measurement System (RSM-1), developed with the assistance of the Japan Science and Technology Agency (JST); and made possible by the research breakthroughs of Prof. Dr. Kazue Kurihara of Tohoku University, specifically the studies of the resonance shear method for evaluating liquid properties in nanospace, and the twin-path method for measuring the surface force between opaque substrates.

It is known that decreasing the liquid film thickness confined between two solid surfaces below the nanometer range, the film can achieve unique properties such as ordered structure formation and drastic increase in viscosity, due to confinement and interface effects, of which are completely different from those of bulk liquid. Liquid film thickness, of which determines the property of bulk liquid, is strongly dependent upon liquid-liquid and liquid-solid surface interaction. Various shear measurement techniques employing the surface forces apparatus (SFA) have been developed and used for measuring various properties of confined liquids such as viscosity, friction, and lubrication. It is not possible, however, to evaluate all of these properties without using different sets of techniques.

The Resonance Shear Measurement System (RSM-1) enables the measurement of resonance shear response and is able to evaluate all of their properties by continuously changing the thickness of liquid film confined between two solid surfaces at nanometer resolution. In addition, the surface potential, adhesive force, and steric structures of adsorbed molecules can be evaluated using surface forces measurement.

• Contact information
Sales Department, ULVAC-RIKO, Inc.
TEL: +81-45-931-2285
URL: www.ulvac-riko.co.jp

New 1 watt 4K cryocooler released for application in the medical equipment and superconductor markets

—— ULVAC CRYOGENICS INC.

ULVAC CRYOGENICS INC. released the 4K cryocooler for the cryogenic equipment market in July 2009. The original 4K (kelvin) cooler was of the 0.3W@4.2K type, and its application was limited to the use of cryostat, etc., but the new type, with an increased cooling capacity of 4K, targets the lucrative market for larger cryocoolers, such as medical equipment and superconductive applications. Sales began in January 2010.

- UR4K10: Specifications of the new 4K cryocooler (1W@4.2K)

(1) Stage 2 refrigeration capacity 20W@40K
(2) Stage 2 refrigeration capacity 1.0W@4.2K
(3) Stage 2 ultimate temperature 3.0K

In addition, the lineup of 0.3W machines has been expanded and enhanced for improved capacity, and we are developing new machines to keep up with ever-increasing demand for higher capacity.

• UR4K03 lineup
(1) UR4K03(C10) 0.3W@4.2K
(2) UR4K03(C15R) 0.4W@4.2K

The UR4K03 cryocooler employs a closed-cycle helium gas circulating GM refrigerator, which does not use liquid helium. The UR4K03 comes with a temperature fluctuation suppression mechanism (patent pending) that can keep the temperature amplitude within 20mK. Temperature amplitude impacts the measurement of micro-signals using superconductors, and there has been a demand for technology that minimizes the amplitude. To this end, the company has already been successful in fulfilling the demanding requirements for millimeter-wave measurement equipment.

In addition to the main unit, the cryocooler is equipped with a compressor to circulate helium gas, flexible hoses, and a power cable.

In addition to the URSP20 pulse tube cryocooler, the 2-stage 10K cryocoolers RM10/RM20/RM50/RM80T, and the 1-stage 80K cryocoolers RMS10/RMS50/RMS80T/RS150T, ULVAC CRYOGENICS will continue to enhance its lineup of large-scale cryocoolers and environmentally friendly products.

• Contact information
Sales Headquarters,
ULVAC CRYOGENICS INC.
TEL:+81-467-85-0303
URL: www.ulvac-cryo.com/

Development of the Sapio-1300 Series optical thin-film vapor deposition equipment for infrared cut filters used in digital single-lens reflex cameras

—— SHOWA SHINKU CO., LTD.

SHOWA SHINKU CO., LTD. has launched the Sapio-1300 Series optical thin-film vapor deposition equipment, incorporating a process technology that suppresses particles more effectively during deposition compared with existing machines. Performance levels of the exhaust speed of gases and water molecules, the automatic pressure adjuster, the optical film thickness meter unit, etc., have been improved for the Sapio-1300 Series. As a result, improvements in accuracy have been realized to the order of two times for the exhaust speed, three times for the pressure control system, and 10 times for the film thickness control system.

Further, the production tact for one batch, which used to be 7 to 8 hours, has now been reduced to 5 hours, and the 4-batch deposition repeatability for existing machines has been improved to a continuous 20 batches. With regard to the environment, the device uses a cold-trap helium system instead of CFC gas, and its footprint has been reduced by 30% to economize on floor space.

The main application field for the series is infrared cut filters for digital single-lens reflex cameras.

• Contact information
Sales Office, SHOWA SHINKU CO., LTD.
TEL: +81-42-754-1331
URL: www.showashinku.co.jp

Release of the advanced function QCM-based molecular interaction quantitative analyzer that is applicable to physical properties assessment

—— Initium, Inc., ULVAC, Inc.

Initium, Inc., in cooperation with ULVAC, Inc., has developed and begun marketing the AFFINIX QN Pro, a molecular interaction quantitative analyzer based on QCM (Quartz Crystal Microbalance) technology as the top-of-the-line product in the AFFINIX series of systems.

The existing AFFINIX series systems are already utilized in a wide variety of applications, such as biological macromolecules (protein, DNA) and material substances (micro-particles, films). In addition to the existing measurement capability, the new AFFINIX QN Pro has many advantages, one of which is its ability to obtain 8 types of parameters, enabling its application in the assessment of physical properties, such as viscosity, elasticity, rigidity/flexibility, and structural changes.

Its main characteristics include: 1) admittance analysis QCM (QCM-A), enabling the acquisition of 9 parameters, 2) simultaneous and separate measurement of changes in mass and changes in viscosity, 3) the capacity to obtain information on rigidity/ flexibility, 4) the capacity to assess physical properties (changes in rigidity/ flexibility or structure), 5) the ability to measure liquid temperature by ascending/ descending program, 6) the capability to measure infinitesimal quantities, 7) its applicability to special sensors, and 8) the ability for unit exchange with AFFINIXQN, QN μ.

Applicable areas include the assessment of structural changes in polymers/ protein, etc.; the evaluation of surface properties of film swelling/ rigidity/ flexibility; the measurement of viscosity/ elasticity of macromolecule solutions/ grease; the observation of the coagulation of

gels/ paints; or the analysis of material degeneration. The system is expected to be widely used in new areas of application in physical properties assessment.

• Contact information
Sales Department, Initium, Inc.
TEL: +813-5218-8030
Sales-related: info@ initium2000.com
Technology-related:
support@ initium2000.com
URL: www.initium2000.com

Sales begun of thin-film lithium secondary cells manufactured by GS Caltex of South Korea

— ULVAC EQUIPMENT SALES, LTD.

ULVAC EQUIPMENT SALES, LTD. introduced thin-film lithium secondary cells manufactured by GS Caltex of South Korea in the Japanese market in November 2009.

The market for the lithium secondary cells is expanding year by year, as they are used in products including automobiles, mobile phones, and digital household appliances. However, existing lithium cells use a liquid electrolyte, raising safety and environmental concerns with regard to their use in portable products.

Thin-film secondary cells use a solid electrolyte, ensuring greater safety. Also, the thin film process provides the added value of lightness and flexibility to the finished products. Instead of standalone applications, it can be expected that thin-film lithium secondary cells will be incorporated into, for example, electronic components in compact electronic and biomedical devices, such as RFID tags and MEMS-IC's.

This product accomodates design/ production under original specifications that accommodate various conditions for use with ULVAC's deposition equipment and ULVAC Materials, Inc.'s dedicated targets.

• Contact information
ULVAC EQUIPMENT SALES, Inc.
TEL: +81-3-5218-6011
URL:www.ulvac-es.co.jp

Sales begun of Shinoda Plasma's Display

— ULVAC EQUIPMENT SALES, LTD.

Shinoda Plasma Co., Ltd. (headquartered in Kobe; President Tsutae Shinoda), a venture business in extra-large area plasma displays in which ULVAC, Inc. has invested and ULVAC EQUIPMENT SALES introduced, was awarded the Kansai Frontrunner grand prize in January 2010. Among nine companies awarded this prize, Shinoda Plasma was specially chosen to also receive the jury's special award for the outstanding novelty of its products.

Sponsored by the Kansai Institute of Information Systems and Industrial Innovation, the Kansai Frontrunner grand prize is awarded to and provides support for highly promising products and technologies.

Shinoda Plasma earned the award for its ultra-light, thin and extra-large area display module that uses plasma tubes of approximately 1 mm in diameter instead of existing glass substrate. The film-type display is the first of its kind in the world, and it received high marks for its revolutionary features, such as its excellent expandability as well as its ability to display on curved surfaces.

On the back of strong orders from exhibition sites and public facilities, the company is planning to increase its production capacity by 2.5 times by the first half of 2011, and is investing approximately half a billion yen to expand its plant. At present, the company primarily makes extra-large area displays, SHiPLA, measuring 2 m high and 3 m wide. And the company has successfully developed an extra larger area display measuring 4 m in height and 3 m in width, the world's largest. It has been installed to the KIX Airside Avenue in the Kansai International Airport.

• Contact information
ULVAC EQUIPMENT SALES, Inc.
TEL: +81-3-5218-6011
URL:www.ulvac-es.co.jp
Shinoda Plasma, Co., Ltd.
TEL: +81-78-302-1728
URL: www.shi-pla.jp

PHI 700 Xi Scanning Auger Nanoprobe won AVS 2009 Product Award from the American Vacuum Society

— ULVAC-PHI, Inc.

The PHI 700 Xi Scanning Auger Nanoprobe developed by ULVAC-PHI, Inc. and its affiliated company, Physical Electronics USA, Inc., has won AVS 2009 Product Award selected by American Vacuum Society.

The PHI 700 Xi was introduced in September 2009. Using its own CMA (Cylindrical Mirror Analyzer) technology, high-energy resolution Auger analysis was performed. This is perfect for applications currently in high demand. Further, its remote operation capability and failure diagnosis via the Internet were cited as additional reasons for the award.

CMA technology is superior because of high sensitivity and high throughput especially for samples with uneven surfaces. The PHI 700 Xi is highly used for analysis of devices with complex three-dimensional shapes. For example, photovoltaic devices effectively use sunlight that is delivered by micron-level convex-concave from surface to power device. The PHI 700 Xi has made it possible to analyze such uneven samples, which conventional flat thin-film analyzers are incapable of analyzing.

• Contact information
International Sales Department,
ULVAC-PHI, Inc.
TEL: +81-467-85-4220
URL:www.ulvac-phi.co.jp

Launch of ULKS Ver.3 low-k interlayer dielectric film material with enhanced plasma damage resistance

— ULVAC, Inc.

ULVAC, Inc. has launched its ULKS Ver.3 dielectric film material required for next-generation LSI's. Currently, in order to control the increase of inter-wire capacity caused by miniaturization, a low dielectric constant is required for the dielectric film, which forms the interlayer/ inter-wire film in the fabrication of wiring.

The newly released ULKS Ver.3 is the improved version of ULKS Ver.2 released in 2008. It is a porous silica film that enables the control of the increase in relative dielectric constant induced by plasma damage, which has been an issue in Cu/Low-k integration. The film endures approximately the same level of plasma damage as the porous interlayer dielectric films deposited by CVD and currently employed in the market, but the new product lineup offers high relative dielectric constants of 2.0, 2.2, or 2.4, and is thus superior to CVD films. It also surpasses CVD films in its mechanical strength.

The deposition process is also simplified to three short-tact stages of spin-coating, soft-baking, and UV cure.

• Contact information
Semiconductor & Electronics Equipment Global Business Unit, ULVAC, Inc.
TEL: +81-55-998-2178
URL: www.ulvac.co.jp

Luminous NA-8000, a plasma ashing system compatible with organic process for semiconductors/ electronic parts

— ULVAC, Inc.

ULVAC, Inc. has launched Luminous NA-8000, a plasma ashing system with a wide variety of applications in the fields of semiconductor and electronic parts.

In the fields of semiconductors and electronic parts, more and more sophisticated organic films possessing properties such as high heat resistance, high mechanical strength, and high refractivity, have been used in recent years. Luminous NA-800 is applicable to a wide range of processes from the ashing of high function organic films to the simple etching of oxide or SiN layers.

Another key advantage of "Luminous NA-8000" is cost performance arising from the optimization of required functions. The process modules and transport modules were simplified in the design stage with a view to cost reduction.

Its properties include "allowing a wide range of processes and high quality," "an

upgraded system and economized space," and "a flexible transport arrangement," allowing an extensive range of applications, from the processing to packaging of semiconductors/ electronic parts.

• Contact information

Semiconductor and Electronics Equipment Global Business Unit, ULVAC, Inc.
TEL: +81-467-89-2016
URL: www.ulvac.co.jp

Launch of FABISEQ, an equipment diagnosis system for equipment data collection and analysis.

— ULVAC, Inc.

In October 2009, ULVAC, Inc. developed FABISEQ (FAB Information System for Equipment), an equipment diagnosis system for the collection of detailed equipment data and analysis, and released it as a tool for the ei-5, a batch process high vacuum evaporation system.

EES (equipment engineering systems) have been attracting attention as a means of improving productivity in the fields of electronic device manufacturing, FPD and semiconductors. FABISEQ was developed, based on the concept of EES, as a simplified EES tool. The data-collection method can be selected from two options: direct installation on the PC that controls the equipment, or direct connection to a PC that is added separately to the PLC (programmable logic controller). Both methods enable a sampling rate of 100msec. The system is equipped with such functions as overlaying data for comparison, enlarged display, differential-integral calculation, and statistical processing, including average/ variance, which allow for multi-dimensional analysis, diagnosis, and the detection of the abnormal data. These functions, in turn, contribute to quality control, increased yield, and the maintenance and improvement of capacity utilization.

The system is currently compatible only with our ei-5 batch process high vacuum evaporation system. However, we plan to expand FABISEQ's compatibility with a wider selection of our products, including other deposition tools as well as sputtering tools.

• Contact information

Sales, Control Solutions Division
ULVAC, Inc.
TEL: +81-46-789-2244
Email: fabiseq@ml.ulvac.com
URL: www.ulvac.co.jp

The ninth Japan Vacuum Industry Association awards: Thin-Film Photovoltaic modules Production Turnkey Line, and Qulee Series residual gas analyzer/ process gas monitor, honored in succession

— ULVAC, Inc.

At the ninth Japan Vacuum Industry Association awards, ULVAC, Inc. was honored

twice in succession: The "Thin-film photovoltaic modules production turnkey line won the grand prize in the category of vacuum equipment, and the Qulee series residual gas analyzer/ process gas monitor won the award in the category of vacuum components/ parts/ materials.

• Grand prize in the category of vacuum equipment "Thin-film photovoltaic modules production turnkey line"

Thin-film silicon solar cells are manufactured by first depositing amorphous silicon film on the glass substrate with a PE-CVD device, which then goes through a series of production systems, including the laser scribe, PVD, the substrate scrubber, and the sealing machine, and thus a variety of technical information is required.

ULVAC's Thin-film photovoltaic modules production turnkey line not only provides all the tools needed for production, but also performance evaluation, throughput, and guaranteed yield/ production capacity in a package. Further, it offers technical know-how, selection of constituting materials, production guidance, and maintenance support. Thus, all in all, it serves as a comprehensive turnkey system for the production of thin-film solar cells, which was the major reason for the honor. This comprehensive line is a groundbreaking product that enables companies that do not possess specialized technical knowledge in the field to participate in the energy business. The fact that it can make positive contributions to the environment was an added reason for the award.

• The award in the category of vacuum components/ parts/ materials "Qulee series residual gas analyzer/ process gas monitor"

The quadrupole mass spectrometer (QMS) was first introduced in 1970, and it is one of ULVAC's historic products, marking its 40th anniversary this year. It has been through many generations of upgrades, and currently is offered as the Qulee Series residual gas analyzer/ process gas monitor. Qulee comes from the German word "klee," which means four-leaf clover, combined with the "Q" from QMS.

The award was based on recognition of the product's abundant lineup and its high quality, as detailed below:

(1) CGM series

Does not require a complex differential exhaust system, measures up to 1Pa, and is suitable for sputtering machines

(2) BGM series

A standard product that is low-cost but provides reliable basic functions

(3) HGM series

Offers high sensitivity and is suitable for research and development

In the future, we plan to introduce an updated version the HGM series, improve the quality of the entire Qulee Series, and introduce common parts to be shared with other standard products for better quality. We continue to aim for further innovations.

• Contact information

[Thin-Film Photovoltaic modules Production Turnkey Line] FPD·PV Global Business Unit, ULVAC, Inc.
TEL: +81-467-89-2257
[Qulee Series] Components Division, ULVAC, Inc. Product Manager Group
TEL: +81-3-5218-5708
URL:www.ulvac.co.jp

CSR partner for the local soccer team Shonan Bellmare

— ULVAC, Inc.

As the CSR partner for the local soccer team Shonan Bellmare, ULVAC, Inc. has participated in CSR (corporate social responsibility) activities in close contact with the community since October 2009. ULVAC employee volunteers are propelling these activities in consultation with the Bellmare. At the "Bellmare Wonderland 2010," a player and community exchange event held in Hiratsuka City in Kanagawa Prefecture, ULVAC organized a booth to introduce its corporate activities. There, its "quick charge system" for electric vehicles and "solar panels" were displayed, vacuum experiments were performed, and gold film glue was on sale.

Also, once per season, a home game is designated as "ULVAC Special Day," and ULVAC organizes the "escort kids" who accompany the players when they walk onto the field, and the "ball persons" who collect the ball when it bounces out of the field. ULVAC also sets up a display booth to introduce its corporate activities and invites students and staff members of Chigasaki Special School to deepen exchanges with the local community.

It was great news that immediately after ULVAC became a CSR partner, Bellmare successfully promoted itself to the J1 League. ULVAC intends to grow steadily and to continue supporting Shonan Bellmare so that it can make a strong showing in the J1 League.

• Contact information

• Send your comments and opinions (about the magazine or ULVAC Group) to :

Local report from Singapore

Reporter: ULVAC SINGAPORE PTE LTD Nickson Chan

ULVAC SINGAPORE PTE LTD, Mr. Ueda (M.D) gave a lectured on "Creation of new business model by combining servicing and product" on a joint program with Waseda University and NTU Double MBA program.

Interaction between Waseda University and NTU International MBA Educational Institute

ULVAC SINGAPORE PTE LTD, Mr. Ueda (M.D) was invited as a guest for Waseda University and NTU Double MBA program on 23rd January 2010. He gave a lectured on "Creation of new business model by combining servicing and product".

Waseda University Business School and Nanyang Technological University had tied up to establish the International MBA Education Institute based on the request of the government in 2005. NTU is a prestigious school that is ranked 27th place in the world business college ranking as announced in the "Business Times". Singapore aims to be the hub of the educational institution in Asia and had already invites world eminent university such as The University of Chicago, Duke University, Johns Hopkins University, and INSEAD to come into Singapore now.

Students taking the Waseda University and NTU Double MBA program are able to obtain both Waseda University degree and NTU degree after completion of the program. About 30 students from different countries such as Japan, Singapore, Malaysia, Indonesia, Indo, China, Korea, France and Switzerland, are taking this double MBA program. Some of the students are on scholarship sent from their country, some of them are dispatch by theirs companies, some of them are studying abroad with their own expense to form the program. But everybody eats and lives together in the student campus so that bonding can be built among the students.

The request of Professor Reiji Otaki of the Waseda University business school comes true

This time, giving the opportunity whereby Mr. Ueda (M.D) to become the guest lecturer was requested by Professor Reiji Otaki from Waseda University which in charge of business college. The aim was to designate the practical lecture of the company practitioner to be part of the class call "Service Management for Technology Companies"

Professor Otaki always teaches his students, "This is the time that service management is necessary for manufacturing". Professor Otaki explained why his request, "I know the product of ULVAC well because I had been experimenting on super conductive material and semiconductor materials. For this reason, I am very interested to know how ULVAC gains customer's satisfaction and how ULVAC organizes service management." Professor Otaki told us that he is interested in ULVAC technology consultation, new product development based on customer focus, and technical service after delivery (Service Cycle).

The contents of the lecture on the day are summarized as follows;

- Focused on Customers related to ULVAC Business
- Emphasized that Customer Service was very important in manufacturer

Mr. Ueda (M.D) introduced how ULVAC interacts with customers, provides services, manage customer relationship and what ULVAC gets from these strategies method. It was good reputation as "Students were listening ardently and attentively to the presentation that was presented in English"

After his presentation's, question-and-answer session was answered. Actual stories of failure with customer and how ULVAC recovered to re-build relationships with customers were presented. Real life issues and experience were also shared with students on how hardship and effort that ULVAC had done, which this actual experience which these students know they can't learn in the class..

General Administration Department, General Administration Section, ULVAC, Inc.
TEL: +81-467-89-2033
URL: www.ulvac.co.jp

Wakayama Plant, a super-size jig cleaning dedicated plant that is the largest of its kind in Japan, offering the latest facilities and technology

— ULVAC TECHNO, Ltd.

ULVAC TECHNO, Ltd., a company dedicated to customer service, has opened its Wakayama Plant, one of the world's largest facilities dedicated to the cleaning of large parts for FPD manufacturing equipment. The opening of the Wakayama Plant brings the total number of ULVAC's jig cleaning plants to four in Japan, and with four already in existence overseas, the total number worldwide is now eight.

Not only is the Wakayama Plant the largest domestically, it also has been favorably received for its state-of-the-art facilities and its environmentally friendly stripping technology, which the company developed itself. The cleaning process has also been drastically improved through a functional layout, in which jigs to be cleaned safely pass through a consistent cleaning process from arrival to shipping, ensuring superior quality control.

[Wakayama Plant]
Kominedai 2-chome, 8-3, Hashimoto-shi, Wakayama, 648-0005
TEL: +81-736-38-2200 (main line)

• Contact information
General Administration Department, General Administration Section, ULVAC TECHNO, Ltd.
TEL: +81-467-87-1046
URL:www.ulvac-techno.co.jp

ULVAC WEB SITE:
http://www.ulvac.co.jp/eng/

ULVAC Group

ULVAC,Inc.
ULVAC TECHNO, Ltd.
ULVAC KYUSHU CORPORATION
ULVAC TOHOKU, Inc.
ULVAC SEIKI COMPANY, LIMITED
ULVAC CORPORATE CENTER Ltd.
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ULCOAT TAIWAN, Inc
MUE Materials Taiwan Co., Ltd.
Physical Electronics USA, Inc.
ULVAC (THAILAND) LTD.
ULVAC MALAYSIA SDN. BHD.