

Report

The 2006 Masao Horiba Awards

Introduction

In memory of the 50th anniversary after the foundation of HORIBA, Ltd., the “Masao Horiba Awards” was established after the founder’s name. In 2006, the theme for the 3rd Masao Horiba Awards was “X-ray analysis”, and among many excellent candidates, this prize was awarded to 3 people, and a special award was awarded to 1 person. The purpose of the 2006 Masao Horiba Awards, the circumstances from acceptance of candidates to evaluation, and the outline of the award ceremony are reported below.

Purpose of the Award, and Targets and Fields

In 2003, the 50th year since the foundation of HORIBA, HORIBA group established an award for young researchers and engineers outside our company engaged in the field of measuring and analytical technology. The purpose of this award is “to support researchers and engineers who are engaged in research and development by which generation of unique analytical and measuring techniques is expected in Japan and overseas, and to further elevate the value accorded to measuring techniques in science technology”.

HORIBA was founded by Masao Horiba, the current Supreme Counsel, as a pioneer of venture business when he was still a student. Starting from development of a glass electrode-type pH meter, the first in Japan, this company is now a general analytical equipment maker and is expanding its business globally. Cooperation with universities and research institutes has always been important in the company’s history, and it is no exaggeration to say that such cooperation has led to the HORIBA of today.

In establishing the award, Masao Horiba stated that, “creating a clear picture of substances of which contents, nature, and behavior are unknown is very important for scientists and technologists. Solutions to these challenging problems require analytical instruments where high orders of science and technology are applied. Although analytical instrumentation is an extremely important area of science and engineering, the necessity for such technologies has not been well recognized among public, or among academic circles. This award has been established in the hope that it will provide encouragement to academic persons who are working to establish new analytical fundamentals,

an area that may be unspectacular but is key to all scientific fields. The importance of the field of analytical and measuring technology, though the job in this field is not showy, is widely appealed by Masao Horiba, and he cheers up all the researchers and engineers who devote themselves basic studies in a step-by-step fashion.

The target technology fields of the award in the past were below. The field, "pH measurement", which M. Horiba has worked on by himself, was chosen for the first-time award. "Infrared-related analysis technologies", which are the principal technologies for gas analysis and also the traction force for the development in HORIBA, was chosen for the second-time award. And the field, "X-ray analysis", was chosen for the 2006 award. X-ray analysis technique is one of the basic technologies in elemental analysis in HORIBA. And this technique has been leading to advanced products, which have been supplied for 30 years. For example, the X-ray micro-analyzer which was the first product in Japan and based on development of an energy-dispersion type semiconductor detector, and the desktop X-ray analytical microscope based on the development of X-ray guide tube. What is more, as to X-ray application in the medical field, its application was started in the next year after its discovery by Röntgen in 1895, more than 100 years ago. Now, it is used in various industrial fields such as elemental analysis, crystal structure analysis and non-destructive inspection, and also, in many fields of natural scientific technology such as space research and life science. In the future, further expansion of its fields of application is expected. From these viewpoints, X-ray analysis was considered appropriate as the target technology field for the 2006 award. The following description was provided in the statement of purpose.

X-ray analysis technology is a mainstay of HORIBA's element analysis division. We have been supplying X-ray micro-analyzers and X-ray fluorescence analyzers based on the development of our energy-dispersive X-ray detectors and X-ray guide tubes for the past 30 years. X-rays are photons with energy ranging from several 10's eV to several 100's keV, and their transmission, absorption, dispersion, diffraction, and radiation characteristics are utilized in a variety of fields in natural sciences and engineering such as elemental analysis, crystal structure, industrial purposes, exploration of space and life as well in the medical field. X-rays have an incredibly wide range of applications, and its applications and possibilities are still expanding.

(Omission)

The theme for this year's Awards is a valuable one in both academic and industrial terms, and we look forward to receiving many applications from people, who are engaged in research and development in their unique way from basis to applications, and who will carry the development of analysis and measurement technology into the future.

The target technology field should be described in detail in the application as follows. 1. Seed technologies related to X-ray analysis (X-ray principles, device development, etc.), or 2. Application technologies related to X-ray analysis. “Techniques in the wide range from theory to application of X-ray source, X-ray detector, X-ray optical system, X-ray diffraction and X-ray spectrometry” and “techniques of which utilization in the future appears promising” should be included.

Description of Award

Concerning the award, special emphasis will be placed on support of research activities of the recipient, and in addition to the diploma of merit, a supplementary award of 500,000 yen will be awarded on the winning year, the next year and the year after next as a research grant. We hope this grant is used effectively to improve research results through the support which is continuous and no restriction on its usage.

Screening Committee

The screening committee consisted of Atsushi Horiba (the Chairman), 4 external researchers who have great knowledge in technology of basis and application on X-ray analysis, 2 engineers on equipment development related to X-ray analysis in HORIBA, and 2 special jury members. The total is 9 people in the committee.

Application and Evaluation

In a two-month application period from April 1 through May 31, 30 cases from Japan and 10 cases from overseas were applied.

The subjects of the studies under application were very diverse: studies on X-ray sources such as X-ray tube, X-ray optic element, X-ray detector, standard substance, etc. were found in the basic field; studies on fluorescent X-ray, X-ray diffraction, X-ray photoelectron spectroscopy, non-elastic scattering, structural analysis, etc. were found in the field of analytical technology; and use in medicine, identification and archaeology, analysis of materials, environmental analysis, etc. were found in the field of applications. In addition to the study results, the screening committee performed evaluation based on the purpose of the award that we support studies by the excellent young researchers and expect the improvement in the future. After the primary screening of the review of documents applied, the jury members made the final selection in discussion. Out of the largest number of applications we've ever had, 40 in total, the candidates were narrowed down

to 3 persons actively engaged in development of unique studies. In a meeting of the Board of Directors of HORIBA, 3 awardees of the Masao Horiba Awards, including for the first time a non-Japanese researcher, were officially selected. Furthermore, a special award was determined for a candidate well known for many study results, despite a deviation from the purpose of this award. The theme of this candidate's application was in a challenging new field and expected to lead to a very large contribution in medical field.

Award Commemoration Seminar and Award Ceremony

On October 17, the anniversary of the Horiba Radio Laboratory founded by Masao Horiba, an award commemoration seminar and award ceremony were held this year. On that day, following a company commemoration ceremony for employees of HORIBA, the award commemoration seminar and poster session were held in the afternoon at Shiran Kaikan of Kyoto University. Many researchers with a great knowledge of X-ray analysis and related studies, in particular, were invited. By holding the poster session as a study presentation and the lectures in addition, we hoped that the recipients could deliberate and discuss more deeply with more audiences. Thereafter, the award ceremony and award commemoration party were held with the official authorities also invited as well. Figure 1 is a commemoration photograph with the award recipients in the center.

In addition, animation showing the principle of X-ray and X-ray fluorescence analysis, and brief digests of presentations introducing the award recipients and the contents of their studies were prepared and used to introduce the contents of the studies during the ceremony. Further, the principle model of an X-ray analytical microscope and its "heart", actual X-ray guide tube, and its half-cut model were prepared and presented to the visitors on the day of



Figure 1 Commemoration photograph with Award recipients

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Figure 2 Principle model of X-ray analytical microscope, and X-ray guide tube

the ceremony (Figure 2).

The Masao Horiba Awards X-ray Working Group consisting of internal young engineers, leaders of X-ray measurement in HORIBA, prepared a document showing the history of X-ray and radiation measuring technology, and products resulting from its application, which was distributed as a pamphlet and presented using a panel (Figure 3).

Conclusion

The purpose and concrete management of the Masao Horiba Awards in 2006 were described above. We believe the management was successful in obtaining results which fully reflect the purpose of the award, such as the contents of applicants' studies and screening process. On the basis of this experience, the target technology field for the next Masao Horiba Awards was set to be "Cell or biological particle measuring techniques in medical analysis".

As to the present subject field "X-ray analysis", we recognize this technique is indispensable for basic studies of materials, and has widely been applied to a variety of fields expanding to development of new measuring methods and this technique is supporting advanced science technology. We are certain that the HORIBA group will regard the core technique as important and also serve as the big force to link measurement applications with needs in society.

<Screening Committee (without prefix and in no particular order)>

Honorary Chairman of Screening Committee	: Masao Horiba (Supreme Counsel, HORIBA)
Chairman of Screening Committee	: Atsushi Horiba (Chairman, President & CEO, HORIBA)
Vice Chairman of Screening Committee	: Yohichi Gohshi (Honorary Professor of the University of Tokyo, Executive Auditor of Tsukuba University)
Jury members	: Jun Kawai (Professor, Materials Science and Engineering, Faculty of Engineering, Graduate School, Kyoto University)
	: Kazuo Taniguchi (Professor, Electronics and Applied Physics, Graduate School, Osaka Electro-Communication University)
	: Izumi Nakai (Professor, Applied Chemistry, Faculty of Science, Tokyo University of Science)
	: Kenichi Obori (General Manager, Scientific Instruments & Systems Division, HORIBA)
	: Shintaro Komatani (Project Manager, XGT Project, Scientific Instruments & Systems Division, HORIBA)
Special Jury Members	: Hiromoto Nakazawa (Fellow, National Institute for Materials Science (Independent Administrative Agency))
	: George J. Havrilla (Technical Staff Member, Los Alamos National Laboratory)

<Award recipients and Titles of Award-winning Studies>

- Dr. Yasuko Terada, Chief Investigator, Japan Synchrotron Radiation Research Institute
Prize-winning theme: Innovation of micro-beam X-ray fluorescence analytical method using high energy radiation and its application
- Assistant Professor Hisashi Hayashi, Department of Chemical and Biological Science, Faculty of Science, Japan Women's University
Prize-winning theme: Development of new X-ray spectroscopic method using resonance X-ray non-elastic dispersion
- Professor Koen Janssens, University of Antwerp
Prize-winning theme: Identification of chemical species in main and trace components by X-ray in various environmental samples and samples of cultural heritage

<Special Award winner and Title of Winning Study>

- Professor Masami Ando, DDS Center, Research Institute for Science and Technology, Tokyo University of Science
Prize-winning theme: Development of a system targeting early diagnosis of mammary cancer

【History of X-ray/Radiation Measuring

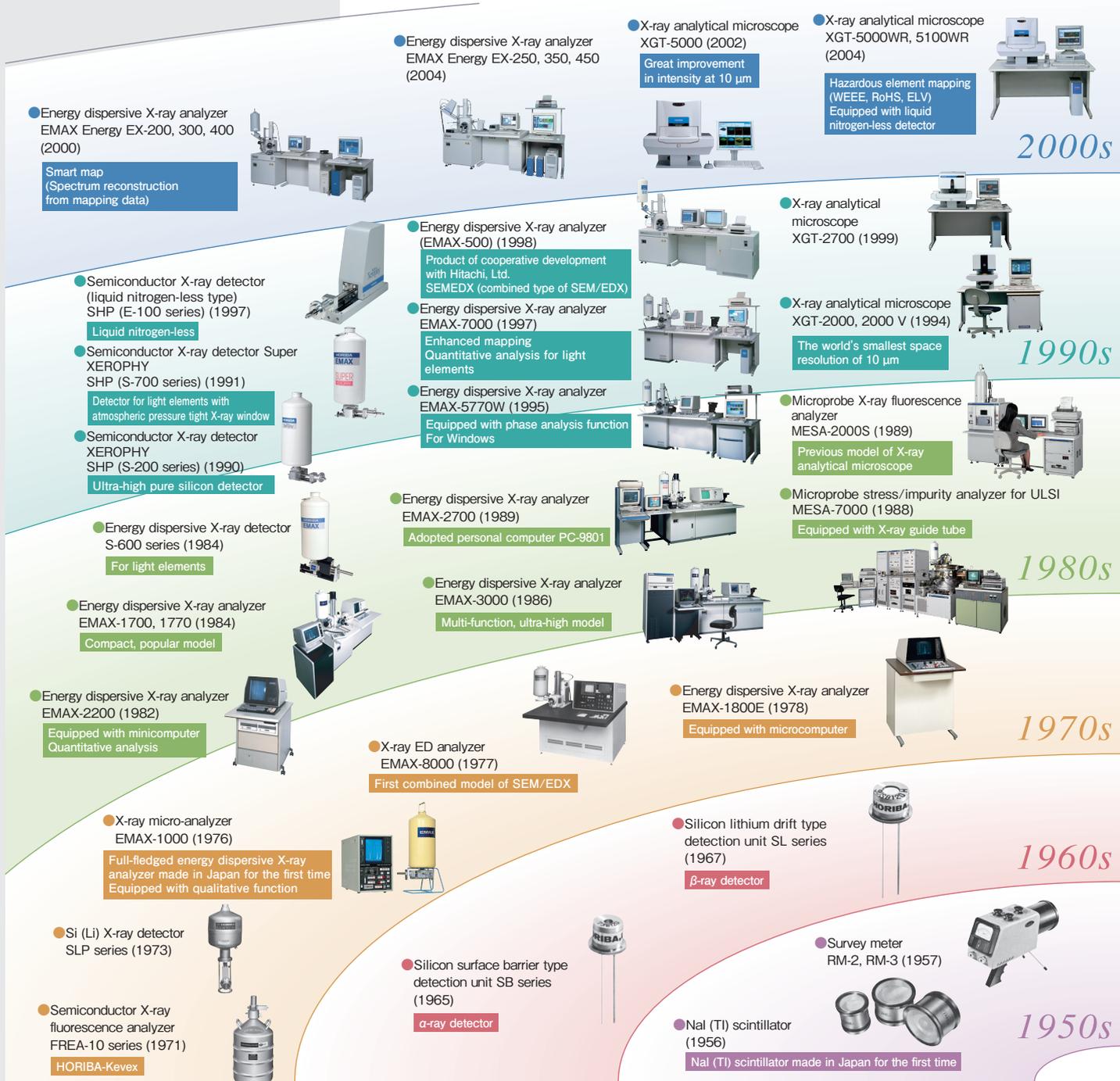


Figure 3 History of X-ray and radiation measuring technique and applied products

Technique and Applied Products

- X-ray fluorescence analyzer of hazardous elements XGT-1000WR, 1100WR (2004)

Quantitative analysis of hazardous elements (WEEE, RoHS, ELV)
Equipped with liquid nitrogen-less detector



- X-ray fluorescence sulfur analyzer SLFA-2100/2800 (2001)



- Gamma plate (2002)

Nal (TI) scintillator
Maximally 31 inches



- X-ray fluorescence element analyzer MESA-500W (1998)

For Windows



- X-ray fluorescence element analyzer MESA-500 (1993)

Standard-less quantitative analysis
(Fundamental parameter method)



- X-ray fluorescence sulfur analyzer SLFA-20 (1996)

Ultra small and light



- X-ray fluorescence sulfur analyzer SLFA-1100H/1800H (1994)

Great improvement of X-ray tube output power



- X-ray fluorescence sulfur analyzer SLFA-1100/1800 (1991)

Temperature-atmospheric pressure correcting function



- V/Ni, Fe analyzer for crude oil and heavy oil MESA-710 (1986)

Quantitative analysis of specific target



- Gilt-component online analyzer MESA-5200 (1984)

Equipped with personal computer in HORIBA for the first time



- Automatic steel discrimination instrument MESA-5500 (1984)

Online system



- Multi-elements simultaneous analyzer MESA-1130 (1981)

Equipped with Si (Li) X-ray detector



- High sensitivity sulfur analyzer SLFA-920 (1982)

Tumble



- Total chlorine and total sulfur analyzer for insulating oil MESA-200 (1981)

Equipped with multi-channel analyzer



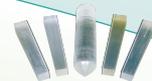
- Sulfur analyzer for petroleum SLFA-800 (1980)

Equipped with microcomputer



- CsI (TI) scintillator (1986)

Delivered to Cornell University in US



- Automatic radiation dose rate meter DR-400 (GADM-400) (1985)



- High pure germanium y-ray detector GHP series (1985)



- Sulfur analyzer SLFA-200 (1974)

Bench-top sulfur analyzer for oil, first in the world
Equipped with 1 tip LSI for electronic calculator



- Sulfur analyzer for petroleum SLFA-10 (1973)

Equipped with X-ray tube



- Nal (TI) scintillator (1969)

12 inches (Anger type)



- Liquid scintillation spectrometer LS-500 (1966)

Measurement of low energy β -ray
Equipped with full automatic sample exchanger



- Liquid scintillation spectro-system LS-700 (1972)

NIM modules



- Radioactive waste decontamination monitor WD-1, WD-2 (1959)



- Scintillation spectrometer SS-1A (1958)



- Liquid scintillation spectrometer LS-300 (1961)

Liquid scintillation spectrometer made in Japan for the first time



- Lithium drift type germanium detector Ge (Li) series (1970)

