

Report

The Second Masao Horiba Awards

Introduction

HORIBA established the “Masao Horiba Awards” honoring the founder’s name on the 50th anniversary of the company. In 2005, the second presentation of the Masao Horiba Awards was carried out. We invited applicants working in the area of infrared related analysis and measurement technologies and chose three outstanding award winners. This report details the purpose, invitation, screening process, and award ceremony of the second Masao Horiba Awards.

Award Purpose and Targeted Applicants/Field

In 2003, HORIBA celebrated its 50th anniversary, and at this time established an award for young researchers working on measurement and analysis technologies outside the company. The stated purpose of the award was “To nurture domestic and overseas researchers and engineers who are researching or developing analysis/measurement technologies which will serve as milestones in the future, and to enhance the value of analysis technology.”

Throughout the history of HORIBA, established by Masao Horiba as a pioneer of student venture business, from the first development of the glass electrode pH meter in Japan through to global business expansion as a general analyzer manufacturer, universities and research institutes have cooperated with and supported HORIBA.

Dr. Masao Horiba said, “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 the 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.” This award celebrates those researchers and engineers who are working on fundamental research, by recognizing the importance of analysis measurement technology. The target field for the first year award was “pH measurement,” which Masao Horiba has himself worked on, and for this second year the target field was “infrared related analysis and measurement technologies,” a principal technology used for gas analysis which originally led to HORIBA’s growth. The interaction of infrared radiation with substance is deeply related to molecular behavior in the substance, such as vibration and energy. “Infrared measurement” is critically important in today’s advanced research and its applications.

From this point of view, “infrared measurement” is a suitable theme for the second Masao Horiba Awards and the prospectus for award applications has been indicated as follows:

Infrared absorption measurement is HORIBA's core technology with more than 280,000 infrared analyzers shipped. Physically, infrared optics is the integration of electromagnetic wave and quantum theories based on the discussions in the field of molecular vibration and thermal energy, serving the important source of information for the analytical and measurement technologies. In addition, the applicability of infrared analysis and measurement is now expanding, not only in the scientific field, but also in a wide variety of industrial applications. We cordially invite applicants who are pursuing unique research and development in a field ranging from basic science to ultimate application in an academically or industrially valuable target technology and can shoulder the future development of analytical and measurement technologies.

In the application outline, the target technology field is indicated as follows:

1. Seed technologies on infrared-related analysis

-Technologies concerning the principle and equipment development of material technology or optical-system technology.

2. Application technologies on infrared-related analysis

-A wide field of technologies including spectroscopy and chemometrics closely related to a specified application

- Technologies on infrared-related analysis which are necessary in the fields of advanced materials, environment, energy, nanotechnology, biotechnology, life science and will contribute to the development of these fields.

The target wavelength range is specified from "near-infrared" to "far-infrared."

The Prize

To focus on supporting the award winners' research activities, 500,000 yen is to be awarded in addition to recognition. Additionally, for the two years following, a further 500,000 yen research grant will be awarded each year. Use of the continued grant support is unrestricted. We expect the winners to utilize the funds effectively for such means as publishing their research results.

Screening Committee

The screening committee was consisted of ten members: The current president Atsushi Horiba as the chairperson, four external expert researchers in fundamental infrared measurement and its applications, two HORIBA members with a doctor's degree, and three special screening members.

Application and Screening

Notification lasted for 2 months from the beginning of April. Twenty-five applications inside Japan and seven from outside Japan were made.

These applications were in areas from fundamental to applied research and in a wide range of wavelengths from near-infrared to far-infrared. Also they covered a broad range of fields, such as research and development of spectroscopic measurement equipment, research of materials, chemicals and biological materials utilizing the infrared spectroscopy or vibration spectroscopy, medical and astronomical research, spectroscopy method,

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analysis method, and reactivity research.

Research contents were considered by the screening committee with the award's stated purpose in mind "to support brilliant young researchers so as to expand future possibilities." Based on the first screening, which was determined by reading all application documents, the screening committee chose three applicants out of 32 applicants because of their outstanding originality and future promise. Then the HORIBA executive board screened these three applications and approved them as award winners. Additionally the board approved one applicant outside Japan as a special award winner and invited him to the award ceremony.

Award Seminar and Ceremony

The award seminar and ceremony were held on October 17th, the anniversary that Masao Horiba established the Horiba Radio Laboratory. The event began with the ceremony for company members at the HORIBA office. In the afternoon, the award seminar and poster session was held at Shiran Kaikan Hall of Kyoto University, with invited researchers from outside of HORIBA. After that, the award ceremony and party were held with invited public officers. In the award seminar at Shiran Kaikan Hall of Kyoto University, the award winners made presentations and poster sessions about their research, inviting researchers with particular expertise in infrared measurement and its related researches. As with the first award presentation, the seminar

【History of Infrared Measurement Technology and Application Products】

- Infrared sensor
- Gas analyzer
- Solid analyzer
- Liquid analyzer

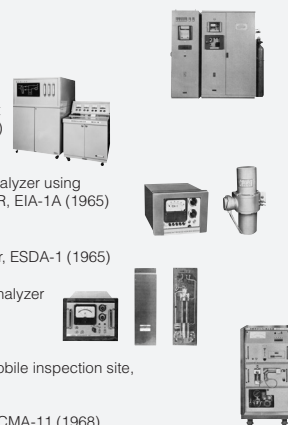
1950s

- The first model of gas analyzer, GA-1 (1957)



1960s

- Ambient CO monitor, APPA-1 (1963)
- Emission measurement system, MEXA-1 (1964)
- Explosion-proof gas analyzer using deflection method NDIR, EIA-1A (1965)
- Stack gas SO₂ analyzer, ESDA-1 (1965)
- Automotive emission analyzer bench, AIA-2 (1966)
- CO analyzer for automobile inspection site, MEXA-110 (1967)
- Oil content analyzer, OCMA-11 (1968)

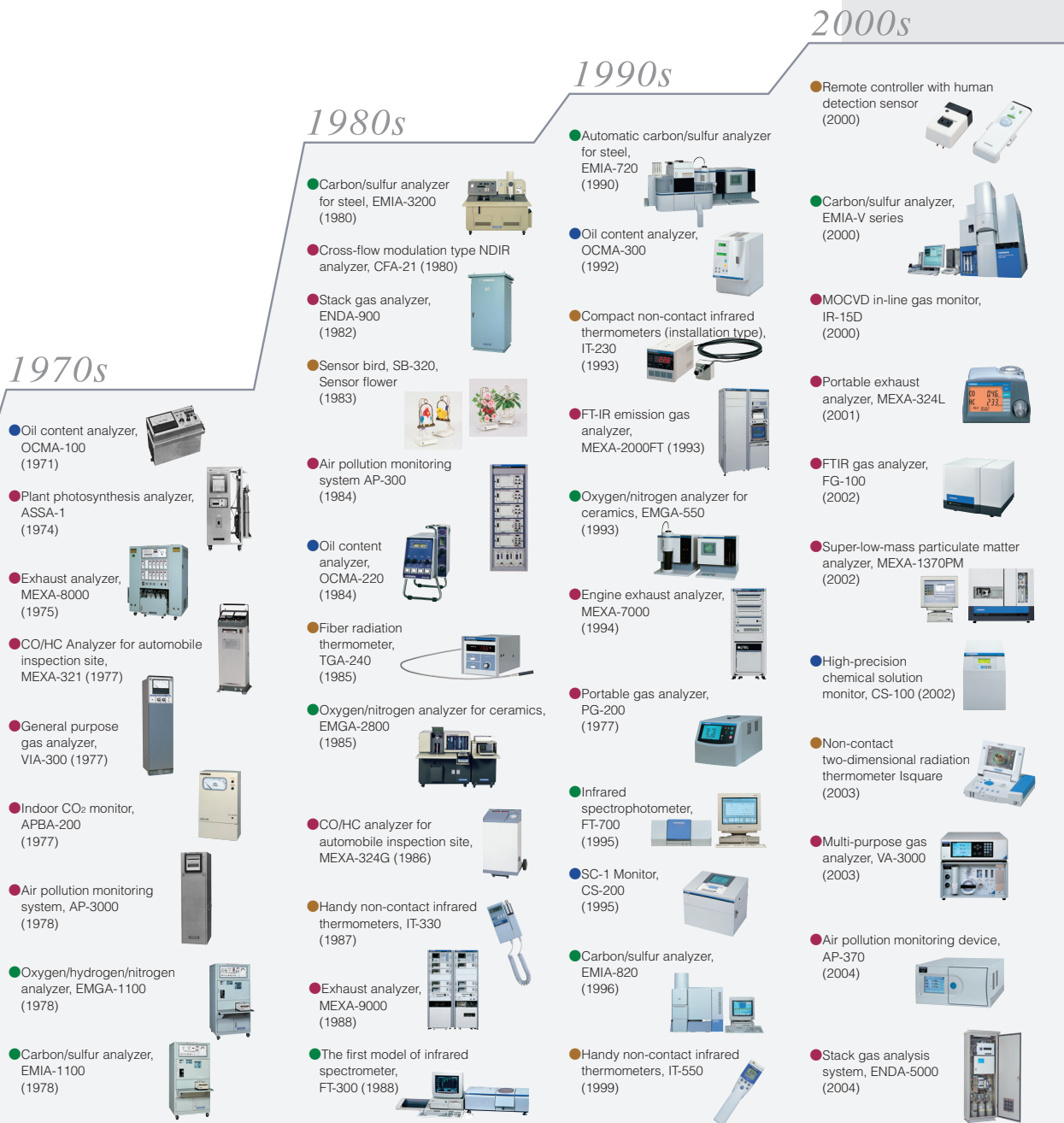


● Infrared measurement technology

- Alkali halide single crystal production technology (1953)
- Crystal polishing technology (1956)
- Optical null method NDIR design technology (1956)
- High-speed response NDIR technology (1963)
- NDIR vehicle emission analyzer production technology (1963)
- NDIR air pollution analyzer production technology (1963)
- Infrared analyzer application technology (1966)

Figure 1 History of Infrared Measurement Technology and Application Products

was arranged in the style of presentation and poster session, and allowed attendants and award winners to discuss the research deeply. In addition the history of infrared measurement technology and application products were introduced, using pamphlets, which were given out on that day, and a panel (Figure 1).



- NDIR Stack gas analyzer production technology (1970)
- Multilayer deposition technology for multilayer interference filter NO meter (1970)
- NDIR photosynthesis analyzer production technology (1972)
- Hard coating multi layer interference filter (1972)
- Fusion of HORIBA's gas analysis technology and KOKUSAI DENSHI's combustion technology (1977)
- NDIR sensor production technology (1977)
- Pyro-sensor piezoelectric material, packaging technology (1978)
- Pyro-electric detector, P2LS-F (1980)
- High purification/cable production technology, infrared fiber [Crysten] (1980)
- CO₂ laser crystallization (1982)
- Antireflection film with laser durability (1982)
- Thin film process technology, thermopile detector, TP-101 (1983)
- NDIR dual twin type GP-401 (1991)
- Technology of miniaturizing NDIR oil extraction mechanism (1992)
- Infrared spectrum multicomponent analysis technology (1993)
- Thin film Pyro sensor, GP-21xTR (1993)
- 64 elements array-shaped thermopile, TP-64 (2001)
- Thin film flow sensor, FS-100PT (2003)
- 4 elements Pyro sensor, GP-800R (2004)

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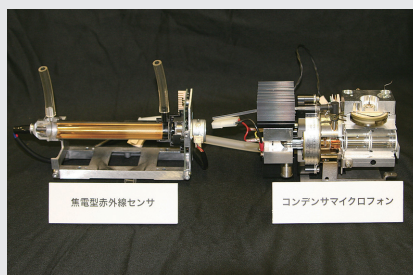


Figure 2 Gas Cell of Non-dispersive Infrared Gas Analyzer (NDIR), and Cutaway Model of Detector Structure

Masao Horiba Awards' Infrared Working Group, members of which are some of HORIBA's young engineers working for the future of HORIBA's infrared measurement, created a digest version of the awarded research presentation. Moreover they made an animation, which simply explained the principles of the infrared gas analyzer's measurement method, the gas cell of non-dispersive infrared gas analyzer (NDIR), and a cutaway model of detector structure (Figure 2) for the people who attended the ceremony. Figure 3 is the photo with award winners.



Figure 3 Commemorative Picture of the Award Winners with the Committee Members

Afterword

We have explained the purpose and process of the second Masao Horiba Awards. We feel we were able to manage this award appropriately and obtain results which sufficiently reflected its specified purpose in terms of application contents and screening process. In anticipating the next Masao Horiba Awards, we had specified X-ray analysis, one of the HORIBA's core measurement technologies, as the target field. We were also able to confirm that infrared measurement is a crucial technology for fundamental material research through this award's focus on infrared measurement. Additionally we ascertained that this measurement is supporting cutting-edge science technology, since it can be expanded to new measurement methods for not only the application fields but also development research. Now we are sure that this experience will be a great power in connecting measurement applications to their needs, while keeping infrared measurement as a core technology for the HORIBA group.

<Outline of the Application>

[Qualification of Applicants]

Researchers or engineers belonging to universities and public testing and research organizations.

[Target Technology Field]

Infrared-related analysis technologies

[Screening Method]

The Screening Committee discusses the achievements and the prospects based on the submitted application documents and determine the Award winners. Up to 5 winners' work will be announced annually in August.

[Prize]

Recognition and follow-up grants will be provided. (500,000 yen per winner to be provided at the time of winning and an identical sum to be provided for the following two years respectively)

[Ceremony]

October 17th 2005 (Monday) at Shiran Kaikan Hall in Kyoto University.

The research to be published to the society through the lecture by the winner or the poster session.

[Period of Application]

Application must arrive at the office by May 31st, 2005.

[How to Apply]

Apply with the specified application form, letter of recommendation, articles concerning relevant research, and technical data. For details, including application forms, refer to our home page: <http://www.mh-award.org/>

[Screening Committee](Titles are omitted)

Honorary chairperson: Masao Horiba (Supreme Counsel, HORIBA, Ltd.)

Chairperson: Atsushi Horiba (President and CEO, HORIBA, Ltd.)

Vice chairperson: Masahiro Kawasaki (Professor, Department of Molecular Engineering, Graduate School of Engineering, Kyoto University)

Member:

Yukihiro Ozaki (Professor, Department of Chemistry, School of Science and Technology, Kwansai Gakuin University)

Mitsunori Saito (Professor, Department of Electronics and Informatics, Faculty of Science and Technology, Ryukoku University)

Hiroshi Funakubo: (Associate Professor, Department of Innovative & Engineered Materials, Interdisciplinary Graduated School of Science and Technology, Tokyo Institute of Technology)

Masayuki Adachi: (General Manager, Automotive Test Systems Division, HORIBA, Ltd.)

Hiroshi Uchihara: (General Manager, Application Center, HORIBA, Ltd.)

Special members:

Shigeo Minami (Professor Emeritus, Osaka University)

Ronald. K. Hanson (Professor, Department of Mechanical Engineering, Stanford University)

Giuseppe Zerbi (Professor, Department of Industrial Chemistry and Chemical Engineering, Politecnico of Milano)

<Award Winners and the Content of Awarded Research>

Harumi Sato (Postdoctoral Fellow, Department of Chemistry, Graduate School of Science and Technology, Kwansai Gakuin University)

Awarded theme: Study of C-H...O hydrogen bond for biodegradable polymer using infrared spectroscopy and X-ray diffraction.

Takeshi Hasegawa (Associate Professor, Department of Applied Molecular Chemistry, College of Industrial Technology, Nihon University)

Awarded theme: Development of a new measurement method using the concept of virtual light

Yasushi Inouye (Associate Professor, Graduate School of Frontier Biosciences, Osaka University)

Awarder theme: Near-field vibrational spectroscopy

<Special Award Winners and the Content of Awarded Research>

Michael William George (University of Nottingham, England)

Awarded theme: Development of infrared spectroscopy analyzer with high time resolution (picosecond) performance.