

## Greetings from the Director of RIMCM

Quantitatively understanding the states and properties of matter based on scientific evidence is essential for ensuring that our daily lives are safe, secure, and enriched.

The Research Institute for Material and Chemical Measurement is engaged in establishing and disseminating national measurement standards that underpin the development of the chemical and materials industries and support the safety and well-being of daily life and health. We conduct research and development on measurement and physical property evaluation technologies, and ensure their reliability. We are advancing the development of measurement standards that underpin the fundamentals of chemical measurement and physical property evaluation, as well



**Dr. INAGAKI Kazumi**  
Director of RIMCM

as the development and dissemination of reference materials that ensure reliability.

Furthermore, while striving to ensure the equivalence of the measurement capability within the international framework, we are strengthening the domestic foundation for chemical and physical property measurements. This is achieved through not only routine calibration and the supply of reference materials, but also technical consulting, including customized measurements tailored to user needs, co-development of measurement instruments and publication of explicitly reliable databases.



- Research Planning Office of NMIJ
- Collaboration Promotion Office of NMIJ
- Research Institute for Engineering Measurement (RIEM)
- Research Institute for Physical Measurement (RIPM)
- Research Institute for Material and Chemical Measurement (RIMCM)
- Research Institute for Measurement and Analytical Instrumentation (RIMA)
- Center for Quality Management of Metrology

- Inorganic Standards Group
- Reference Material Evaluation Group
- Gas and Humidity Standards Group
- Organic Analytical Standards Group
- Organic Primary Standards Group
- Bio-medical Standards Group
- Nanodimensional Standards Group
- Particle Measurement Research Group
- Thermophysical Property Standards Group
- Advanced thermal analysis research group



**Dr. GONDA Satoshi**  
Director of RIMA

## Greetings from the Director of RIMA

The Research Institute for Measurement and Analytical Instrumentation (RIMA) is dedicated to developing, advancing and disseminating national metrology standards related to radiation, radioactivity, and neutrons. The Institute also pursues cutting-edge research and development in advanced measurement and evaluation technologies using probes such as quantum beams. Specifically, to ensure the reliability and safety of radiation-based therapies, the Institute supports accurate dose measurement and control for both external irradiation using high-energy photons or particle beams, and internal irradiation employing sealed sources or radioactive isotopes. In parallel, we work to protect the safety of professionals handling radiation in industrial and medical fields by establishing the technologies and metrological traceability essential for

accurate radiation dose measurement and management. In addition, we conduct research and development in a wide range of advanced measurement technologies, including nano-void analysis based on positron annihilation techniques; structural materials analysis using neutron beam facilities; three-dimensional imaging technologies employing light, X-rays, and neutrons; high-throughput, simultaneous X-ray absorption spectroscopy and X-ray scattering measurements; and optical functional analysis through transient absorption spectroscopy. By providing measurement technologies and data that support the development of new materials and products, we are accelerating the industrial deployment of these technologies. By further advancing these initiatives, we aim to contribute to solving societal challenges and the creation of innovation, thereby helping to realize a safe, secure, and prosperous society.



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- Ionizing Radiation Standards Group
- Radioactivity and Neutron Standards Group
- Advanced Beam Measurement Group
- Radiation Imaging Measurement Group
- Non-destructive Measurement Group
- Applied Nanoscopic Measurement Group
- Nanomaterial measurement research group



# Introduction of RIMCM

The RIMCM consists of 10 research groups engaged in developing technologies for inorganic and organic chemical analysis, particle measurement, and precise measurement of shapes, structures, electronic states, and physical properties using various probes. We provide a wide range of calibration services and various standard solutions, biological reference materials, compositional reference materials and advanced reference materials to both domestic and international users based on these technologies.

## ■ Inorganic Standards Group

To help ensure the safety of drinking water and food—both essential to everyday life—we supply certified reference materials (CRMs) for the analysis of regulated elements in matrices such as river water and polished rice. We also provide electrolytic conductivity standard solutions that are widely used in industrial applications. In addition, we conduct advanced research on trace element analysis, which is essential for developing and managing these reference materials.

## ■ Reference Material Evaluation Group

We develop and supply national primary standards for standard solutions of metallic and non-metallic ions and for pH standard solutions, in support of the Japan Calibration Service System (JCSS). To ensure their reliability, we advance SI-traceable analytical methods for inorganic elements as well as the Harned cell method for pH measurement.

## ■ Gas and Humidity Standards Group

We develop and supply various standard gases traceable to the International System of Units (SI), using primary standard gases whose concentrations are determined based on gravimetric (mass-based) measurements, primarily to support the Japan Calibration Service System (JCSS). We also develop and provide SI-traceable humidity standards over a wide range, from low humidity (dew point:  $-70\text{ }^{\circ}\text{C}$ ) to high humidity (dew point:  $95\text{ }^{\circ}\text{C}$ ), using a high-precision dew-point generator. In addition, we conduct research and development on measurement methodologies, including ultra-high-accuracy oxygen gas analysis and highly sensitive, high-precision trace moisture detection based on cavity ring-down spectroscopy (CRDS).

## ■ Organic Primary Standards Group

We conduct research and development of analytical techniques—such as freezing point depression methods, quantitative nuclear magnetic resonance spectroscopy (qNMR), and titration methods—that are required for the accurate quantification of the purity or concentration of organic reference materials (high-purity substances and standard solutions) in a manner traceable to the International System of Units (SI). In addition, by applying these developed analytical techniques, we provide highly reliable certified reference materials and calibration services.

## ■ Organic Analytical Standards Group

Our group is working on analytical methods and techniques for high-accuracy (good trueness and high repeatability) quantification of trace organic compounds. We develop and supply highly reliable certified reference materials (CRMs) that can be used for instrument calibration, method validation, and evaluation of analyst. We mainly focus on extraction and clean-up procedures followed by chromatographic analyst proficiency. Furthermore, we are researching other topics, such as ultra-trace level water content, and contributing to standardization in Raman spectroscopy.

## ■ Bio-medical Standards Group

We focus on developing analytical methods and related technologies to accurately determine the purity and concentration of various biological substances, including small molecules (e.g., steroid hormones and amino acids), macromolecules (e.g., proteins and nucleic acids), and even cells. We also develop and supply related reference materials. Furthermore, we participate in international comparisons to ensure the reliability of analytical techniques in bioanalysis and clinical chemistry.

## ■ Particle Measurement Research Group

Our group is engaged in the development of measurement standards for particles, powders, and polymers. Among our recent achievements, we developed a certified reference material for polystyrene latex particles with a nominal diameter of 300 nm in 2022, and a reference material for zeta potential measurement in 2025. In addition, we extended the lower limit of the calibration range for particle size and size distribution width down to 10 nm in 2025. Since 2021, we have been serving as a pilot laboratory for an international comparison of particle number concentration in liquids under CCQM.

## ■ Nanodimensional Standards Group

Nanodimensional Standards Group is mainly engaged in research and development of nanodimensional standards required in industrial fields such as semiconductor manufacturing. Nanometrological methods, for instance, Traceable X-ray Reflectometry (T-XRR), X-ray Photoelectron Spectroscopy (XPS), Metrological Atomic Force Microscopy (M-AFM), Scanning Electron Microscopy (SEM), Focused Ion Beam Scanning Electron Microscopy (FIB-SEM), Transmission Electron Microscopy (TEM) and Flow Particle Tracking (FPT) are employed to develop certified reference materials, provide calibration services, promote international standardization, and conduct collaborative activities toward social implementation.

## ■ Thermophysical Property Standards Group

We are developing reliable technologies for measuring the thermophysical properties of advanced solid materials. These properties include the thermal expansion coefficient, thermal diffusivity, thermal conductivity, specific heat capacity and heat-related quantities. These measurement technologies can be applied to various material characterizations and are useful for solving energy-related problems, such as achieving energy savings and a low-carbon society. We also provide calibration services and reference materials for calibrating and validating instruments that measure thermophysical properties.

## ■ Advanced Thermal Analysis Research Group

Our group develops AI- and simulation-integrated thermal analysis and innovative temperature measurement techniques for the evaluation of thermal properties of advanced functional materials. We also provide high-quality and large-scale databases of spectral data for organic compounds and thermophysical properties.



# Introduction of RIMA

Our division comprises seven research groups whose mission is to develop measurement standards relating to radiation, radioactivity and neutrons, as well as advanced measurement technologies.

In particular, the Nanomaterial Measurement Research Group, established in April 2025 to strengthen our capabilities in advanced measurement technologies, is introduced in more detail.

## ■ Ionizing Radiation Standards Group

This group develops and disseminates the measurement standards that contribute to the medical and industrial use of radiation, the safe use of radiation, and environmental radiation monitoring. Its work includes measurement technologies for X-rays, gamma rays, beta rays, and other charged particles, as well as the development of traceable and accurately calibrated radiation fields.

## ■ Radioactivity and Neutron Standards Group

This group focuses on the development and dissemination of measurement standards for radioactivity and neutrons, along with related measurement technologies. Recently, the group has been actively working on radioactivity standards for medical radionuclides and the development of traceable and accurately calibrated neutron fields that contribute to Boron Neutron Capture Therapy (BNCT).

## ■ Advanced Beam Measurement Group

This group develops advanced measurement and evaluation techniques for cutting-edge materials using high-intensity neutron and positron beams. It is also engaged in the development of ultra-compact inspection instruments utilizing X-rays and positrons, and is promoting their application to infrastructure inspection and diagnostics.

## ■ Radiation Imaging Measurement Group

This group advances state-of-the-art analytical technologies, including imaging, computed tomography (CT), and ultrafast spectroscopy using X-rays and short-pulse lasers. The group also works toward the practical implementation and societal deployment of these technologies for non-destructive testing of infrastructure and industrial products, as well as in-process monitoring techniques during laser processing.

## ■ Non-destructive Measurement Group

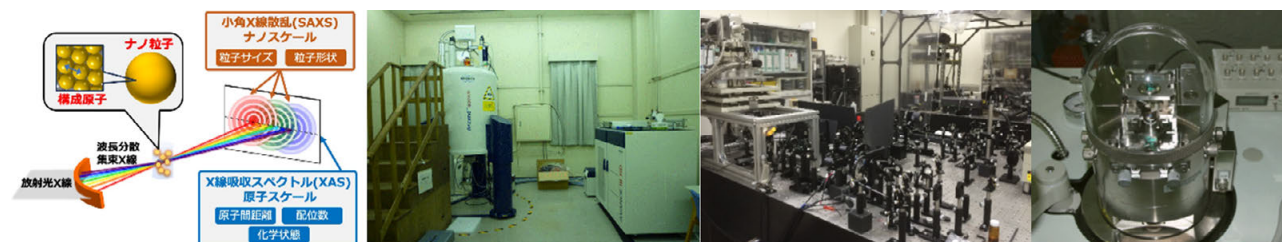
This group develops technologies that utilize cutting-edge imaging measurement, ultrasonics and AI to visualize displacement, 3D geometry, strain distributions and defects in social infrastructure and transportation systems. This enables reliable structural health assessment.

## ■ Applied Nanoscopic Measurement Group

This group develops novel measurement and analytical technologies that serve as fundamental platforms for the creation of nano-materials and other advanced materials. In addition, the group is expanding its research toward biological diagnostics and environmental monitoring, aiming to translate advanced measurement techniques into practical applications that benefit society.

## ■ Nanomaterial Measurement Research Group

The Nanomaterial Measurement Group is advancing nanoscale structural and functional characterization by integrating a broad range of state-of-the-art measurement techniques, including radiation-based methods such as synchrotron x-rays, time-resolved laser spectroscopy, scanning probe microscopy, and solid-state NMR and MRI. In fields such as energy materials, next-generation semiconductor devices, and medical and bio-related materials, analytical technologies capable of probing internal structures, interfacial states, and reaction and degradation processes with both high precision and multidimensional insight are indispensable. To meet these needs, our group is engaged in highly reliable three-dimensional nanostructure characterization, as well as in operando studies to elucidate reaction and degradation mechanisms in functional materials using synchrotron x-rays and related techniques, analysis of excited states and carrier dynamics by time-resolved optical spectroscopy using ultrashort-pulse lasers, development and standardization of nanoscale infrared spectroscopy and nanoroughness evaluation methods, and enhancement of the sensitivity of solid-state NMR and MRI using hyperpolarized gases, together with the development of spectral databases. In addition, we actively promote instrument sharing and collaborative research through AIST's shared facility programs and related schemes, providing advanced measurement infrastructure to a broad range of users from academia, industry, and public research organizations. Through these efforts, as well as through the social implementation of research outcomes and international standardization activities, we aim to contribute to the advancement of nanoscale materials measurement and the strengthening of industrial competitiveness in Japan.



From left to right: Schematic illustration of simultaneous high-speed measurement of small-angle x-ray scattering and x-ray absorption spectra, and photos of 600 MHz solid-state NMR system, femtosecond transient absorption spectroscopy system, scanning probe microscope with environmental and electrical measurement capabilities.

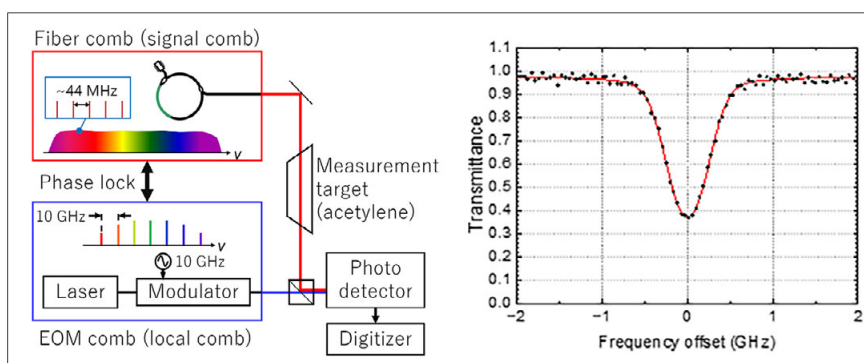
## Research Topics

# High-speed and high-resolution dual-comb spectroscopy by combining two types of optical frequency combs

KASHIWAGI Ken

Optical frequency combs have equally spaced optical frequency modes and we can stabilize all mode frequencies by controlling frequency offsets and spacings. Dual-comb spectroscopy (DCS) is a spectroscopic method that uses optical frequency combs. One comb (signal comb) is absorbed by measurement targets such as gas phase molecules, and the other comb (local comb) resolves the absorption spectrum in high frequency resolutions. This does not require mechanical moving parts, and provides high measurement speeds and stable spectroscopy while the frequency resolution and the measurement speed are in a tradeoff relationship.

We realized a high-resolution DCS with higher measurement speed by combining two types of optical frequency combs with different generation principles: a fiber comb, which is based on a pulsed fiber laser with a narrow mode spacing, is absorbed by measurement targets, and an electro-optic modulator (EOM) comb, which is generated by modulating a single frequency laser output and has a high repetition frequency, reads out the absorption spectrum. We achieved a read-out speed increase of two orders of magnitude over the conventional method. The center frequencies of measured absorption lines in  $\nu_1 + \nu_3$  band of acetylene ( $^{13}\text{C}_2\text{H}_2$ ) molecule matched the previously reported values.



Reference:

K. Kashiwagi, S. Okubo, and H. Inaba, *Opt. Express* **34**, 8262-8274, 2026  
<https://doi.org/10.1364/OE.584127>

Experimental setup for high-speed and high-resolution dual-comb spectroscopy and a measured absorption line example in  $\nu_1 + \nu_3$  band of acetylene ( $^{13}\text{C}_2\text{H}_2$ ) molecule

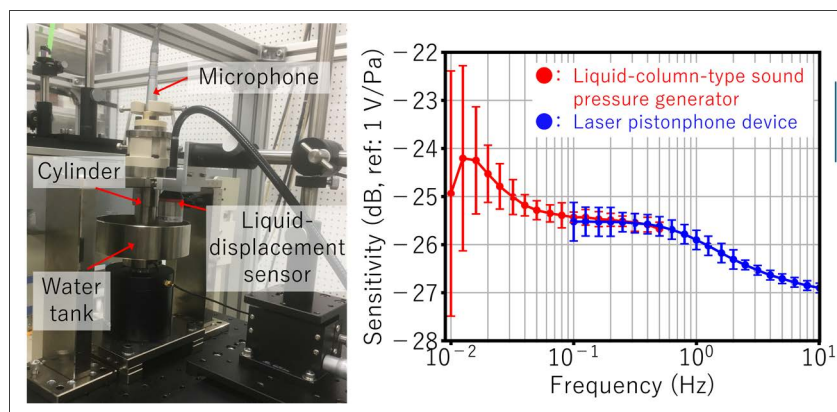
# Calibration of microphones using the liquid-column-type sound pressure generator

Koto HIRANO, Keisuke YAMADA, Hironobu TAKAHASHI and Hideaki NOZATO

Infrasound, acoustic waves with frequencies below 20 Hz, is generated by large-scale phenomena such as volcanic explosions, tsunamis, and nuclear explosions. To ensure the reliability and traceability of infrasound measurements, calibration of infrasound sensors is essential.

NMIJ has been dedicated to establishing acoustic standards for infrasound and calibrating the sensitivity of microphones using a laser pistonphone calibration device. However, this device has a critical limitation: sound pressure leakage from the moving piston. Although we proposed an improved correction method for this leakage, deterioration of the signal-to-noise ratio below 0.1 Hz was inevitable.

To address this challenge, NMIJ has developed a liquid-column-type sound pressure generator specially



Reference:

K. Hirano, H. Takahashi, K. Yamada, and H. Nozato, *Measurement Science and Technology*, **35**, 055009, 12pp, 2024  
<https://doi.org/10.1088/1361-6501/ad23c3>  
 K. Yamada, K. Hirano, H. Takahashi and H. Nozato, *Metrologia*, **61**, 065002, 11pp, 2024  
<https://doi.org/10.1088/1681-7575/ad77da>

designed for calibration in the infrasonic frequency range. This system uniquely uses low-frequency vibration of a liquid column to generate sound pressure. By sealing the pressure generation port with liquid, the system eliminates sound pressure leakage. Using this system, NMIJ has successfully achieved calibration of microphones down to 0.01 Hz. The next step is to calibrate a variety of infrasound sensors installed in monitoring systems using microphones calibrated with this system as reference standards.

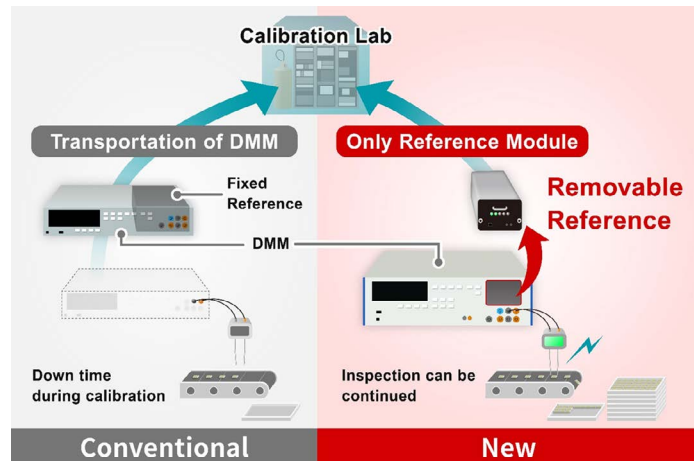
## Development of a Measuring Instrument that Seamlessly Realizes Quality Management

MARUYAMA Michitaka

To obtain reliable measurement results, traceable “reference standards” and the “calibration” of measuring instruments based on them are essential. However, while frequent calibration improves reliability, it also presents a dilemma by increasing operational costs and the risk of degradation. To address this issue, NMIJ, in collaboration with a domestic measuring instrument manufacturer, has developed a new type of digital multimeter—the Removable-Reference Digital Multimeter (RR-DMM)—which features a detachable reference source that was previously fixed. This solution achieves both high measurement accuracy and reduced operational cost. In this system, a temperature stabilized Zener diode reference voltage source module can be removed from the DMM main unit for calibration while still powered. Once calibration is completed, the module can simply be reinserted into the main unit, eliminating the need to transport the DMM itself. Even when the reference module is removed, the DMM remains operational, allowing continuous operation 365 days a year with zero downtime.

Reference:

M. Maruyama, et al., *Conference on Precision Electromagnetic Measurements (CPEM)*, 2024  
<https://doi.org/10.1109/CPEM61406.2024.10646039>

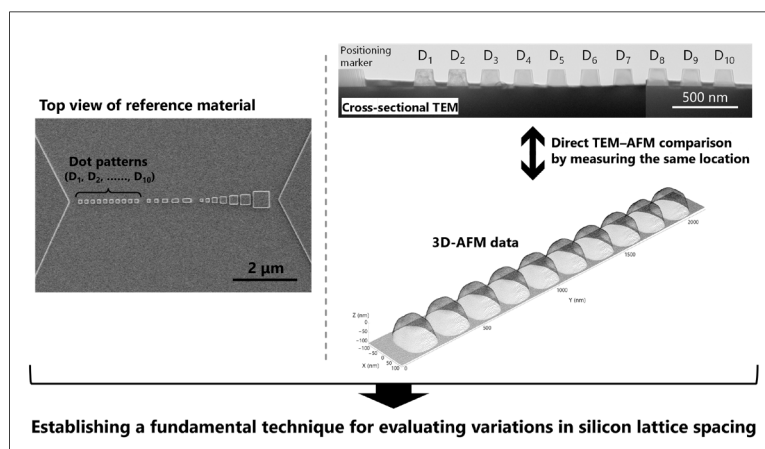


Photographs and concept of the developed RR-DMM

## Development of a reliability evaluation technique for transmission electron microscopy measurements based on silicon lattice spacing

KIZU Ryosuke, KOBAYASHI Keita

As semiconductor devices become smaller and more complex, reliable measurement of nanostructure dimensions is becoming increasingly important. The lattice spacing of silicon crystals is a promising length standard in the nanometer range. However, transmission electron microscopy (TEM) generally requires destructive thinning for specimen preparation, making it difficult to fully verify measurement reliability by TEM alone. In this study, we developed a fundamental technique that enables direct comparison between TEM measurements and atomic force microscopy (AFM) measurements with SI traceability ensured by laser interferometry, using the same specimen and the same structure. An originally developed reference material allows both methods to measure the same structure while avoiding conventional destructive specimen preparation, enabling evaluation of the relative difference between TEM and AFM results based on different principles. This makes it possible to assess the influence of TEM specimen preparation on measurement results and is expected to strengthen the technical basis for nanoscale length standards and improve the reliability of TEM-based measurements in semiconductor metrology.



Direct comparison measurement of the reference material by TEM and AFM

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Reference:

R. Kizu and K. Kobayashi, *Measurement Science and Technology*, **36**, 055005, 13pp, 2025

<https://doi.org/10.1088/1361-6501/adcadb>

# The AIST compact accelerator-based neutron source (AISTANS) and industrial applications

B. E. O'Rourke & KINO Koichi

Neutron beams are useful for non-destructive analysis of the interior of materials and structural components due to their high penetration and their ability to detect light elements such as hydrogen, which is difficult with X-rays. Consequently, interest in neutron spectroscopy and imaging is growing in the industrial sector. To provide a neutron analysis environment suitable for industrial applications, we have developed "AISTANS," a compact neutron analysis facility that balances accessibility with measurement flexibility [1].

Each of the two neutron analysis beamlines supplies neutron beams with distinct characteristics. This is achieved by passing neutrons, which are generated by irradiating a tantalum target with an electron beam, through two solid methane moderators with different designs, each of which cools the neutrons to energies (wavelengths) suitable for analysis. One beamline is optimized for neutron diffraction measurements and Bragg-edge imaging with high wavelength resolution. The other beamline utilizes high flux to perform radiography and computed tomography (CT) using a neutron flat-panel detector [2]. Leveraging these characteristics of AISTANS, a wide range of industrial applications are being pursued, such as imaging the crystalline phases of electrodes inside rechargeable batteries and non-destructive testing of automotive components.

Reference:

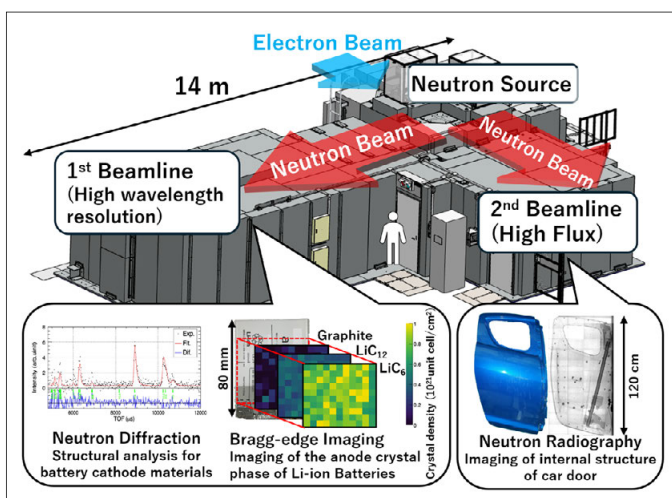
[1] K. Kino et al., *Nuclear Inst. and Methods in Physics Research*, A **927**, 407–418, 2019

<https://doi.org/10.1016/j.nima.2019.02.062>

[2] T. Fujiwara et al., *Review of Scientific Instruments*, **93**, 013304, 2022

<https://doi.org/10.1063/5.0066557>

\*AISTANS: Analytical facility for Industrial Science and Technology using Accelerator based Neutron Source



The AIST Analytical Neutron Source, AISTANS and some typical industrial applications.

## Featured Topics

### Greetings from APMP TCMM chair



AZUMA Yasushi

It is a great honor for me to serve as the Chair of the Asia Pacific Metrology Programme (APMP) Technical Committee for Materials Metrology (TCMM). This is the first time in twelve years that NMIJ has served as the TCMM Chair. Under the active and energetic leadership of previous Chairs, TCMM has promoted regional cooperation in materials metrology and contributed to the development of measurement capabilities within APMP.

TCMM is the youngest committee in APMP. Our activities cover a wide range of materials measurements without being limited to specific measurands. Over the years, TCMM has organized international comparisons on nanoparticle size, tensile strength, and nanometer-scale thin-film thickness. The committee also collaborates with international initiatives such as International Organization for Standardization (ISO) and The Versailles Project on Advanced Materials and Standards (VAMAS), to support standardization and the advancement of materials metrology.

TCMM brings together experts with diverse backgrounds and expertise, and this diversity is one of our greatest strengths. By encouraging open discussion and collaboration, I hope to further develop TCMM activities together with all members.

I sincerely appreciate your continued support and cooperation.

## Greetings from APMP TCRI chair

I am Tadahiro Kurosawa, who has been appointed as the Chair of the APMP Technical Committee on Radiation Measurement (TCRI). Radiation standards form the foundation supporting safety and trust across diverse fields such as medicine, and industry. Their development and advancement represent a vital mission within the international community. Building upon the achievements of past Chairs, I will further strengthen collaboration with national metrology institutes and advance efforts to ensure the international consistency of radiation dose and radioactivity measurements. Furthermore, I intend to invigorate discussions on the development of new measurement technologies and the resolution of existing challenges, thereby contributing to the safe use of radiation across the entire region. I will strive to make TCRI an even more valuable community, serving as the driving force for radiation standards in the Asia-Pacific region. With your support, we will move forward together. I look forward to your continued cooperation.



KUROSAWA Tadahiro

## AIST Signs MOU with G7 and Australian NMIs to Advance Quantum Measurement Technologies based neutron source (AISTANS) and industrial applications

On October 15, 2025, the National Institute of Advanced Industrial Science and Technology (AIST), together with the national metrology institutes (NMIs) of the G7 countries and Australia, signed a Memorandum of Understanding (MOU) to strengthen metrological collaboration in measurement technologies that support the accelerated development and deployment of quantum technologies.

The purpose of this MOU is to promote cooperation in pre-standardization activities for quantum technologies, that is, initiatives that support future standardization. It represents the first step toward establishing “NMI-Q\*,” an international framework designed to advance, in a rapid and flexible manner, the development of measurement technologies and the assurance of their equivalence in support of innovation and industrial applications in the rapidly evolving field of quantum technologies.

This initiative is also based on the Kananaskis Common Vision for the Future of Quantum Technologies\*\*, in which the leaders of the G7 countries emphasized the need for international cooperation in quantum technologies at the G7 Summit held in Canada in June 2025. The signing ceremony was held in Paris, France, and was attended by representatives of eight organizations: INRiM (National Metrology Institute of Italy), LNE (National Metrology Institute of France), NIST (National Institute of Standards and Technology, United States), NMIA (National Measurement Institute, Australia), NPL (National Physical Laboratory, United Kingdom), NRC (National Research Council Canada), PTB (National Metrology Institute of Germany), and NMIJ/AIST (National Metrology Institute of Japan, AIST).

Under this MOU, the participating organizations will promote the reliability, safety, and interoperability of quantum technologies through activities such as the development of performance evaluation methods and data for quantum technologies, the implementation of strategic pre-standardization activities toward international standardization, support for practical implementation through collaboration with industry and academia, researcher exchanges, and the organization of joint workshops.

AIST has contributed to ensuring international consistency in the field of quantum metrology through the advancement of cutting-edge measurement technologies, including optical lattice clocks, which are extremely high-precision clocks with accuracy beyond the current definition of the second, and high-precision measurements of electrical quantities based on quantum effects. Through this strengthened cooperative framework, AIST will further deepen its collaboration with research institutions and industry in Japan and overseas, and will support the social implementation and international standardization of quantum technologies by sharing reliable measurement technologies and data.



Reference:

<https://nmi-q.org/>

[https://www.mofa.go.jp/mofaj/pageit\\_000001\\_02025.html](https://www.mofa.go.jp/mofaj/pageit_000001_02025.html)

## Research report conducted at the BIPM

### **-Development of an ionization current measurement system for updating the International Reference System (SIR 2.0) for activity measurements of gamma-ray emitting radionuclides-**

I stayed at the Bureau International des Poids et Mesures (BIPM) from January 2025 to July 2025, as a secondee, to develop an ionization current measurement system for updating the International Reference System (SIR 2.0). The original SIR was established in 1976 at the BIPM to complement international comparisons for activity measurements of gamma-ray-emitting radionuclides. In the SIR, a well-type ionization chamber is used to measure the radioactivity of a gamma-ray-emitting radionuclide. I developed



From left, Mr. Adrien Kiss, Mr. Manuel Nonis, Dr. Takahiro Tanaka, and Dr. Carine Michotte with the SIR 2.0 (right) at the BIPM.

a new ionization current measurement system for this SIR 2.0. A careful noise reduction technique is required because the ionization current produced by the SIR 2.0 well-type ionization chambers is in the range of femtoamperes ( $10^{-15}$  A) to picoamperes ( $10^{-12}$  A). I achieved precise measurements at sub-picoampere levels and demonstrated the potential for comparisons at five times lower activity levels. I look forward to the launch of the SIR 2.0 in the future. I would like to express my sincere gratitude to the many people who supported the realization of this research.

Reference:

[https://www.linkedin.com/posts/bipm\\_bipm150-ionizingradiation-radioactivity-activity-7354054048448188416-gsyS](https://www.linkedin.com/posts/bipm_bipm150-ionizingradiation-radioactivity-activity-7354054048448188416-gsyS)

## **Report on the Varenna Summer School on Metrology (BIPM Summer School)**

This report summarizes participation in the Varenna Summer School on Metrology, which was held in July 2025 in Varenna, a town on Lake Como in northern Italy. The school was the 217th course offered by the Scuola Internazionale di Fisica “Enrico Fermi,” an international physics school established in 1953 by the Società Italiana di Fisica (SIF). The official title of the course was “Future Needs for Metrology: Climate Science, Quantum Technologies and the Digital Transformation.”

The program brought together about 50 young researchers and graduate students from national metrology institutes and universities around the world. Two researchers from NMIJ participated and attended lectures over the seven-day program. The lectures covered a wide range of topics, from fundamental aspects of measurement science to the latest developments in metrology. Highlights included a lecture by BIPM Director Martin Milton (at the time) on the history and revision of the SI, as well as presentations on on-chip metrology, demonstrations of quantum computing technologies, and advances in nuclear clocks.

The school provided a valuable opportunity to engage in international discussions on metrology and to recognize both the breadth and depth of current research in this field.



## Visit by the President of the Physikalisch-Technische Bundesanstalt (PTB)

From February 16 to February 17, 2026, Prof. Dr. Cornelia Denz, President of the Physikalisch-Technische Bundesanstalt (PTB), Germany, visited NMIJ. On February 16, Dr. Denz first visited the Liquid Flow Standards Group at an NMIJ facility at the North Site, where an active exchange of ideas took place. Afterwards, a visit to the High Energy Accelerator Research Organization (KEK) was carried out, where Dr. Denz had active



Group photo at NMIJ, AIST

idea-exchanges with researchers on some of the newest research equipment. On February 17, Dr. Denz gave a presentation entitled "Next Generation Metrology: Strategic Perspectives for Research, Industry, and Legal Metrology", and visited several NMIJ laboratories, including the Mass Standard Research Group, the Quantum Electrical Standards Group and the Optical Metrology-related Group. The visit provided fruitful exchanges of ideas and opportunities for future collaboration between the organizations, especially in physics-related fields.

## Visit by the Domain Manager from the Federal Institute of Metrology Switzerland (METAS)

On March 16, 2026, Dr. Ulrich Schlapbach, Domain Manager of the Federal Institute of Metrology (METAS), Switzerland, visited NMIJ. During his visit, Dr. Schlapbach visited several NMIJ laboratories, including the Photometry and Radiometry Research Group, the Applied Optical Measurement Group, the Mass Standards Research Group, the Force and Torque Standards Research Group and the Length Standards Research Group. The visit provided fruitful exchanges of ideas and opportunities for future collaboration between the organizations, especially in fields related to optical measurement, mass standards, force-torque standards, and length standards.



Group photo at NMIJ, AIST

## Visit by the CEO of the National Physical Laboratory (NPL), United Kingdom



Group photo at NMIJ, AIST

On March 19, 2026, Dr. Pete Thompson and Dr. Cyrus Larijani, CEO and senior research scientist, respectively, of the National Physical Laboratory (NPL), the United Kingdom, visited NMIJ. Several NMIJ laboratories, including the Quantum Electrical Standards Group, the Radio-Frequency Standards Group, the Thermometry Research Group, and the Time Standards Research Group hosted visits for both delegates. Active conversations between the delegates and researchers from the host laboratories made this visit fruitful and provided opportunities for future collaboration.

## Visit by the Director of the Bureau International des Poids et Mesures (BIPM)

On May 11 and May 12, 2026, Dr. Annette Koo, Director of the Bureau International des Poids et Mesures (BIPM), visited NMIJ. On May 11, after participating in a presentation by NMIJ on its Metrology DX Activities, Dr. Koo gave a presentation entitled “BIPM Priorities and Its Relationship with Japan” and afterwards visited several NMIJ laboratories, including the Mass Standard Research Group, the Quantum Electrical Standards Group, the Applied Optical Measurement Group, the Photometry and Radiometry Research Group, the Time Standards Research Group, and the Organic Primary Standards Group, to actively exchange ideas with the researchers in charge.

On May 12, accompanied by Dr. USUDA, Dr. HOSAKA and Dr. AKOSHIMA from NMIJ, Dr. Koo paid a courtesy visit to the Metrology Policy Office of the Ministry of Economy, Trade and Industry (METI), and the AIST Tokyo Headquarters. This two-day visit has been a significant contribution to building a strong foundation for future cooperation.



Group photo at NMIJ, AIST

## 21st NMIJ-KRISS Summit

NMIJ and Korea Research Institute of Standards and Science (KRISS) participated in the 21st NMIJ-KRISS Summit, held on June 27, 2026, in Kyoto, Japan. This summit commemorated the 25th anniversary of the first MOU between both institutes and highlighted the long-standing cooperation between KRISS and NMIJ.

In this meeting, six delegates from KRISS, and seven from NMIJ, were involved in discussions on four topics: AI for Metrology in the National Metrology Institute of Japan, Overview of AI Technologies Applied to Metrology Techniques at KRISS, SMEs Support through Metrology: NMIJ & AIST Approach, and Introduction to KRISS SME Support Program. An update to the Cooperation Package was also made. Both institutes agreed to initiate a new collaboration in quantum resistance standards and to continue most of the ongoing collaborations. On June 28, 2026, delegates from NMIJ and KRISS participated in a company tour to the Technology Research Laboratory, SHIMADZU Corporation, to visit the first commercially available optical lattice clock in the world. Delegates from both institutes then visited the HORIBA TECHNO SERVICE for some laboratory visits in the Analytical Solution Plaza.



The world's first commercially available optical lattice clock (foreground), KRISS Lee President (left), Usuda Director General (center), and Shimadzu Corporation Nishimoto Managing Executive Officer (right).



Visit to HORIBA TECHNO SERVICE, Co., Ltd.



Group photo at Summit Site

# Organization and management team of NMIJ

NMIJ is composed of four Research Institutes: Engineering Measurement (RIEM), Physical Measurement (RIPM), Material and Chemical Measurement (RIMCM), and Measurement and Analytical Instrumentation (RIMA), Center for Quality Management of Metrology (CQMM), Research Planning Office of NMIJ and Collaboration Promotion Office of NMIJ.

The important missions of NMIJ are to develop, maintain and disseminate measurement standards, and to conduct research and development of measurement technologies, both of which are the areas being expected to make remarkable progress as an infrastructure for industrial science and technology.



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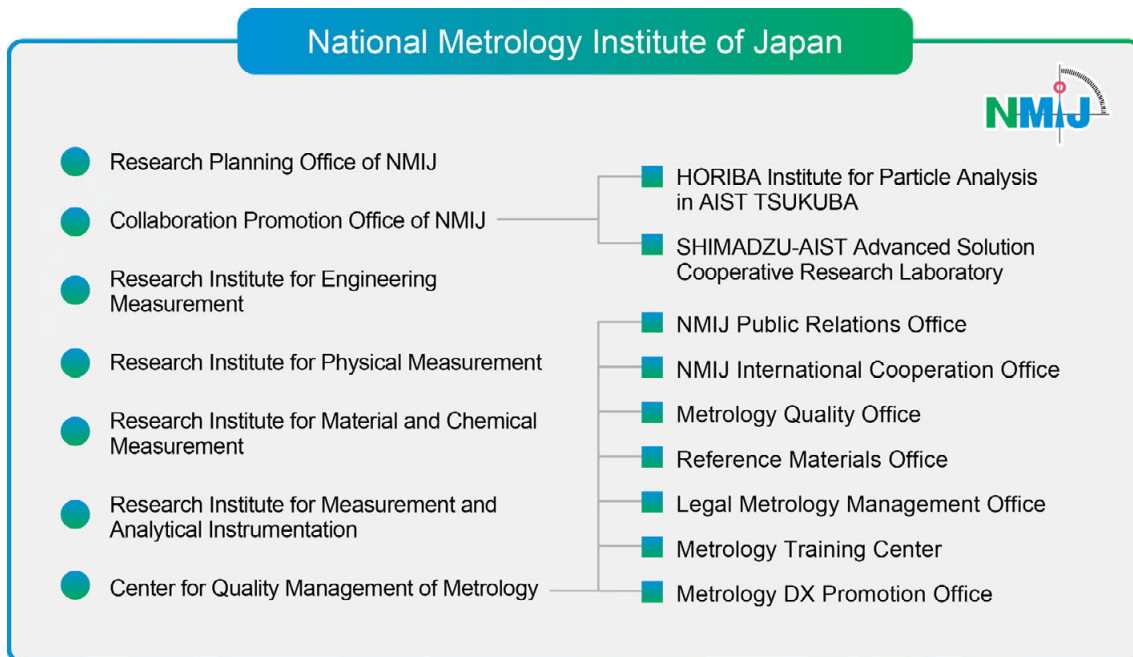
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