KOKEN LTD.

2019 2

先端研究の分野に広がる KOACH

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公益財団法人かずさDNA研究所
東京大学宇宙線研究所 重力波推進室

実際の作業者の呼吸波形を用いた

電動ファン付き呼吸用保護具の防護性能に関する研究

花粉症に役立つセルフケア

顔に密着できるマスクで花粉を防ぐ

No.721

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KOACH Case Studies Archive

The KOACH is becoming widely used in the advanced research fields.

Continuing from the previous special topic in December, 2018, we will report once again the widespread use of the KOACH in the research fields. In particular, we will present the points of why these researchers have decided to introduce the KOACH and what benefits they have received.

What we will introduce to you this time are:

- Kochi Institute for Core Sample Research, the Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
- Genome Research Development Department, Kazusa DNA Research Institute
- Gravitational Wave Project Office, Institute for Cosmic Ray Research, the University of Tokyo

Case 1

Case 1 Kochi Institute for Core Sample Research, JAMSTEC

Studying "cores," the sediment samples taken from the deep subsea floor to explore the unknown biosphere there.

"An open and bright clean room we have never seen before has come into reality."

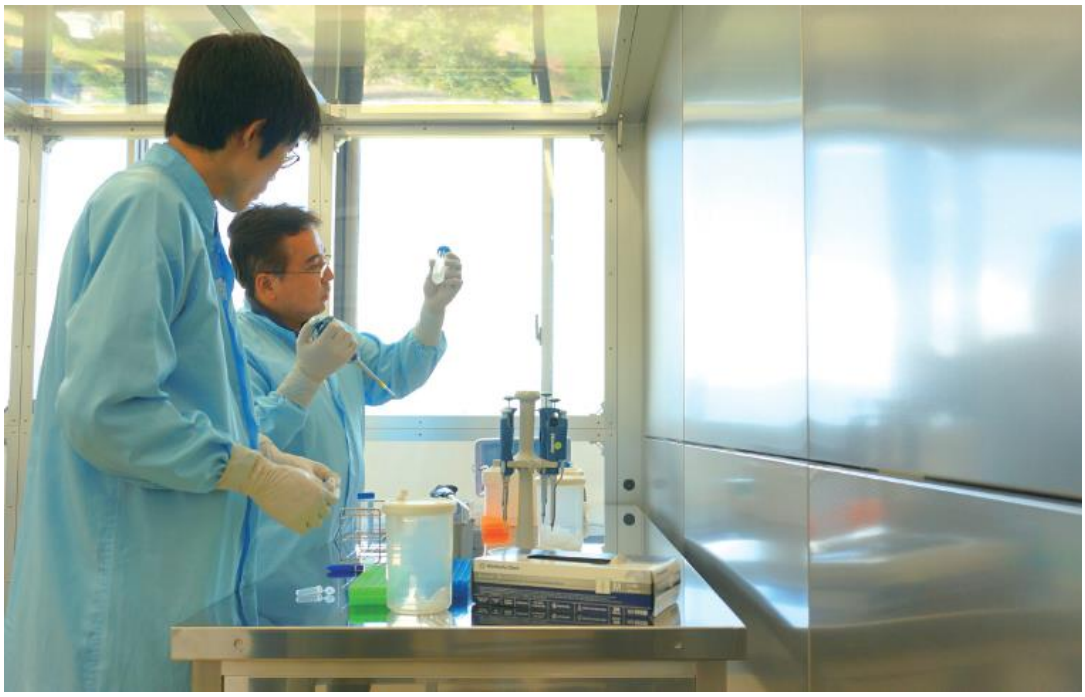
Dr. Yuki MORONO
Senior Researcher and Deputy Group Leader
of Geomicrobiology Group,
Kochi Institute for Core Sample Research

A new laboratory was established to study microorganisms under better conditions than before. To provide a clean space necessary for handling the core samples taken from the extreme environments on Earth, the Floor KOACH has been introduced.

It is essential to prevent airborne microorganisms in the atmosphere from contaminating the sample.

Being capable of capturing as small particulates as airborne DNAs with its high performance filter, the Floor KOACH will prevent such contaminants from recirculating into a clean area or a laboratory. Dr. Morono said that the performance provided by the Floor KOACH was what he wanted to have in his new laboratory. He also said, "When conducting an experiment on the "core" samples taken from under the sea, even if we can detect a new microorganism, we will not be able to evaluate properly the environmental conditions under which it lived unless the experiment is conducted in a super clean environment that is not affected entirely by microorganisms or DNAs floating in the air.

Also, a probable contamination may damage the scientific reliability of research results. Thus, it was essential to provide a completely clean environment where external influence is suppressed to a minimum."



Purified air generated by a push hood (as pictured on the right) flows toward the opening on the left. By placing the lab bench close to the push hood and making workers accessing it from the airflow's downstream side, adverse effects of particles generated by the workers on experiments can be minimized.

Floor KOACH was introduced because of its air purification performance and an open space concept.

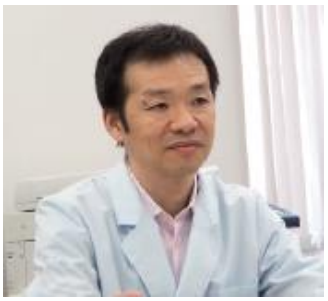
The fact that particles generated during operation can be swept away quickly was considered as an important issue when choosing a cleanroom. Dr. Morono said, "If particles are generated inside the conventional cleanroom, it is difficult for the level of cleanliness to return to its original level, creating suspicion about possible contamination to the sample. For a new laboratory, we wanted a clean environment where the level of cleanliness can be recovered quickly even if particles, microorganisms or their DNAs are generated during experiment."

The fact that it can form a clean zone in an open space without encircling it by walls is another key factor when choosing the Floor KOACH. "In the traditional cleanroom which is surrounded by walls on the four corners, workers sometimes feel confined. Confined space may cause mental stress on workers and reduce working efficiency. To solve this problem, we wanted to create a cleanroom that will give 'a sense of brightness and liberating expansiveness' by introducing the Floor KOACH that consists of the transparent guide screens. Elementary and junior high school children who come to visit our facility can see our researchers working inside the laboratory through the guide screens. This helps them to understand our research activities more easily, which was not possible in the traditional cleanroom," said Dr. Morono.

Case 2

Kazusa DNA Research Institute Department of Applied Genomics
With its focus on DNA sequencing technology it offers analysis of genes, genomes, and biomolecules in general on the contract basis.

"We can obtain reliable data efficiently with help of the KOACH."



Mr. Yoshinori HASEGAWA,
Leader of Genetic Analysis Team,
Clinical Omics Analysis Group of the Department of Applied Genomics

"KOACH does not harm workability and can improve analytical accuracy."

In order to respond to the increasing demand to analyze gene expression information more accurately we can provide "single cell RNA seq" services. Unlike DNA, RNA is very fragile and can be destroyed easily by even RNA-splitting enzymes derived from airborne bacteria or particles. Therefore, when analyzing RNA in a small volume, you need to pay special attention to the working environment by purifying it using a clean bench. Our first impression of the demo model we borrowed was that workability was excellent because the workspace was not encircled by walls. The purified airflow travels horizontally at a very low speed, so slow that workers inside do not feel air pressure. Unlike the conventional clean bench, there was no single case of trouble that a small amount of samples dries during the work.

We could reduce the number of unanalyzed samples significantly after the introduction of the KOACH while in the conventional clean bench we experienced the failure rate of about 10%. This was because (1) human errors do not happen any more due to the fact that workability was improved in an open work environment, (2) no contamination happens due to the fact that a level of cleanliness was improved and (3) drying of samples were suppressed. As a result of these factors, we think that we have achieved the improvement of our analytical accuracy.

The KOACH, which does not harm workability due to its open structure, helps improve analytical efficiency and accuracy.

Easy relocation is a big advantage of the KOACH.

As we expected the number of analyses to increase and more clients would request for our analytical services, we believed that there would be more cases where we had to conduct more than one analytical work that should be normally avoided in the same laboratory. The KOACH is portable and can form a clean environment in a short time. Thus, as long as a room is available, you can conduct an analytical work anytime and anywhere.

Now that we have obtained ISO Class 1 clean environment at our laboratory, with more confidence than ever, Kazusa DNA Research Institute is now in a better position to provide analytical results to customers and we believe that we have realized the increased expectations and trust of our customers.

Case 3

Institute for Cosmic Ray Research, University of Tokyo
Gravitational Wave Project Office

KAGRA- A Large-Scale Cryogenic Gravitational Wave Telescope to try to detect gravitational waves

"KOACH provides a super clean environment absolutely necessary for cutting-edge technology to support KAGRA project."

Mr. Eiichi HIROSE
Project Assistant Professor of Gravitational Wave

Clean Environment Necessary for KAGRA Project

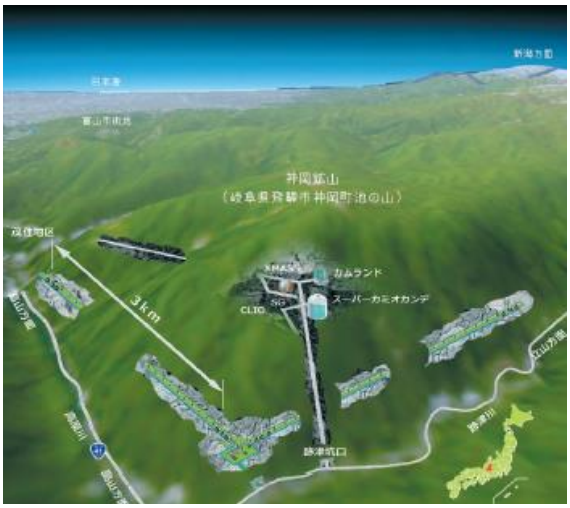
A Large Scale Cryogenic Gravitational Wave Telescope nicknamed "KAGRA" was constructed in the Kamioka mine in Kamioka-cho, Hida-city, Gifu Prefecture. In a mine there is very low seismic noise and temperature and humidity is stable.

A gravitational wave telescope utilizes a wavelength of the laser light source as a measuring scale to measure changes in length. A tiny amount of dust on the detector may cause instability of the wavelength of the laser. Therefore, a clean environment is absolutely necessary inside the tunnel where the detector is installed.

Anxiety Removed by KOKEN's Quick Response

The clean environment at the laboratories for gravitational waves that I observed in the US was not satisfactory. On the other hand, clean rooms that are installed at semi-conductor factories are too big in structure to be built inside the tunnel site for "KAGRA" project. "KOACH" caught my attention when I entered an Exhibition Hall. After the exhibition, I received a follow-up contact from Koken who subsequently responded without delay to my questions and concerns. The responses were

supported with convincing data and were enough to relieve my concern. It was useful when I tried to persuade a decision maker for his approval.



KAGRA

What are Accomplished by Introducing the KOACH.

With the introduction of the KOACH, we could review the entire work environment and make a significant change in our mind-set. Since its installment we have been running the Floor KOACH Ez around the clock and we have found no problem in cleanliness. And, its trouble-free maintenance to keep the room clean all the time is fantastic. When contamination occurs in the clean zone, almost immediate recovery of cleanliness can be expected, which is a strong point of “KOACH”.

The ultimate role of KOACH is to create a clean environment in the tunnel site. The tunnel site, whose environment is entirely different from that of the office site in terms of particle counts and humidity, requires much severe conditions. Creation of a clean environment will become a key to succeed in detecting gravitational waves.

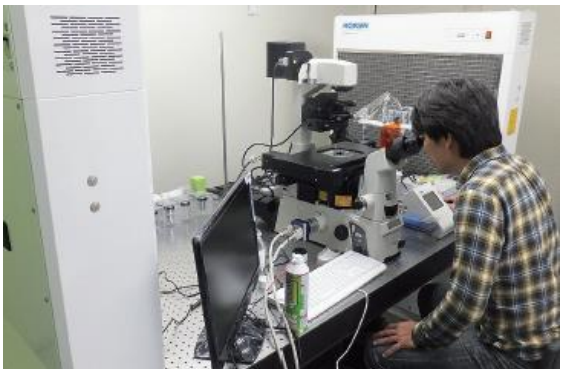
A List of Research Institutes Which Have Adopted the KOACH

Hokkaido University	Research Center for Zoonosis Control
	Research Institute for Electronic Science
Iwate University	Faculty of Agriculture
Tohoku University	Advanced Institute for Materials Research (AIMR)
	Institute of Multidisciplinary Research for Advance Materials
	Institute of Fluid Science
	Tohoku Medical Megabank Organization
Yamagata University	Department of Biochemical Engineering
Fukushima Medical University	Fukushima Global Medical Science Center
Saitama University School of Engineering	Department of Functional Materials Science
Keio University School of Medicine	Department of Physiology
	Institute for Advanced biosciences
Chuo University	Faculty of Science and Engineering
Tokyo Institute of Technology	Department of Applied Chemistry Graduate School of Science and Engineering
	Department of Materials Science and Engineering
	Laboratory for Chemistry and Life Science, Institute of Innovative Research
The University of Tokyo	Institute for Cosmic Ray Research, KAGRA Project
	Department of Medical Science, Functional Biology, Photon Science Center
	Institute for Quantitative Biosciences
Tokyo University of Agriculture	NODAI Genome Research Center
Waseda University	Waseda Institute for Advanced Study
	School of Advanced Science and Engineering
	Research Organization for Nano & Life Innovation
Nihon University	Department of Marine Science and Resources
JAXA	Department of Spacecraft Engineering
	Department of Interdisciplinary Space Science
Kazusa DNA Research Institute	Department of Applied Genomics, DNA Sequencing Team
High Energy Accelerator Research Organization (KEK)	Accelerator Laboratory
	Institute of Particle and Nuclear Studies
National Institute of Polar Research	Transdisciplinary Research Integration Center
National Center for Child Health and Development	Department of Genome Medicine

The National Astronomical Observatory of Japan	
The National Institute of Advanced Industrial Science and Technology	National Metrology Institute of Japan
	Research Center for Photovoltaics
	Spintronics Research Center
National Agriculture and Food Research Organization	National Food Research Institute
Natural History Museum and Institute, Chiba	Molecular phylogeny and evolution/molecular ecology
Japan Atomic Energy Agency	Sector of Nuclear Science Research, J-PARC Center
	Aomori Research and Development Center (IFMIF)
National Institute for Materials Science	Center for Green Research on Energy and Environmental Materials
National Institute of Technology, Nagaoka College	Department of Mechanical Engineering
University of Toyama	Instrument Analysis Facility
University of Yamanashi Hospital	Clinical Trial Management Office
Shinshu University	Dept. of Electrical and Electronic Engineering
Shizuoka University	Innovative Photonics Evolution Research Center
Nagoya University	Department of Physics
Knowledge Hub Aichi	Development of technology relating to early stage diagnosis
National Institutes of natural Sciences	Department of Technology
	National Institute for Basic Biology
The Wakasa Wan Energy Research Center	R & D Department, Biological Resources
Fujita Health University Hospital	Institute for Comprehensive Medical Science
Kyoto University	Faculty of Engineering
	Center for Ecological Research
	Center for iPS Cell Research and Application (CiRA), Genomics and Epigenomics Core Facility
	CiRA, Dept. of Cell Growth and Differentiation
	Institute for Frontier Medical Sciences
Osaka University	Graduate School of Engineering
Hyogo College of Medicine	The Institute of Experimental Animal Sciences
Hiroshima University	The Graduate School of Advanced Sciences of Matter
Yamaguchi University	Graduate School of Science and Engineering
Tokyo University of Science, Yamaguchi	Department of Pharmacy
The University of Tokushima	Biological Science and Technology
Kyushu University	Medical Institute of Bioregulation

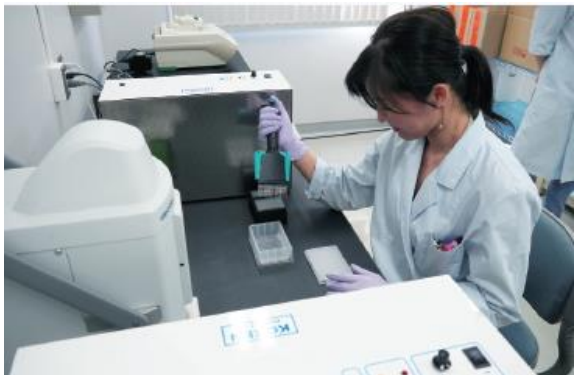
Kumamoto University	Former Faculty of Life Sciences
	Faculty of Life Sciences
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	Center for Marine Biosciences
	Research and Development Center for Submarine Resources
	Department of Subsurface Geobiological Analysis and Research
	Kochi Institute for Core Sample Research, Geomicrobiology Group
	Former Geomicrobiology Group
	Center for Deep Earth Exploration
Ministry of the Environment	National Institute for Minamata Disease
Okinawa Institute of Science and Technology Graduate University	DNA Sequencing Section

Chikyu-the Center for Deep Earth Exploration's Scientific Drilling Vessel, JAMSTEC



Advanced ICT Research Institute, National Institute of Information and Communications Technology

High Performance Computing Infrastructure, RIKEN



Department of Applied Genomics, Kazusa DNA Research Institute