KOKEN LTD.

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KOACH INFORMATION

"What made us decide to choose the Table KOACH is its superior workability that enables workers to perform analytical work in an open space without interference."
--Integrated Institute for Regulatory Science, Research Organization for Nano & Life Innovation, Waseda University

Integrated Institute for Regulatory Science of Waseda University was using clean benches to prevent contamination when conducting single cell isolation and adjusting the extraction and amplification reaction of DNA by reagent. Researchers had a hard time in working under a clean bench environment due to poor workability and could not achieve research results that they wanted. After the introduction of the KOACH T500-F, which can form a clean local zone in an open space, however, all such problems were solved at once and they are now promoting innovative research aggressively.

Researchers crossing different areas of expertise at the Research Organization for Nano & Life Innovation, Waseda University

Research Organization for Nano & Life Innovation, Waseda University was established in 2015 to perform both research and education in nanotechnology, spanning multiple disciplines crossing different areas of expertise, including environment, energy, medicine and telecommunications.

It consists of seven research institutes with a gathering of more than 300 experienced researchers, including engineers from private companies and researchers and graduate students from other universities. It is now engaged in more than 20 large public research projects together with collaborative projects with companies and other contracted projects.

Integrated Institute for Regulatory Science that studies risks associated with environment, medicine, health and food.

Integrated Institute for Regulatory Science is one of 7 institutes of the Research

Organization for Nano & Life Innovation. It studies on risks and management of chemical compounds, biological specimens and pharmaceutics. It focuses on 3 core research fields, one of which is bioscience engineering research: It analyses the genome information of microorganisms and animals at their single cell level.
In addition, in collaboration with Computational Bio Big-Data Open Innovation Laboratory, AIST-Waseda University (CBBD-OIL), the Institute shares cutting-edge single cell analytical technologies and related data and are conducting R&D activities with the aim at contributing to the understanding of causal mechanism of various diseases and ultimately-personalized medicine.

INTERVIEW

INTERVIEW with Dr. Masahito HOSOKAWA

Dr. HOSOKAWA is an expert on single cell genomics in bioscience engineering research at Research Organization for Nano & Life Innovation.

Single cell genomics requires a clean environment.

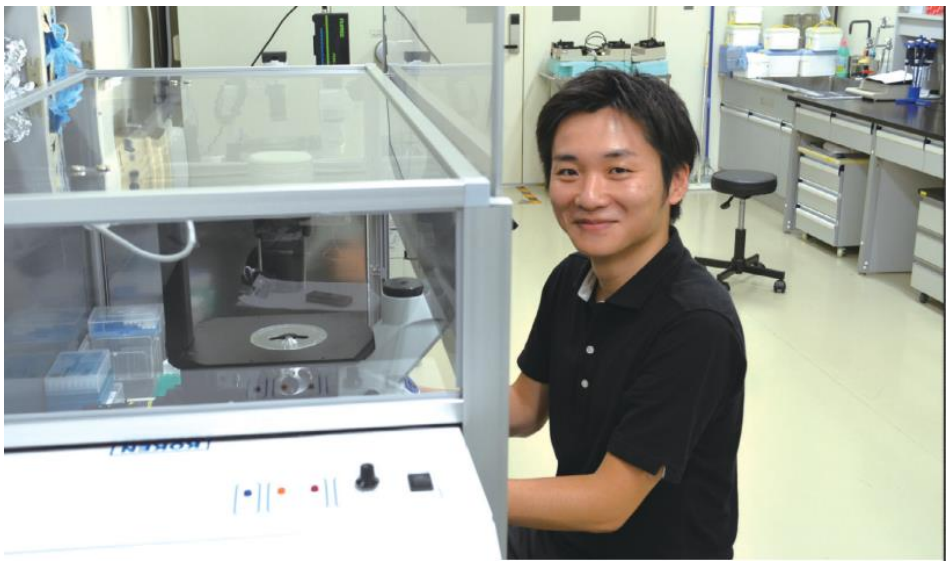
The Integrated Institute for Regulatory Science is now trying to create an innovative technology platform for integrated single cell analysis.

I am engaged in a research project for single cell analysis in the “creation of innovative technology platforms for integrated single cell analysis” sponsored by Japan Science and Technology Agent (JST)’s PRESTO program. In this research project I am trying to

develop an innovative technology to measure even subtle differences in the genome sequence of each single cell in order to identify characteristics of each one of diversified cells contained in a living tissue. If this is achieved, we can evaluate exactly what causes abnormality on the genome of each human cell if people become ill, which may lead to the development of better treatment and medicine.

Jointly with Prof. Haruko TAKEYAMA, director of Integrated Institute for Regulatory Science, I am now engaged in JST-CREST sponsored project of "Establishment of Core Technology for the Preservation and Regeneration of Marine Biodiversity and Ecosystems." In this project I am studying how symbiotic microorganisms are affected by changes in the health conditions of coral reefs and climate changes in general by finding out the genome information on the microorganisms that live in symbiosis with the coral reefs in Okinawa. Although there are various types of microorganisms in nature, we can identify characteristics of each microorganism accurately through single cell analysis.

An actual single cell genomic analysis requires us to isolate an individual target cell from a sample population and draw DNA. If a target cell is contaminated with other DNA or bacteria during this process in the experimental environment, we cannot obtain accurate data. To prevent this from happening, a clean experimental environment is absolutely necessary.



Dr. Masahito HOSOKAWA, Researcher of JST's PRESTO program at Research Organization for Nano & Life Innovation, Waseda University.

In consideration of workability and work content, clean bench was not sufficient.

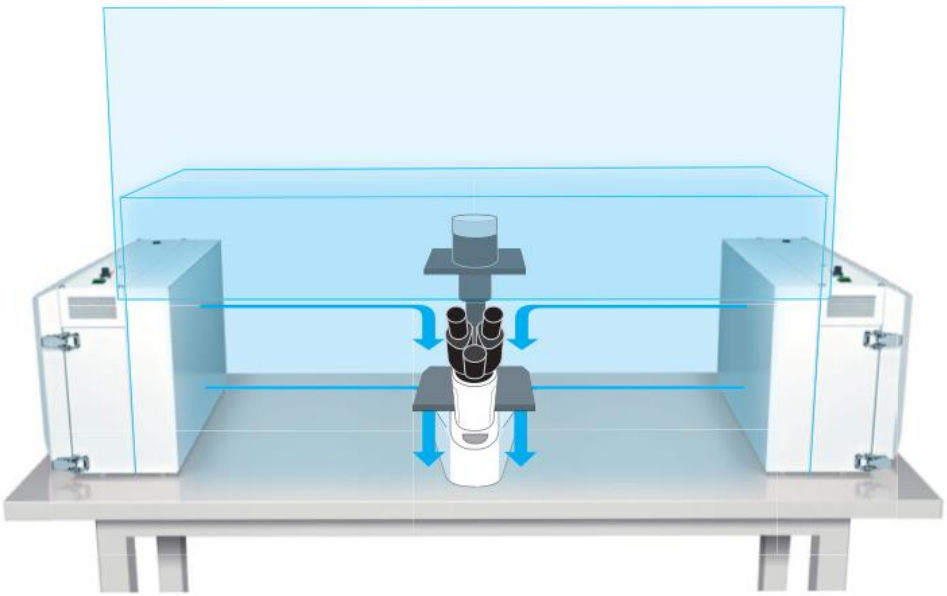
We used a clean bench provided in the laboratory when there was a work to do that required a clean environment. This was before the commencement of a single cell genomic analysis. At the time of beginning a single cell analytical research we have come to think that a clean bench is not suitable for single cell genomic analysis because a clean bench is not a device to form a clean environment in a space where a work is done by observing through a microscope. In my study we extract a cell from the petri dish by observing through a microscope and turn it over to the reaction solution manually. To increase workability, we have to fully open a frontal glass door of the clean bench, which allows contaminated air to flow into the interior. As a result, the work space cannot be maintained at a high level of cleanliness, resulting in a poor experimental result.

KOACH maintains a high level of cleanliness in the work area in spite of the front aperture being fully opened.

When we began our single cell genomic study we investigated experimental environments of other researchers. We found out that many researchers improved the accuracy of their experiments and produced good results by introducing the KOACH for contamination control.

Immediately we tested the performance of a demonstration model. It was confirmed that in only several tens of seconds after the power switch was turned on, a particle counter placed in the work area showed zero value. I was surprised to know that a cleanliness was recovered in a short period of time after I contaminated the air on purpose. The performance of the KOACH, a new clean device with unprecedented mechanism, was as good as that specified in its catalog. The principle that a space between a pair of units facing with each other is purified was quite convincing.

We reproduced the experimental work by actually using a microscope and it was found out that the door of the hood with protective canopy to prevent falling objects from entering into the interior did not interfere with the move of the hands when turning over a cell to the petri dish by observing it through a microscope because the door was wide enough. Also, it was confirmed that the air was maintained at a high level of cleanliness during the work. We decided to introduce the Table KOACH right away.



A High Level of Cleanliness can be Maintained Even in an Open Space

The airflows discharged from a pair of the push hoods that are placed directly opposite to each other collide at the middle and are pushed out into the outside of the clean area. Even if there is a generation of contaminants within the clean area during work, they are exhausted immediately so that the necessary level of cleanliness can be maintained during work.

KOKEN: You have noticed various benefits after the introduction of the KOACH?

Benefit 1: Time spent preparing for work is shortened.

When conducting an experiment in a clean bench, residual contaminants, if you did not clean up the clean bench completely, may have affected the experiment and a satisfactory result may not have been achieved. It is a painstaking and time-consuming task to clean up the whole interior of a clean bench, resulting in the decrease of the actual time for an experiment. The Table KOACH, including the falling object prevention hood, is easy to clean up and the time spent preparing for work was reduced.

Benefit 2: Work efficiency is improved because there is no worry about reagent contamination.

Reagents are not usually used up for one experiment only but are divided into small portions for several experiments. If half-used reagents are contaminated, residual

reagents may also be contaminated and a satisfactory result may not be achieved. Furthermore, whether the residual reagents are contaminated or not may not be certain until the experimental results are obtained. It could be possible to find out that the whole reagents are contaminated after having produced dozens of samples.
This may require us to do an experiment over with a new reagent. This must be a waste of time and money. Since the introduction of the Table KOACH, there has been no redoing of an experiment because there has been no contamination of reagents. Research efficiency is improved since unnecessary experiments are not performed.

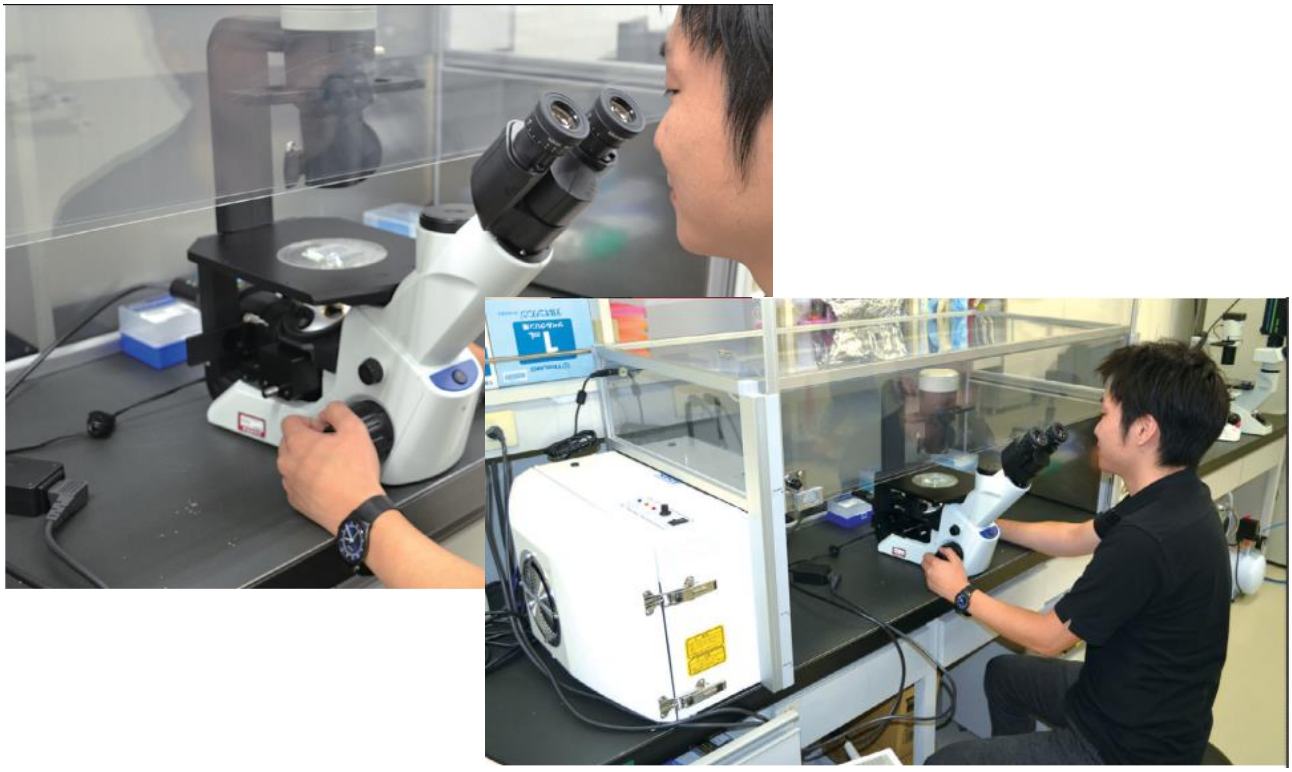
Benefit 3: Excellent experimental results are produced because both the level of cleanliness and the exhaust capability are high.

Even in an ISO Class 5 clean bench zero value may appear when measuring the number of contaminants of 0.3 μ m in size by a particle counter. In spite of this, test results varied sometimes but we did not know what caused these variations. In contrast, very stable test results have been obtained in an ISO Class 1 clean environment provided by the Table KOACH. The difference is obvious.

The Table KOACH can provide a much higher level of cleanliness than the conventional clean bench and also can quickly discharge contaminants that are generated inside or brought into from the outside.

It is, indeed, very important to maintain the air in the workplace at a high level of cleanliness during work, which, we have found out, makes a huge difference in experimental results.

Initially, we decided to install the KOACH because we were attracted to the benefit of its superior workability. However, while using it, we have come to realize various other benefits and we are able to achieve accurate experimental results consistently.



▲ When using a protective canopy to avoid falling objects, the working area can be maintained at a high level of cleanliness even if the front sliding aperture is fully opened, which will allow the freedom of movement of an operator.
(On the left side)

▲

Workability is said to be improved because there is no need to change into cleanroom clothes.
(On the right side)

INTERVIEW

INTERVIEW with Prof. Haruko TAKEYAMA
Prof. TAKEYAMA is Director of the Integrated Institute for Regulatory Science, and Prof. of Department of Life Science and Medical Bio-Science, Waseda University.

We, at the Integrated Institute for Regulatory Science, are undertaking various new researches and studies that should be passed to the next generation. To do so, we are actively trying to look for new methods of analysis if there are and constantly reviewing our experimental environment to meet the requirements of the research contents and with the progress of the study.

Dr. Haruko Takeyama

For example, if you introduce a fixed system such as a cleanroom when a clean environment is needed for a certain study, the area of a laboratory cannot be freely changed in size according to the study contents. And as a matter of fact, a cleanroom cannot be relocated when a laboratory is moved to another location.

In this respect, the KOACH is very handy because it can not only provide a clean environment at a high level of cleanliness necessary for a single cell genomics just by placing it where it is needed but also be moved easily to another location where a clean environment is required.

I think that the feature of the KOACH that it can change a clean environment at will depending on the contents and progress of studies has a great impact on our research environment. It is a system that can solve the space problem faced by many research organizations in Japan. Not only that, isn't it an ideal clean device for research facilities who are taking on new challenges?

Profile of Research Organization for Nano & Life Innovation
Established: in 2015
Director: Prof. Hiroyuki NISHIDE