



Agilent Case Study: NovoCyte Flow Cytometer

Protecting Green Mountains and Clear Waters

Focusing on the frontiers of environmental toxicology, protecting the green mountains and clear waters

As the concept of “green mountains and clear waters are as valuable as gold and silver” becomes gradually ingrained in Chinese culture, environmental protection work is receiving increasing attention. The State Key Laboratory of Environmental Chemistry and Ecotoxicology (SKLECE) at the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, is at the forefront of international discipline development and targets the major needs of national environmental and health research. The group conducts in-depth and systematic research on the analysis methods, environmental chemical behavior, toxicology, and health effects of persistent toxic pollutants.

Professor Kang Yuehui is responsible for the environmental chemistry and toxicology instrument facility, which provides comprehensive instrument usage, reservation, maintenance, and support services for various research groups within the laboratory.

Accurate analysis, insight into the details

While meeting internal research needs, the facility is open to the public, including research institutes, enterprises, and other external organizations, to support research in science, engineering, and health related to the environment in China. This means the instruments are used frequently, so high quality and performance are essential when selecting instruments. His team handles the procurement, operation, and management of the facility's instruments. They also focus on developing common experimental methods to promote efficient scientific research. Professor Kang Yuehui has long focused on expanding the performance and methodology of environmental analysis instruments. His lab is the first research customer globally to use the Agilent NovoCyte flow cytometer.



Kang Yuehui , Ph.D.

Professor at The State Key Laboratory of Environmental Chemistry and Ecotoxicology (SKLECE) at the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences

NovoCyte flow cytometer drives environmental science towards a new future

Widely used to detect and analyze microorganisms and pollutants in water, high performance flow cytometers play a crucial role in environmental toxicology research. The impact of pollutants on cells can be assessed depending on high throughput and sensitivity, multiparameter capabilities, automation, data visualization, and flexibility.

"We needed a flow cytometer that was compact, yet powerful. Suitable for operation in biosafety cabinets or clean benches to meet the lab's special needs. Easy to maintain and durable," Professor Kang Yuehui expressed when discussing why the lab chose the NovoCyte flow cytometer among similar products. "Additionally, since users come from various academic disciplines, including science, engineering, agriculture, forestry, medicine, and materials, the instrument needed to have a simple interface and be easy to use. Considering these factors, the NovoCyte flow cytometer became the first choice."

The track record of the NovoCyte flow cytometer over the years in the lab has shown it excels in application flexibility and operational stability, with its usage often fully booked, meeting the lab's expectations.

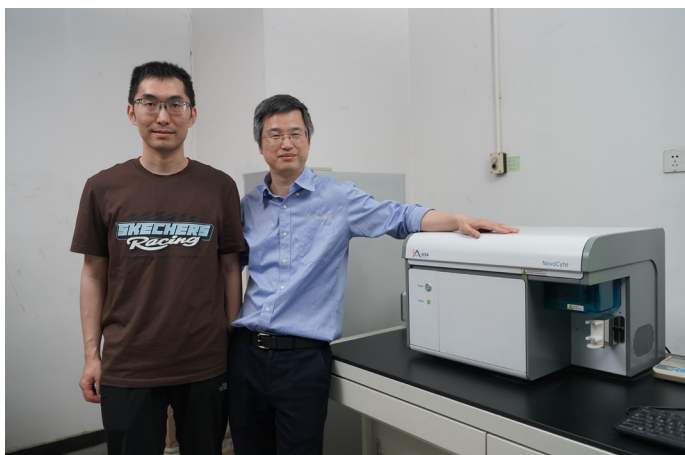


Figure 1. Rao Ziyu, MS (left), engineer at The State Key Laboratory of Environmental Chemistry and Ecotoxicology (SKLECE) and Eric Chen (right), technical marketing director at Agilent Technologies.

Versatile NovoCyte, enhancing research efficiency

NovoCyte shines at environmental microorganism detection. It helps evaluate the disinfection effect of water by detecting the live/dead ratio of bacteria in the environment and monitors the number of cyanobacteria to assess the degree of water eutrophication.

In recent years, SKLECE has achieved a series of original achievements with distinctive research features and having a significant impact in the academic community both domestically and internationally. The large amount of data produced by the NovoCyte flow cytometer has strongly supported these studies. "Whether it is routine toxicology tests, such as apoptosis and necrosis detection, mitochondrial membrane potential measurement, ROS detection, or cell viability assessment, NovoCyte can handle it all, becoming an indispensable helper for our researchers," said Mr. Rao Ziyu, a member in Professor Kang Yuehui's team.

Besides being a professional experimental tool, the NovoCyte flow cytometer also shows its unique value in routine experiments, capable of absolute cell counting without additional consumables. These functions provide crucial data to improve experimental efficiency and expedite research advancement.

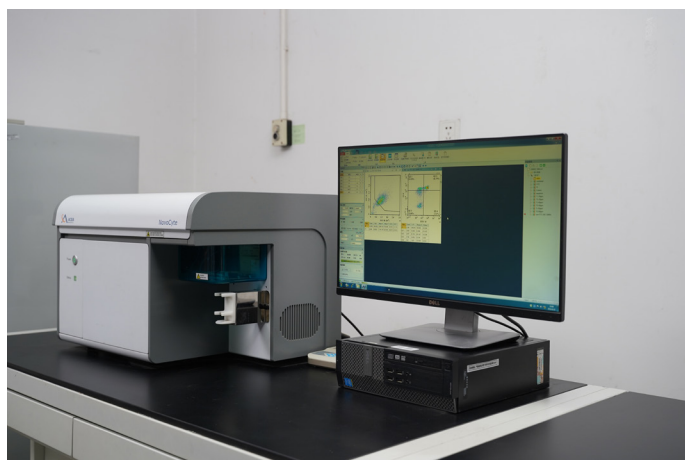


Figure 2. The world's very first NovoCyte flow cytometer. The NovoCyte flow cytometer featured in this case study was originally developed by ACEA Biosciences, Inc., now a part of Agilent.

Hardware and software synergy to increase lab efficiency

The Agilent NovoCyte flow cytometer is one of the most frequently used instruments in the environmental chemistry and toxicology instrument facility, not only due to its powerful performance and wide range of applications but also because its hardware and software design closely meets research needs.

The Agilent NovoExpress software design is extremely user-friendly, with clear logic and simple operation, improving experimental efficiency and user experience. The wide dynamic range on the NovoCyte allows beginners to easily identify and display target cell populations without complex gain voltage adjustments or other cumbersome steps, reducing operational difficulty and allowing novices to quickly and confidently get started conducting experiments. More impressively, NovoExpress software also has powerful image editing functions, allowing users to adjust fonts, colors, and other content directly within the software and export vector images while maintaining high resolution, ensuring image quality is not compromised. This means that data charts obtained from NovoCyte can be directly used in academic papers without additional image processing steps, greatly simplifying the process of organizing and publishing research results.

The integrated quick compensation function in the software makes fluorescence compensation adjustment intuitive and direct, effectively avoiding data bias caused by improper compensation settings and ensuring the accuracy of experimental results. Additionally, the cell cycle plot function provides researchers with intuitive flow cytometry cycle analysis results, facilitating immediate evaluation of experimental progress and optimization of experimental plans.

The startup and shutdown processes of the NovoCyte flow cytometer are also straightforward, with a one-button on/off design that eliminates lengthy preparation and finishing steps, saving valuable time and improving the continuity and efficiency of experiments. Whether it's pre-experiment preparation or post-experiment shutdown, complex operations are no longer needed, allowing researchers to focus more on the experiments themselves.

Over a decade of support

The work performed by Professor Kang Yuehui and Mr. Rao Ziyu vividly demonstrates Agilent's comprehensive ability to provide high-quality products and responsive professional services, highlighting its commitment to establishing long-term trust relationships with customers and becoming a solid partner for researchers. These factors have led to the high recognition of Agilent's products and services by SKELCE, which now owns two NovoCyte flow cytometers. In 2024, NovoCyte celebrated a decade of innovation and optimization. "Over the past 10 years, the NovoCyte flow cytometers have witnessed numerous achievements in laboratory research," stated Professor Kang Yuehui. Looking ahead, the group hopes to further deepen its cooperation with research institutions to jointly expand the cutting-edge applications of flow cytometric technology in environmental science, especially in the field of environmental toxicology, to meet the evolving research needs.

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