

Electronic Pipette

Aiding Accurate and High-Precision Tests

□ A lab worker using a conventional pipette

All images courtesy of ICOMES LAB Co., Ltd.

The pipette is a device widely used in laboratory settings to measure out or transfer small volumes of liquid. By leveraging technology used in its manufacturing of precision parts for cameras, a venture company from Iwate Prefecture in Japan successfully developed the smallest and lightest pipette in the world – an electronic pipette that reduces the strain on lab workers while also improving measurement accuracy.

SASAKI TAKASHI

The pipette is a laboratory tool used to draw up and dispense just the right small amount of liquid needed for a particular task. It is widely used in the fields of chemistry, biology and medicine, including most recently in PCR testing for novel coronavirus infection.

Pipettes can be divided into two broad categories: manual and electronic. Katano Keiji, the CEO of Icomes Lab Co., Ltd., has succeeded in developing the world's smallest and lightest pen-shaped electronic pipette, the "pipetty."

Working with Iwate University, Katano's company developed an

ultrafine drive assembly known as a "micro actuator," actuators being high-precision parts typically used

in SLR cameras and surveying tools.

"Our actuator, created by a process we developed ourselves,



□ The pipetty, a pen-shaped electronic pipette

has been highly praised due to its high functionality and low cost,” says Katano. “But a few years after the company was founded in 2003, I came to really want to sell an original product and offer more than just parts to manufacturers. That’s when our attention was drawn to pipettes.”

Currently, 95% of the pipettes used around the world are the manual type, which require the lab worker to repeatedly draw up and dispense the liquid by hand. To master this technique takes time. Moreover, pipetting can lead to repetitive-strain injuries such as tendonitis in the forearm and elbow.

The pipetty is roughly half the size of conventional pipettes, being 135 mm long and weighing 75 grams. It draws up and dispenses liquids electronically. The pipetty is held the same way as conventional pipettes, but while holding the device like a pen the lab worker can dispense the liquid at the press of a button. The device costs around one half to one third the cost of

conventional electronic pipettes.


“The actuator at the heart of the device has a diameter of 8 mm and a length of 10 mm, and it incorporates a 1-mm plastic gear among other parts. We are the only company that can mass produce such a small actuator. Without this technology, it would not have been possible to build the world’s smallest electronic pipette.”


In addition to improving task repeatability, the pipetty also overcomes the problem of hand-warming when pipetting, further increasing the accuracy of measurements. Heat from a research-

er’s hand can raise the temperature inside a pipette, fractionally reducing the volume of liquid that is drawn up and thereby lowering the precision of the dispensation. The pipetty features the world’s first function to detect internal pipette temperature and regulate the dispensed volume automatically.

The device debuted in 2013 and has received high praise from medical and research institutions in Japan and around the world. Katano was most pleased to hear from a researcher who was finally relieved of her tendonitis by switching from manual pipettes to the pipetty.

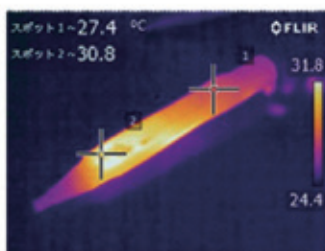
In April of this year, Katano’s company commenced sales of the Bluetooth-enabled pipetty Smart, which enables management of dispensation work processes including precise dispensation volumes for different tasks to be configured on a smartphone.

Katano’s creation not only reduces the workload for researchers, but also contributes to an improvement in the reliability of test and research results by aiding accurate work. Katano and his development team have found joy in this fact, and are focused on further development of medical and scientific devices. 

 At the heart of the pipetty technology are tiny micro actuators incorporating plastic gear technology co-developed with Iwate University

What Is Hand-warming?

Conventional pipettes are affected by “hand-warming” in which the heat of the hand is transmitted to the inside of the pipette, reducing dispensing accuracy.



Pipette heat measured by infrared thermometer