

On-chip Sort

По вопросам продаж и поддержки обращайтесь:

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On-chip Sort

The world's first cell sorter using a disposable microfluidic chip



On-chip Sort is manufactured by On-chip Biotechnologies Co., Ltd. and marketed in North America by PHC Corporation of North America, a subsidiary of PHC Corporation in Japan.

The Next Generation Technology for Innovative Research and Breakthroughs



From cell damage to contamination, our cell sorter solves the persistent problems of conventional cell sorting. We call it On-chip Sort.

Utilizing advanced microfluidic technology and micro-molding technology, the world's first "microfluidic chip-based sorting" technique was developed by On-chip Biotechnologies Co., Ltd. Cell sorting has never been easier than with this disposable chip based fluidic system. This evolutionary technology opens the door to new possibilities for scientific discovery.

	Conventional Sorter	On-chip Sort
Cell Damage	Sorter-induced cellular stress	Damage-free
Contamination	Possibility of cross- contamination	Sterile and contamination-free
Instrument Size	Commonly large	Small enough to fit inside a biosafety cabinet

Cell Size	Typically < 40µm	As large as 140µm
Sheath Fluid	Particular sheath fluid required	Choose from a variety of media

Bringing New Possibilities to the Forefront of Research and Innovation



From cell damage to contamination, On-Chip Sort helps to solve the problems found in the use of conventional cell sorters.

We call it On-chip Sort. Utilizing the advanced microfluidic technology and micro-molding technology, we have developed the world's first microfluidic chip-based sorter. Cell sorting has never been easier than with our disposable microfluidic chip-based system.

Innovation beyond a cell sorter is now here.

Damage-Free Sorting

Sorting of cells by conventional cell sorters following the jet-in-air method causes post-sorting cell changes (e.g., morphological changes, delayed cell growth, decrease in cell viability, and gene alterations) due to "sorter-induced cellular stress" (SICS, Lopez, P. (2018) CYTO2018). It is suggested that SICS is induced by the use of high pressure for sample manipulation, the large pressure differential inside and outside the nozzle, the use of electric charges to deflect droplets into the collection chamber, and high-speed collisions during collection. On-chip Sort, the world's first microfluidic chip-based cell sorter, uses a unique sorting mechanism to eliminate all of the damaging steps involved in the jet-in-air method to significantly reduce SICS. On-chip Sort is the solution to damage-free sorting of your valuable samples.

Sterile and Contamination-Free Sorting

Unlike conventional cell sorters, On-chip Sort is compact enough to fit inside a bio-safety cabinet. As On-chip Sort does not produce aerosols during sorting, it can accommodate biohazardous samples. In addition, the use of a disposable and sterilized chip as the core of its technology allows prevention of cross-contamination between samples.

Use of Any Sheath Fluid of Your Choice

In the On-chip Sort system, sample and sheath fluid flow through the microchannels by pressurizing air over the liquid. Only the target cells are isolated into the collection reservoir, and unsorted cells flow to the waste reservoir, downstream of the microchannel. Unsorted cells are also retained on the chip for further analysis and sorting if necessary. As this cell sorting mechanism works by regulating liquid flow inside the microchannels, the use of a wide variety of liquids for the sheath fluid is possible. For example, culture medium, sea water and oil can be used as the sheath fluid for the sorting of cells, marine organisms, and water-in-oil emulsion droplets, respectively.

Sorting of Large Particles

Conventional cell sorters use a nozzle in their sorting mechanism, which limits the size of cells that can be sorted. On-chip Sort, on the other hand, utilizes the full width and height of the channel, allowing for the sorting of cell clusters, such as spheroids, tissue microdissections, and organoids, up to 140µm in size.

Multi-step Sorting

With the use of our disposable microfluidic chip and the unique damage-free sorting technology, multi-step sorting can be performed using On-chip Sort to isolate a rare population of cells from a highly concentrated heterogeneous sample. Multi-step sorting works by using liquid pulses to deflect a target cell and its surrounding non-target cells into the collection reservoir during the first sort. During the second sort, the isolated cells are reintroduced into the sample reservoir and re-sorted to reduce the number of non-target cells and further enrich the sorted cells.

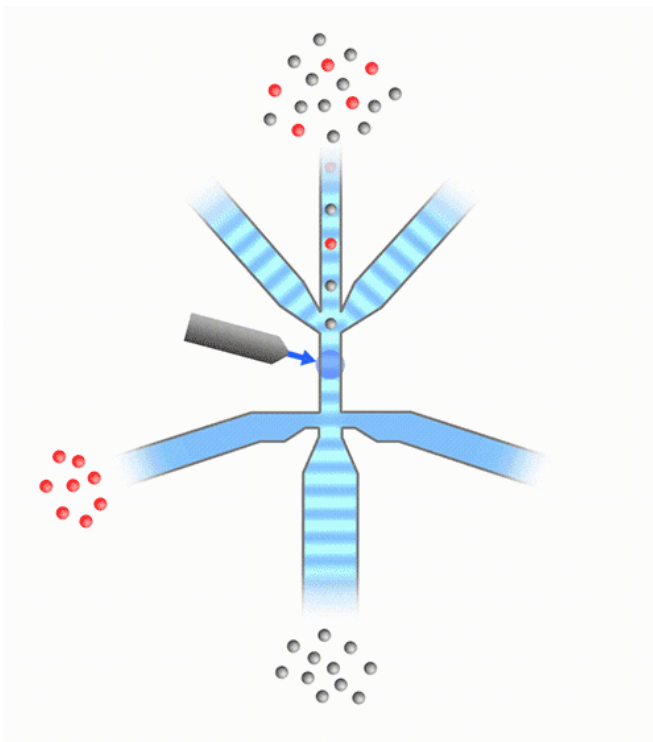
Easy and Maintenance-Free Operation

The operation of On-chip Sort is easy. Lasers are only turned on during analysis and sorting, so no warm-up time is required. The workflow involves loading the sample and sheath fluid onto the microfluidic chip, placing the chip into a chip holder, and then loading into the sorter. Sorting starts after a sorting gate is selected. As all the liquid on the chip is driven by air pressure, no liquid will be in contact with any part of the instrument. When the experiment is complete, you can simply dispose of the chip. On-chip Sort can be turned off without any washing or cool-down procedures.

The Evolution That Opens New Possibilities for Science



Air-over-liquid "Flow shift" method



On-chip Sort uses a small disposable microfluidic chip (with either 80 μm or 150 μm flow channel width) as the core of its technology. Sample and sheath fluid are loaded into the sample and sheath reservoirs on the chip, respectively. Unlike conventional cell sorters, that require a specific sheath fluid, On-chip Sort allows for the use of any sheath fluid appropriate for your cells (e.g., culture medium, fresh water, sea water, oil).

Cell sorting with On-chip Sort utilizes the 'flow shift' mechanism. When a detected target cell is in proximity of the sorting area, a short liquid pulse is generated by pressurization of air to deflect the target cell into the collection reservoir. Non-target cells flow continuously to the waste reservoir. This sorting method does not involve the use of high pressure, nozzle, electric charges, or high-speed collision, which drive the inherent problems of other sorting techniques.

The Continuous Efforts to Move Your Research Forward

Sorting and Dispensing Technology

04



**Microfluidic Chip Cell Sorter
"On-Chip Sort"**

The revolutionary cell sorter that uses disposable microfluidic chips for damage-free and sterile sorting.



**Single Cell Plate Dispenser
"On-Chip SPiS"**

Cell dispenser for accurate and gentle single cell plating into 96 or 384 well plate.

Sorting Technology:

Jet-in-air or Cuvette hybrid cell sorters have multiple processes that trigger sorter-induced cellular stress (SICS). On-chip Sort allows for much gentler sorting of cells compared to conventional sorters due to the use of the microfluidic chips.

Dispensing Technology:

The operation of On-chip SPiS is straightforward. It has a built-in auto-dilution function to adjust the sample to its optimal concentration. A very small aliquot ($<0.3 \mu\text{L}$) of the sample is aspirated by a dispensing pipette tip. A CCD camera counts the number of cells present in the aliquot by image recognition. When a specified number of cell(s) is detected, the aliquot is dispensed into a well of a 96- or 384-well plate. Otherwise, it is dispensed back into the sample tube (or discarded if necessary), and the instrument repeats this process until the number of cells match the specified cell count. On-chip SPiS ensures that almost every well contains the desired number of cells. On-chip SPiS plates single cells per well accurately and easily.

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