

Product Introduction

The DropletBot® Digital Microfluidic Platform is an open-source automation system utilizing Electrowetting-on-Dielectric (EWOD) principles and digital microfluidic (DMF) technology. By precisely modulating the surface tension, and therefore the contact angle, of discrete droplets on a hydrophobic surface, the system enables accurate manipulation of these droplets across an electrode array. This technology finds broad applications in various biological and chemical fields, including diagnostics, cell-based assays, and chemical synthesis. The DropletBot® features a modular design, an intuitive user interface, multi-channel driving capability, and integrated dynamic impedance sensing for real-time monitoring of droplet position, velocity, and electrostatic forces.



Application Areas

Automated Chemical Reactions

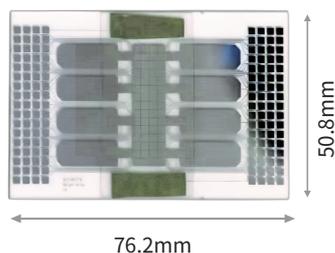
Microfluidic technology facilitates the precise handling of minute fluid volumes, enabling automated chemical reactions. This capability streamlines chemical synthesis processes, enhances reaction efficiency and product purity, and minimizes reagent consumption, making it highly valuable for applications like drug discovery and development.

Biological Sample Processing

The DropletBot® platform automates complex sample preparation and analysis workflows. It accurately manipulates samples for procedures such as cell lysis, mixing, and reagent addition, thereby simplifying protocols, reducing sample loss, and increasing detection sensitivity. It is frequently employed in applications like pathogen detection.

Droplet Control in Material Science

DropletBot® offers precise control over droplet size, shape, and movement, improving mixing efficiency. This is advantageous for applications including emulsion generation, nanoparticle synthesis, and high-throughput screening experiments in materials research.



■ Electrode Array

Features 68 individual metal drive electrodes, each approximately 2.2mm x 2.2mm.

■ Materials

Baseplate: Soda-lime glass substrate with patterned chromium electrodes.
Top Plate: ITO-coated glass featuring a hydrophobic fluoropolymer coating.

*Support for custom chip designs is available.

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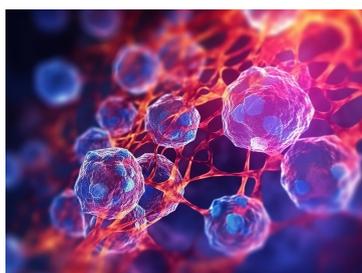
Product Features



- Automatically Load/Unload Chips.
- Automatically Clamp Chips.
- Magnetic Control for Full Chip Coverage.
- Real-time Observation of Droplet Movement in Brightfield.
- Real-time Quantitative Single Point Fluorescence Acquisition.
- 10.1" Touch Screen, External PC Extensible.
- Allow Droplets to Be Visually Dragged and Manipulated via Live Video Overlay, Supporting Experimental Programming, Automatic Control and Experimental recording.

Specifications

1. Fluorescence Module & Camera



Item	Specification
Fluorescence Module	Includes brightfield illumination and a three-color fluorescence module. Standard Filter Configurations: FAM: Excitation (Ex): 455-485 nm / Emission (Em): 505-535 nm Cy5: Ex: 630-650 nm / Em: 670-695 nm HEX: Ex: 510-530 nm / Em: 540-570 nm
Camera	16-megapixel high-definition camera (30 FPS @4K).

2. Temperature, I/O, & Physical Specifications

Item	Specification
Temperature Control	Range: 0°C to 105°C Heating Rate: $\geq 2^{\circ}\text{C/s}$ (from 20°C to 80°C) Cooling Rate: $\geq 1.5^{\circ}\text{C/s}$ (from 80°C to 20°C) Control Precision: $\pm 0.1^{\circ}\text{C}$ Accuracy: $\pm 0.3^{\circ}\text{C}$ Uniformity: $\pm 0.3^{\circ}\text{C}$ across the controlled area
Input	Power: Requires 24V DC, 6A via included adapter (Input: 110–240V AC, 50/60Hz) Interfaces: Ethernet port, 2.5mm x 5.5mm DC power jack, USB Type-A, USB Type-B
Output (Electrode Driving)	Voltage Range: 0–360V peak-to-peak (Vpp) (Accuracy: $\pm 1\text{V}$) Frequency: 1 Hz to 30 kHz (adjustable) Waveform: Square wave Channels: 68 standard electrode channels (expandable to 136)
Physical Specifications	Dimensions: 335 mm (Width) x 270 mm (Depth) x 280 mm (Height) Weight: Less than 10 kg

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