AcouTrap

Table top research platform for acoustic trapping

The central part of the system is an acoustic trapping unit where standing waves are used to trap and hold particles, cells or vesicles against a fluid flow. The acoustic forces can hold polymer microbeads or cells at sizes down to a few micrometers. For smaller objects, e.g. bacteria, extracellular vesicles or nanoparticles, larger polymer seed particles are initially trapped and smaller objects are drawn to these particles by secondary acoustic forces.

The AcouTrap acoustic cell trapping platform

The AcouTrap platform consists of a motorized stage, syringe pumps and valves to interface the acoustic trapping unit with standard 96-well microplates. The system can aspirate and dispense samples and reagents while keeping your trapped sample immobilized in the trapping unit. After processing the sample, the acoustic forces can be switched off and the sample is dispensed into one of the wells. The system is controlled by a computer through a graphical user interface where it is also possible to create user defined scripts automating the sample handling.

AcouTrap Advantages

The main advantages of using the AcouTrap system compared to centrifugation is ability to handle low particle/cell concentrations, automated sample processing, shorter sample processing times and higher recovery rates.

AcouSort

AcouSort is a technology company in the biotech sector located in Lund, Sweden.

AcouSort has developed a platform technology for acoustophoresis that is based on migration with sound. It uses a new method with ultrasound to separate, concentrate and clean cells and other particles.

Separation and cleansing of cells is an important part of research and diagnostics used for cancer and septicemia.

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GENERAL SPECIFICATIONS

Power supply	24 V DC, 5 A
Size (W x D x H)	44 x 40 x 31 cm^3
Weight	12 kg
Pumps	2 x Tricontinent C24000, 1 ml syringe
Motorized stage	X and Y belt drive of microplate and Z lead screw drive of acoustic trapping unit
Chassis	PET-G cover and HIPS chassis
Software	Controlled by a GUI or scripts on a windows PC
Acoustic control	External waveform generator controlled by the GUI

PUMPS Syringe pump, model: Tricontinent C24000

Drive design	Direct drive stepper motor/leadscrew with 30 mm of travel. Proprietary maintenance-free design.
Stroke Speed	4.2 seconds to 800 minutes per stroke (3200 minutes in microstep mode).
Step Resolution	The system uses hi-res mode consisting of 192,000 steps per 30 mm travel
Syringe	1 ml borosilicate glass syringe with UHMWPE plunger (other syringe sizes and plunger materials are available)
Imprecision	< 0.05% CV (full stroke)
Inaccuracy	< 1 % syringe volume (full stroke)
Power Requirement	24 VDC ± 10% ≤ 1.5 Amp (peak)
Syringe Valves	Rotating 3-way PEEK/PTFE valve
Tubing	1/16" PTFE

MOTORIZED STAGE

Power supply	3.1 V DC, 2.5 A
Stepper Motor	Wantai 42BYGHW811
Chip Valve	12 V 3/2-way solenoid PEEK/FFPM valve with port to port volume <37 µl
Syringe	1 ml borosilicate glass syringe with UHMWPE plunger (other syringe sizes and plunger materials are available)
USB Microscope	Dino-Lite AM4113T 1.3 MP

SAMPLE HANDLING

Reservoir volume	15 ml centrifugation tubes for waste and clean buffer
Microplate compatibility	Stage and software is designed for use with standard 96 well microplates

ACOUSTIC TRAPPING UNIT

Working frequency	4 MHz ± 5 %
Actuation voltage	10 Vpp
Trapping volume	~40 nl (1 x 1 x 0.04 mm3)
Flowrate for efficient trapping	≤ 50 µl/min
Fluidic channel	2 x 0.2 mm2 (ID) rectangular borosilicate capillary
Total volume of fluidic channel	16 µl
Swept volume prior to trapping zone	~8 µl
Fluidic Connections	PTFE/FEP tubing 17 µl