CYTEK®

TRANSCEND THE CONVENTIONAL

Cytek® Amnis® CellStream® Benchtop Flow Cytometry

High Sensitivity Flow Cytometry (HS-FCM)
Powered By Amnis® Detection Technology

Unparalleled Combination of Flexibility and Performance

The Cytek® Amnis® CellStream® flow cytometer is a benchtop system that offers unparalleled sensitivity, expanded capabilities, and scalable throughput all at an accessible price.

Exceptional Optics System

- Patented camera technology unique to Amnis® flow cytometers enables you to view cells as they are analyzed in real time for quality control and troubleshooting

High sensitivity flow cytometry (HS-FCM)

- With a single CCD detector that replaces PMTs, CellStream systems deliver unparalleled sensitivity for small particles
- Extremely low MESF values (<10 FITC and <5 PE) enable the detection of low-concentration fluorophores
- Excellent small particle detection makes this system great for bacteria, virus, and extracellular vesicle research
- For complex cell populations, CellStream systems offer exceptional resolution, supporting immunophenotyping and other high-color applications

High-throughput acquisition

- Single-tube and 96-well plate sampling supports a range of throughput needs
- 1 to 7 lasers provide up to 22 detection channels covering up to 20 colors, plus forward and sidescatter
- On-site laser upgrades available right in the laboratory

Intuitive software

- 21 CFR Part 11-enabling features assist in your management of electronic records and signatures in a closed, FDA-compliant system
- Automated daily system calibration ensures consistent and accurate results from day to day
- Unique Event Gallery for visual sample verification allows for quality control and real time troubleshooting

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Inside the CellStream® System

Our patented time delay integration (TDI) and camera technology deliver sensitivity and expandability beyond what is possible with traditional flow cytometers.

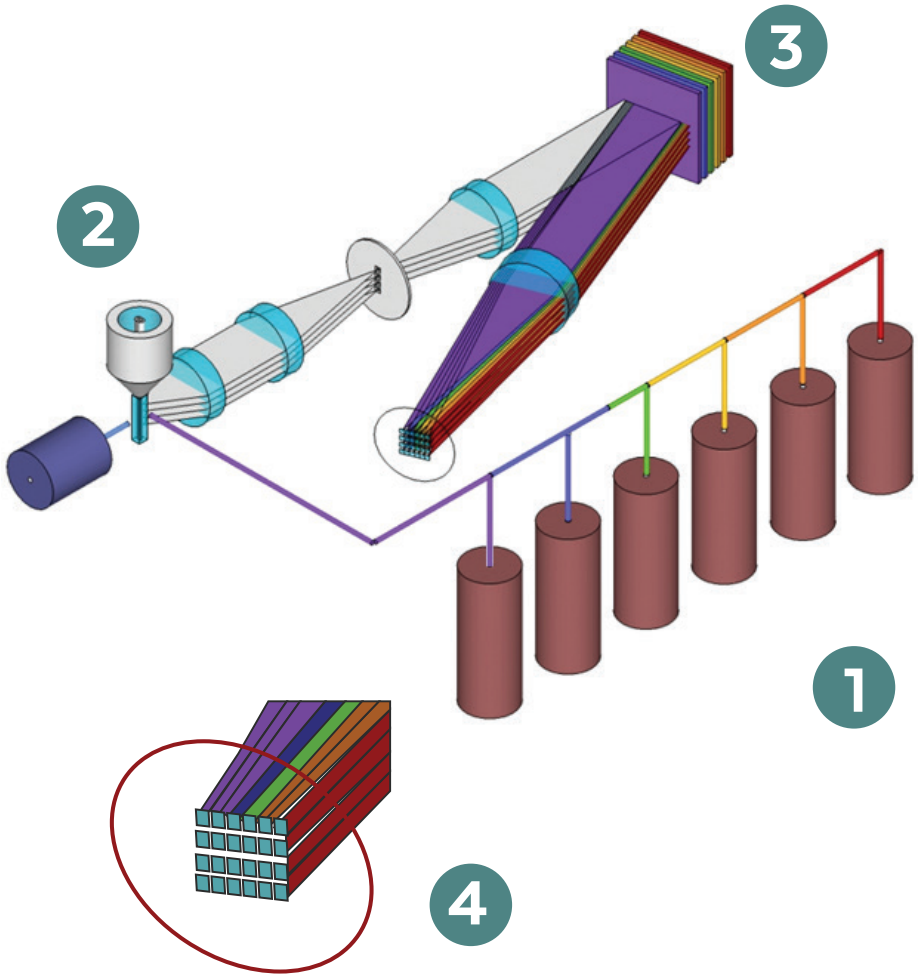


Figure 1.

CellStream system architecture

1. Up to 7 lasers are focused in discrete locations.
2. Hydrodynamically focused cells pass through the laser-illuminated region. Fluorochromes bound to the cells are excited and emit into the collection system. Fluorescence is collected and directed toward an intermediate image plane.
3. The filter stack decomposes each of the four discrete vertical positions in the intermediate image plane into 22 separate channels of data.
4. All 22 channels fit efficiently onto a charge-coupled device (CCD) array. The system's sensor contains multiple discrete collection fields using the same CCD as patented Amnis® Technology.

Stream the Power of Sensitivity

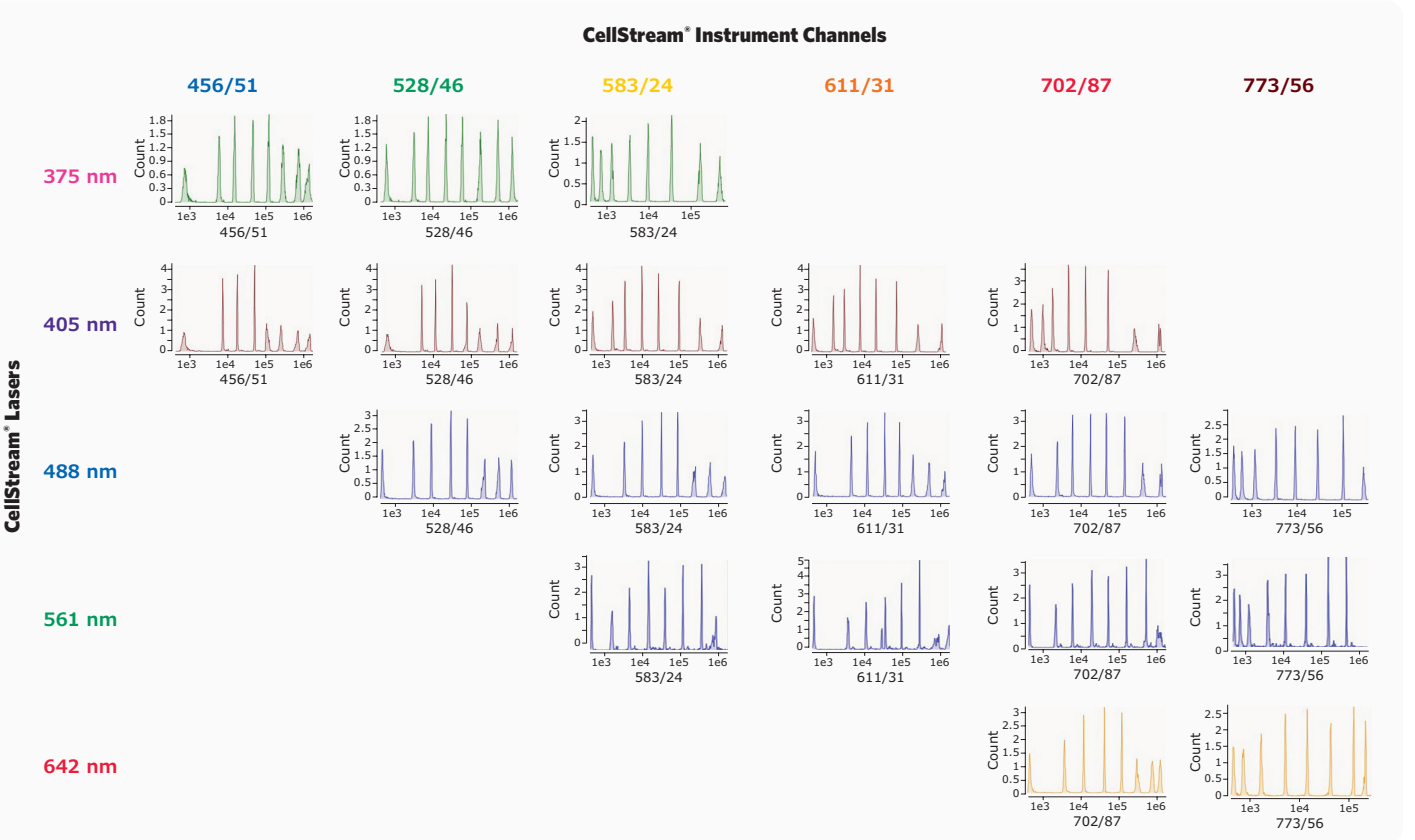
High sensitivity fluorescence detection

The fluorescence sensitivity of the CellStream® flow cytometry platform was evaluated using industry standard 8-peak Spherotech rainbow calibration beads.

The data demonstrated high fluorescence sensitivity of the CellStream system:

- All 8 peaks are clearly resolved in every detection channel, including distinct separation of the unstained bead (first peak) from the lowest intensity bead (second peak)
- Low MESF (molecules of equivalent soluble fluorochrome) values can be determined
- MESF <10 FITC; MESF <5 PE

Figure 2.

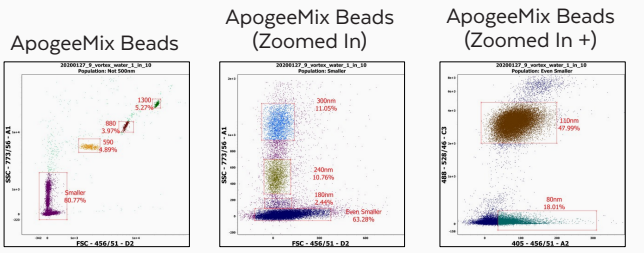


High sensitivity submicron particle detection

CellStream® systems clearly detect and discriminate particles as small as 27 nm.

The figures show the acquisition of ApogeeMix-containing silica spheres with 180 nm, 240 nm, 300 nm, 590 nm, 880 nm, and 1,300 nm diameters. This mix also contains 80 nm, 110 nm, and 500 nm of green fluorescent beads. Source: CellStream Demo data using customer Apogee beads, Filby Laboratory, Newcastle University. January 2020.

Figure 3.



Populations 1.3 µm to > 590 nm

Populations 300 nm to > 180 nm

(non-fluorescent populations)

Populations 110 nm to > 80 nm

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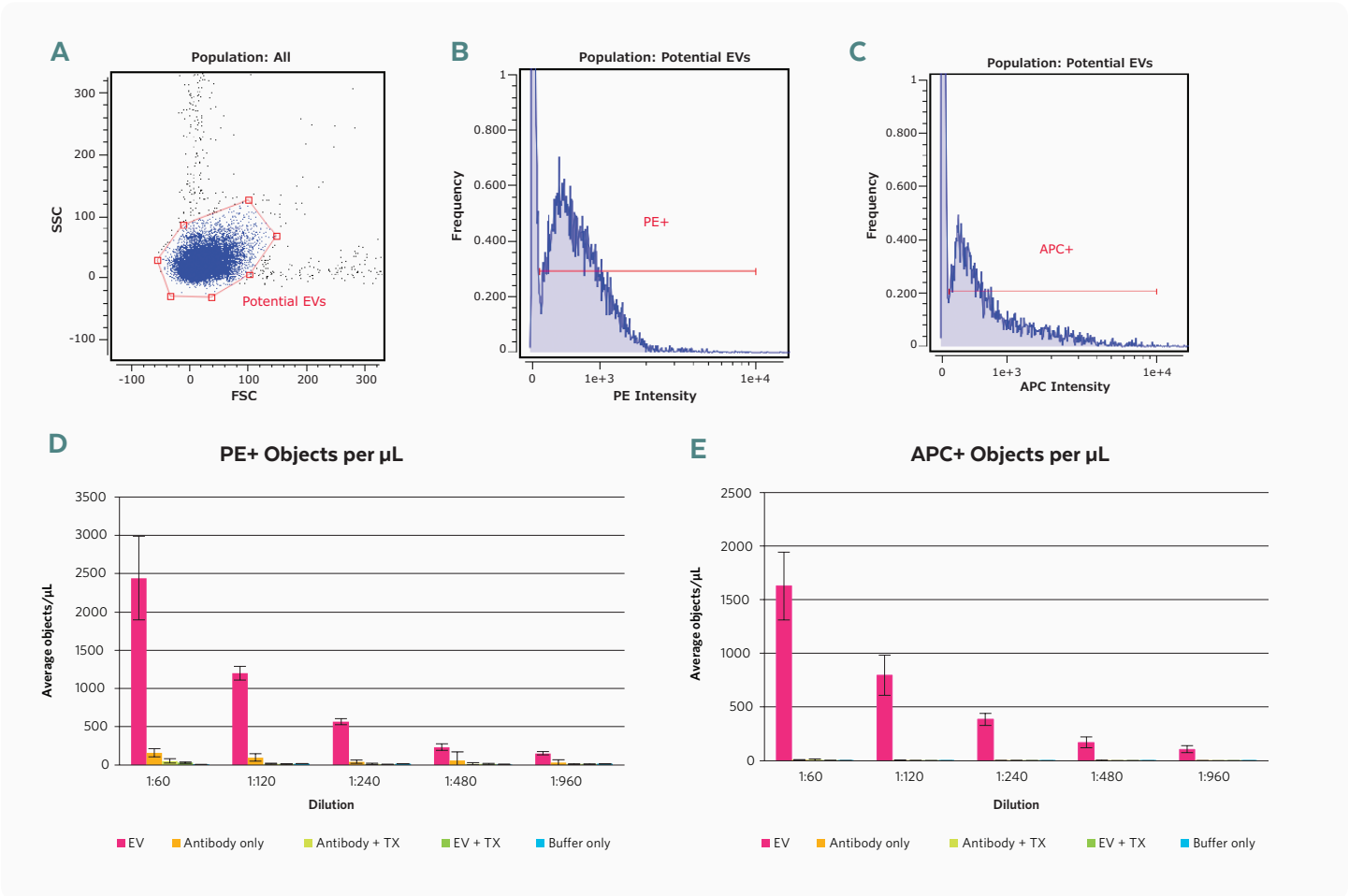
Superior Detection of Small Particles Using Small Particle Detection (SPD) Mode

Only recently has the importance of extracellular vesicles (EVs) as key mediators of intercellular communication been appreciated. EVs are membrane-derived structures that include exosomes, microvesicles, and apoptotic bodies. The study below shows the high sensitivity and capabilities of the Small Particle Detection Mode on the CellStream system.

In this study, RBC-derived EVs were stained with anti-CD235ab-PE and/or anti-CD41-APC. Control samples were collected for antibody only, PBS only, and RBC EVs labeled with anti-CD235ab-PE and anti-CD41-APC incubated with Triton® X-100 (TX). (A) An initial gate (SSC vs. FSC plot) was used to identify potential EVs. Using this gate, (B) PE+ and (C) APC+ events were identified. PE+ and APC+ objects per µl for the various experimental and control samples are shown in (D) and (E): Labeled EVs, antibody only, antibody + Triton® X-100, labeled EVs + Triton® X-100, and buffer only. The objects per µL are the events in the PE+ and APC+ gates shown in (B) and (C).

Figure 4.



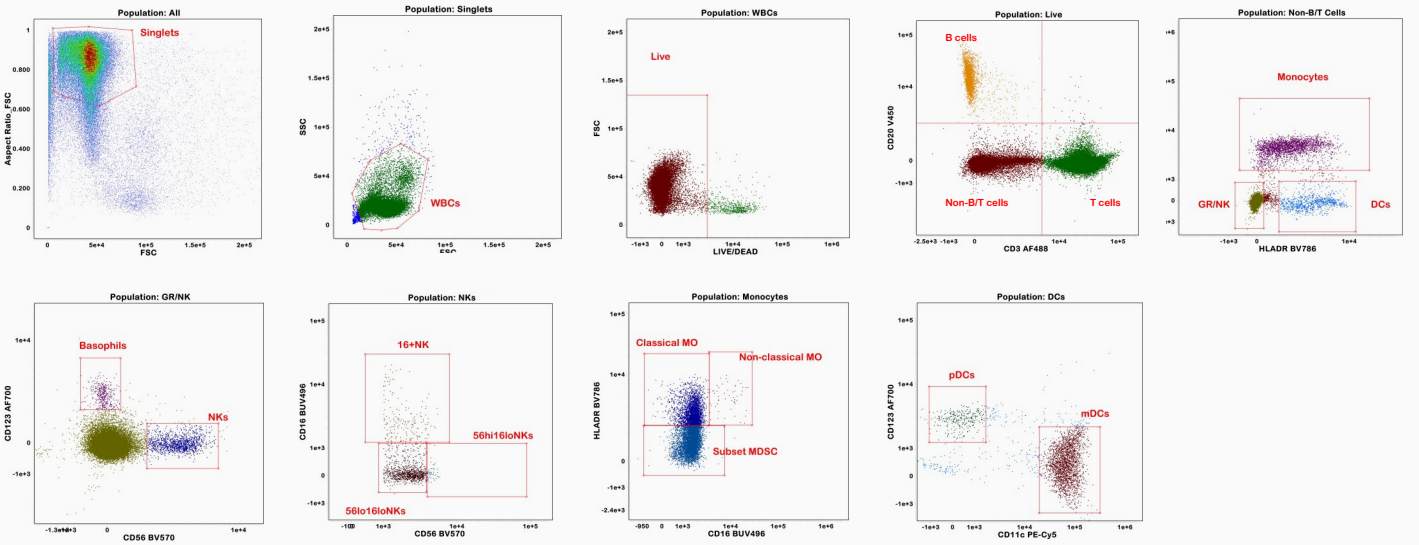
Stream the Power of Versatility

CellStream systems enable you to obtain reproducible, multi-parametric, single-cell data for a wide variety of applications.

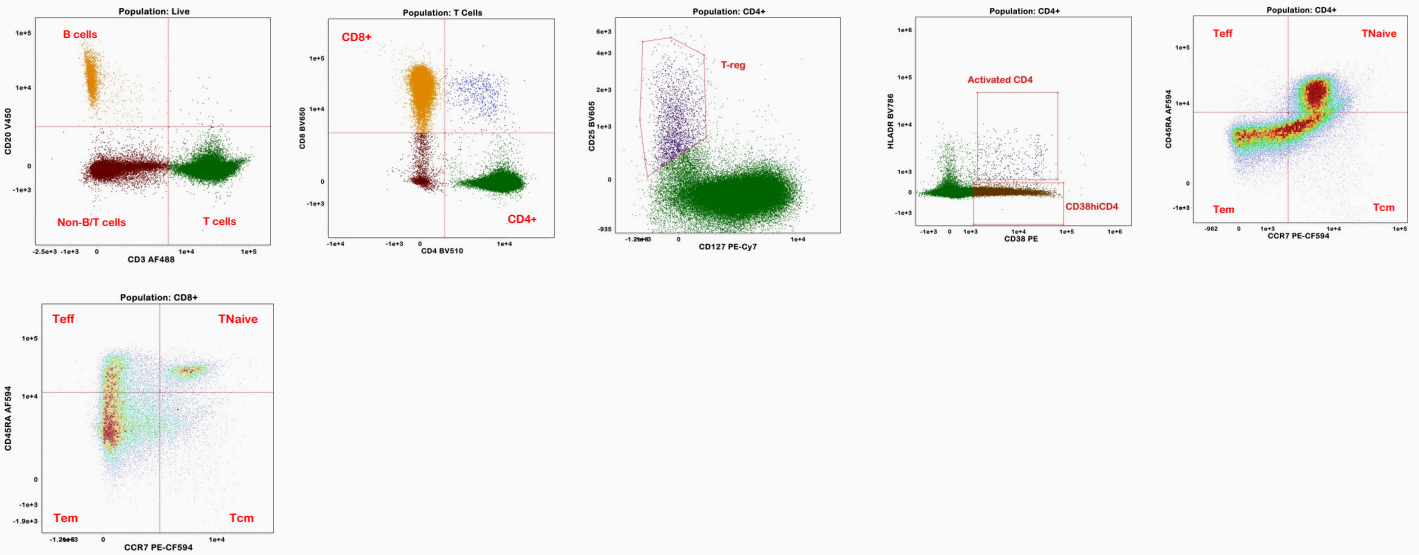
Figure 5. Immunological phenotyping 16-color assay

In this example, a 7-laser CellStream system accurately resolves 16 different fluorochromes within a single assay. Below, different immune cell populations were resolved from one another within a sample of PBMCs.

A. Identification of lymphoid and myeloid populations within human PBMCs



B. Identification of T cell subsets within human PBMCs.



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Staining Protocol

50 µL of PBMCs were stained with the following 16 fluorochromes (2 µL each) for 25 minutes.

Table 1.

	Specificity	Fluorochrome	Clone	Target
1	Live/dead	Violet	N/A	Viability
2	CD4	BV510	SK3	CD4 T cells
3	CD56	BV570	NCAM HCD56	NKs
4	HLA-DR	BV786	G46-6	DCs
5	CD123	AF700	6H6	pDCs
6	CD20	V450	L27	B cells
7	CD8	BV650	RPA-T8	CD8 T cells
8	CD25	BV605	2A3	Tregs
9	CD16	BUV496	3G8	Monocytes
10	CD14	BUV563	MΦP9	Monocytes
11	CD45RA	AF594	HI100	Naïve/memory
12	CD38	PE	HIT2	Activation
13	CD3	AF488	UCH1	T cells
14	CCR7	PE-CF594	150503	Central/effector
15	CD11c	Pe-Cy5	B-ly6	mDCs
16	CD127	Pe-Cy7	RDR5	Tregs

After staining, cells were washed and resuspended in 200 µL of wash buffer (PBS + 2% FBS), and acquired on a 7-laser CellStream® system. A minimum of 200,000 events were collected in 'fast' mode.

A Fully Configurable System

CellStream® systems are made to order. Build an instrument specific for your needs from the available lasers below. All systems come standard with:

- 96-well plates autosampler
- Single tube sampler
- 488 nm laser

Figure 6. Excitation & Emission Capabilities of the 7-Laser CellStream® Flow Cytometer

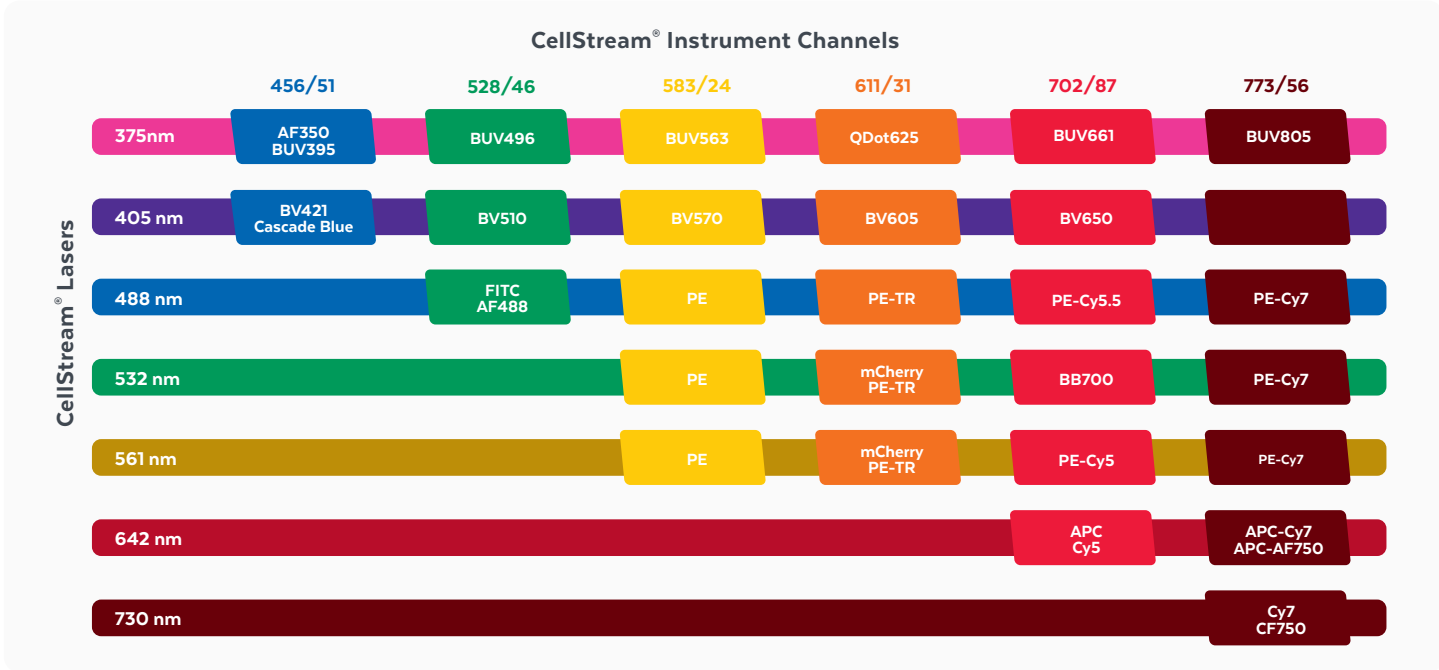

Figure 7. Inside the 7-Laser CellStream® System

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Collect Data with the Confidence of Intuitive Software

Integrated software provides an intuitive, easy-to-use interface, enabling you to focus on your experiments and your data. The software also includes 21 CFR Part 11-enabling features, supporting quality control and data integrity measures in regulated environments.

Figure 8.

Load & Record

- Tubes or plates
- Simple and customizable AutoSampler setup

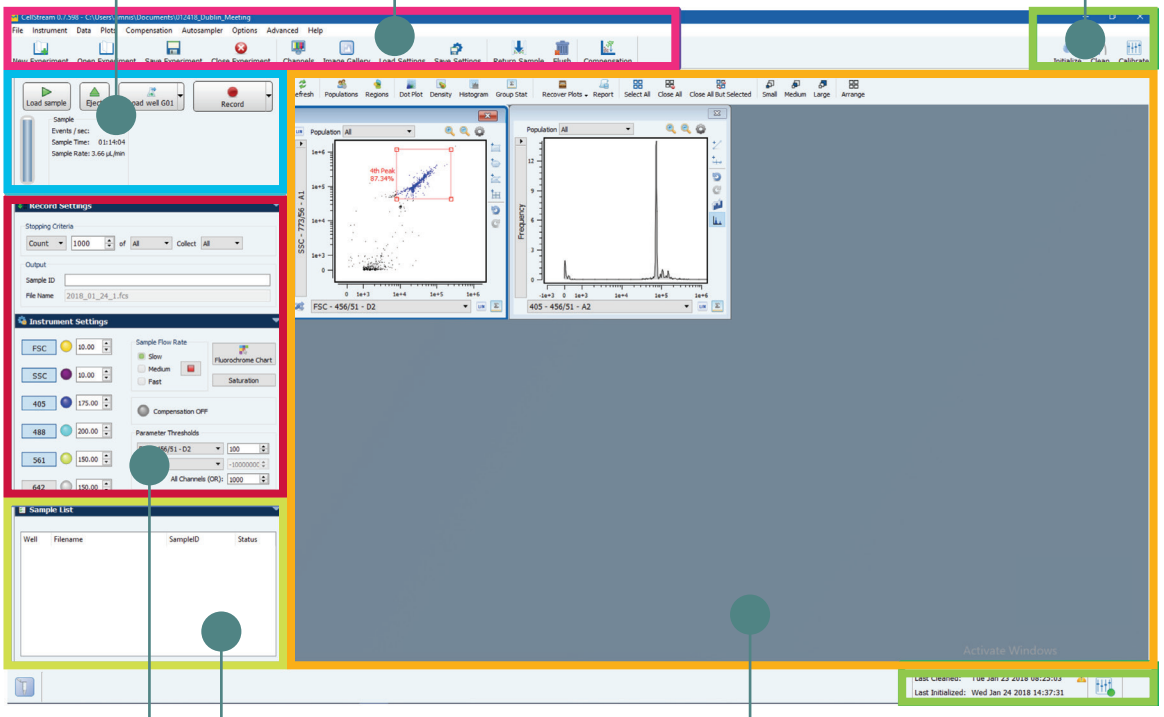
Toolbar

- Quickly define experiments, view Event Gallery, and access other frequently used parameters

Startup/Shutdown/System Status

One click:

- Initialization and daily cleaning with on-board fluidics
- Calibration and testing (laser alignment, dark current, flow core position, flow core stability, channel alignment, and laser power)



Settings

- Record by count, volume, or time
- Intuitive control of instrument, experiment and plotting parameters, and thresholds
- Pop-up fluorochrome chart for easy channel identification

Display & Analysis

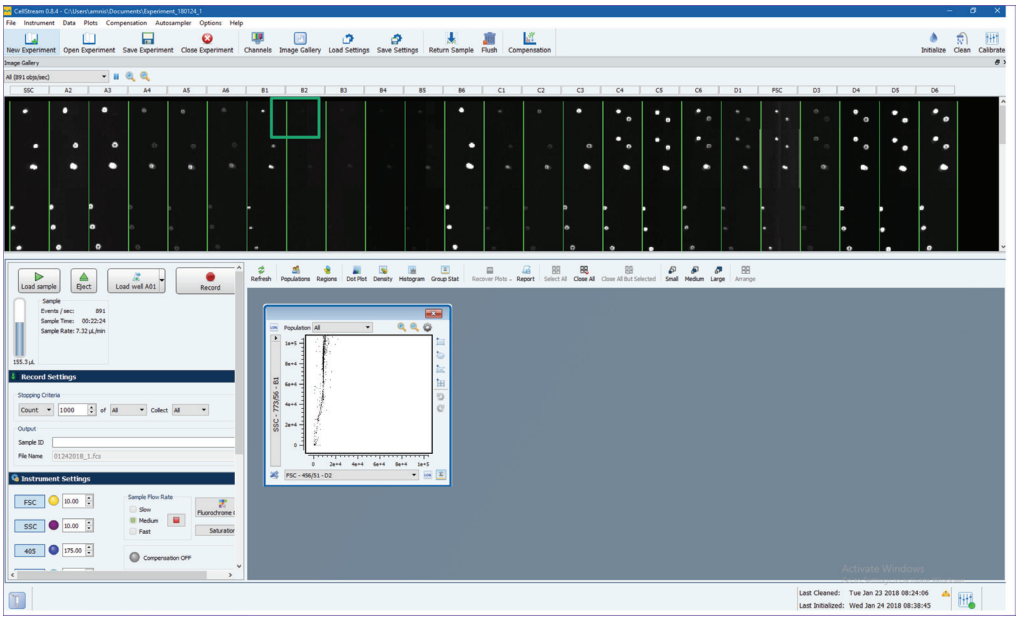
- Full suite of data display and analysis tools (histograms, dot plots, density plots, overlays, dot plot backgating, multi-file analysis, etc.)
- Streamlined acquisition of compensation files
- Export statistics or create customized PDF reports

A Unique Event Gallery Feature of CellStream Acquisition Software Enables Population Verification, Aids in Troubleshooting, and Resolves Doublets

Real-time event gallery

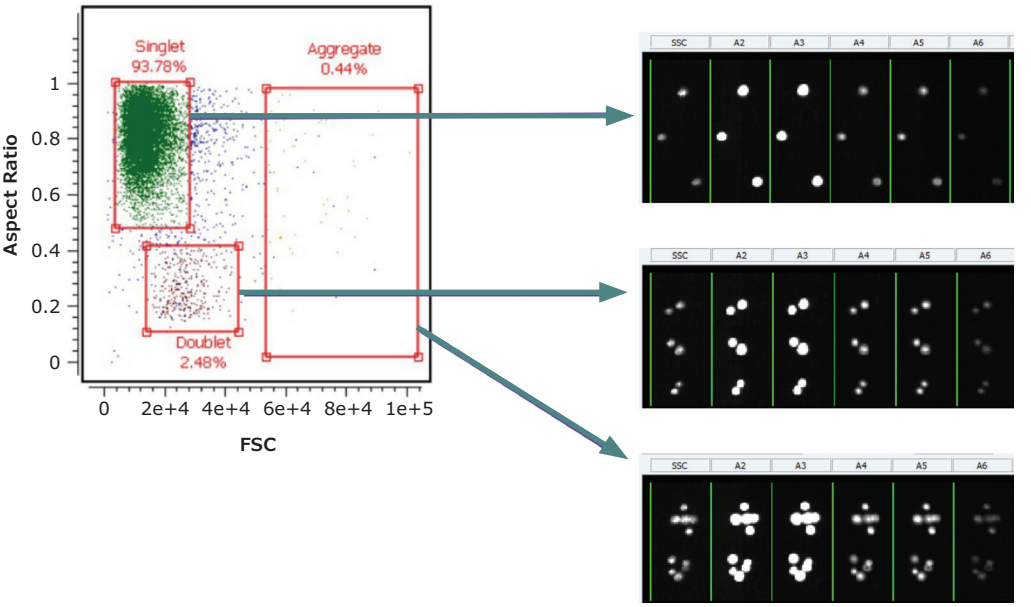
- Low resolution images of your cells in flow
- Provides verification of suspected populations
- Aids in troubleshooting
- Unlike any other non-imaging flow cytometer

Figure 9.



Doublet discrimination

- Aspect ratio feature allows for visual confirmation
- Clear resolution between singlet, doublet, and aggregate events
- Calculated for each channel



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Instrument Service Plans

To help you get the most out of your CellStream® flow cytometry system, our worldwide organization offers a variety of service plans to support your needs and maintain the longevity of your instrument. Our service agreements are flexible, so you can select the level of hardware, application, and software support your lab needs.

Advantages of maintaining a service plan:

- Service support maintains optimal performance, enabling high-quality data
- Planned instrument maintenance reduces overall service costs
- Service plans are the best protection for your instrument investment and its long-term operation
- No service contract is required for one-time service requests

Our highly-qualified field application and instrument specialists also provide:

- Support by email or phone
- On-site instrument training
- On-site scientific applications support

For more information on our comprehensive range of service and support agreements, please contact your sales representative or visit cytekbio.com

System Performance

Parameter	Performance
Fluorescence Sensitivity	MESF <10 FITC MESF <5 PE
CV* (Precision)	<3%
Number of Channels	Up to 22 (20 fluorescent, plus FSC, SSC)
Number of Lasers	1-7
Available Lasers	375, 405, 488, 532, 561, 642, and 730 nm
Camera-Enabled Morphology Parameters	3 (area; aspect ratio; raw max. pixel)
Event Rate	Up to 20,000 cells/second
Flow Rates	3.66 µL/min (Low speed/high sensitivity) 14.64 µL/min (High speed)
Scatter Resolution	FSC <300 nm from 450 nm SSC <200 nm from 785 nm
Dynamic Range	7 decades
System Size (W × D × H)	440 × 625 × 495 mm
Field Upgradeable	Yes
Sample Formats	Single tube or 96-well plate
Absolute Cell Counting	Yes

**Coefficient of variation using chicken erythrocyte nuclei (CEN)*

Order Information

Product Name	Part Number
CellStream® Base System with 488 nm Laser (200 mW) and AutoSampler	CS-100196
CellStream® Four-Laser System with 488 nm, 642 nm, 405 nm, 561 nm Lasers, and AutoSampler	CS-100496
CellStream® Option 375 nm Laser, 70 mW	CS-200375
CellStream® Option 405 nm Laser, 175 mW	CS-200405
CellStream® Option 532 nm Laser, 150 mW	CS-200532
CellStream® Option 561 nm Laser, 150 mW	CS-200561
CellStream® Option 642 nm Laser, 150 mW	CS-200642
CellStream® Option 730 nm Laser, 40 mW	CS-200730
CellStream® Software Multi Access	CS-300300
CellStream® Calibration Reagent	CS-400104
CellStream® On-Site Training	CS-500200
CellStream® Installation	CS-600200
CellStream® IQ/OQ Document	CS-600250

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