



'Kairos' cLDEP Sorter

A four laser flow cytometer with microfluidic sorter

The first ever application of centripetal liquid dielectrophoretic (cLDEP) force to particle sorting: An electric field plucks chosen particles from the stream with **Kairos**. The method, invented by ApogeeFlow, requires no moving parts and yields far higher speed and precision than piezoelectric methods.

User defined regions of interest on the flow cytometer's histograms allow selection of populations of particles to be sorted based on combinations of any optical parameter. The sort decision is made within 10µs of the laser interrogation and an electric field generated at the moment the particle reaches the sort zone giving high purity, yield and sort frequency. The automated system allows batches of samples to be sorted from and to a 96 well microplate unattended.

- *Kairos, centripetal liquid dielectrophoretic (cLDEP) force applied to particle sorting*
 - Electric field plucks chosen particles from the stream
 - High stability: force applied close to the laser for excellent timing precision, no moving parts
 - Microfluidics avoids droplet sorter breakoff instability and nozzle residue stream disturbance
 - High speed: up to 2500 sorts per second from 20µs pulses (analogous to 50kHz droplet frequency)
 - Gentle on cells: low pressure system, no droplet charge
- *ApogeeFlow particle analyser, for extreme small particle applications*
 - Up to 4 lasers, spatially separated
 - 3 light scatter detectors
 - 9 fluorescence colours



Extracellular Vesicles (EV)

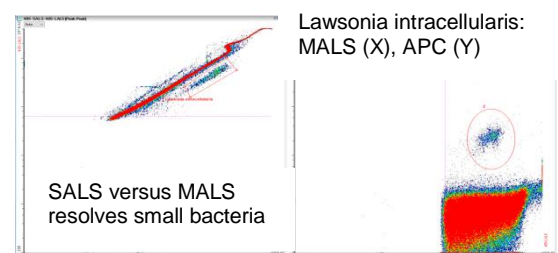
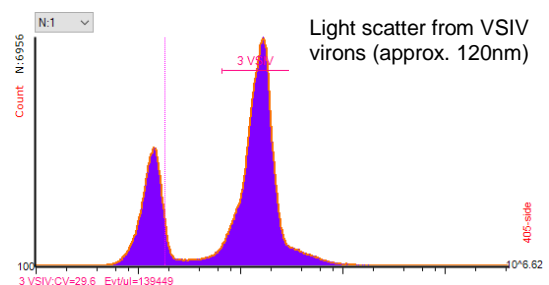
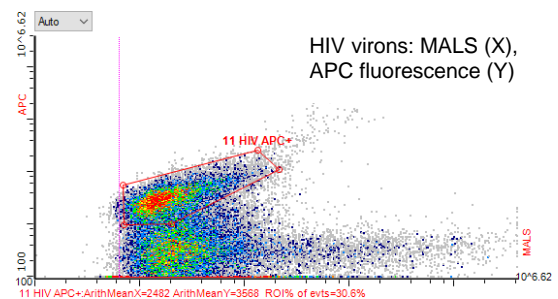
Optimised for extreme, small particle applications without sacrificing the speed required for the measurement of rare populations. ApogeeFlow's *MicroPLUS* optics offer exceptional small particle performance from multiple light scatter detectors. Dedicated models for small particle applications with the power to resolve particles scattering as little as a 100nm silica test bead. Chosen by Nanostics Inc. as the platform for the *ClarityDX* range tests.

Viruses

ApogeeFlow "Micro-PLUS" cytometers are used for viral vaccine development and viral vector immunotherapies. Optimised for small particle applications, it has the performance to measure individual virions like influenza, human immunodeficiency virus (HIV), murine leukemia virus, vesiculovirus (e.g. VSIV), rabies virus, herpes simplex virus (HSV), cytomegalovirus (CMV), vaccinia virus.

Small Bacteria

To measure the smallest bacteria and resolve them from background debris by light scatter & fluorescence requires an optimized cytometer. *Lawsonia intracellularis* (approx. 250nm diameter filamentous bacteria) may be resolved from debris by combination of two high sensitivity light scatter parameters.





Sorting DAPI stained E. coli

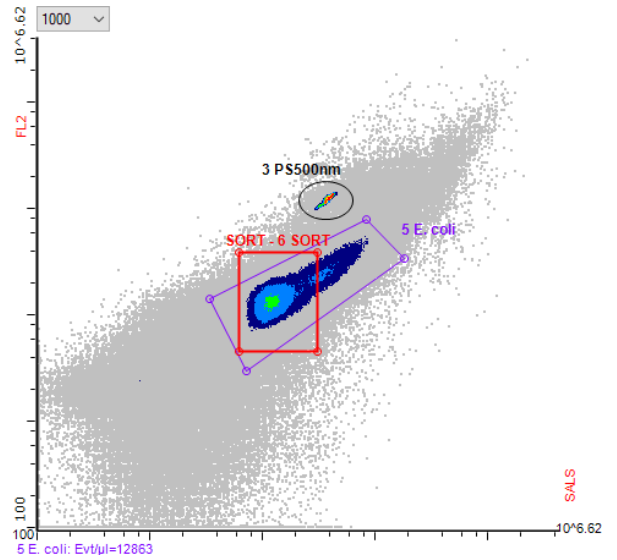
500nm polystyrene test beads were added to a sample of DAPI stained E. coli giving a concentration of 1090 beads/ μ l.

The E. coli population consisted of 8,500 B-period cells/ μ l (before replication) and 4,000 D-period cells/ μ l (larger cells, before division)

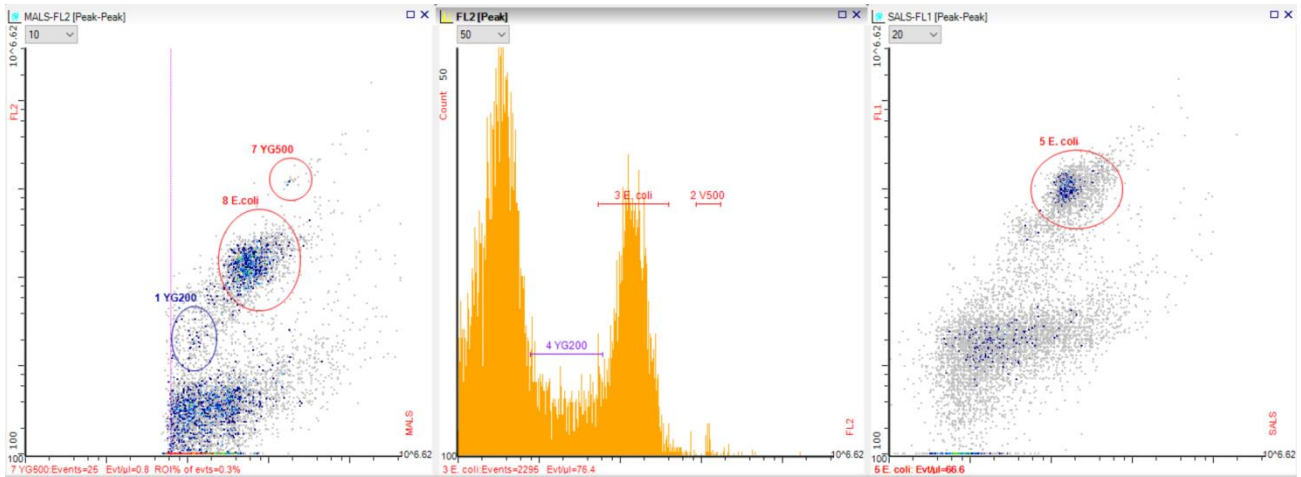
A sorting region of interest ("ROI" #6) was placed around the B-period E.coli. Test beads and D-period E.coli were excluded. The sort ROI included 1650 cells per second which were diverted by cLDEP force to a microcentrifuge tube.

As a control, a second sort was performed after moving the sort ROI to enclose only the 500nm beads.

The resultant samples were re-analysed on the flow cytometer and the below data obtained showing good sort purity and yield.



Sort on B-period E. coli Sort rate 1650Hz



Sort on polystyrene 500nm beads Sort rate 200Hz

