

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: Seek to Pinch: the loading channel flow rate switches from high to low when an event is detected in ROI 1.

File Name: Supplementary Movie 2

Description: Queue Cell: secondary particles are delayed by reversing the loading channel flow direction to avoid collision events.

File Name: Supplementary Movie 3

Description: Accept Singlet: morphometric analysis determines the loaded particle is a singlet and allows it to be measured.

File Name: Supplementary Movie 4

Description: Reject Doublet: morphometric analysis determines the particle is a doublet and quickly reverses flow direction of the measurement channel to remove it.

File Name: Supplementary Movie 5

Description: Bead doublet rejection: all active loading components working together to load a bead sample. When a doublet is rejected and removed, the system quickly finds a singlet and loads that in. A second singlet is found, but delayed before loading into the device.