

# FlowCam® Biologics: Dynamic Imaging Particle Analysis (DIPA) Solution for Protein Therapeutics



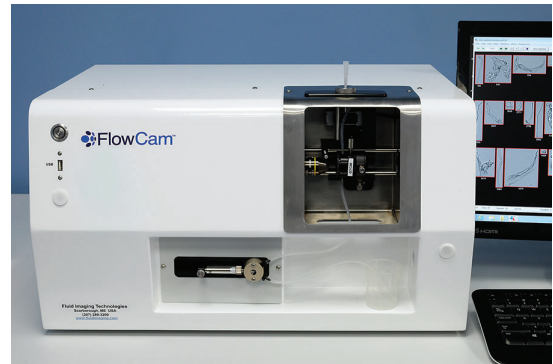
## See What You've Been Missing

Using the proven industry-leading image quality found in the FlowCam VS-Series, FlowCam Biologics is a DIPA system completely optimized for the analysis of sub-visible particulates in protein therapeutics.

### The FlowCam® Biologics Difference:

- Industry-leading image quality: better images yield better measurements.
- Higher Sensitivity: Prevents under-counting of transparent particles and fractionation of larger protein aggregates.
- Complete: Includes pre-built filters for USP <788> reporting and silicone droplet isolation, 21CFR software, installation/training (including IQ/OQ), disposable pipette-tip sample introduction and all system settings optimized for biologics.
- Allows automated, trainable, statistically-based pattern recognition - saves time by isolating different types of particles (intrinsic, extrinsic and inherent) into categories and sub-populations.

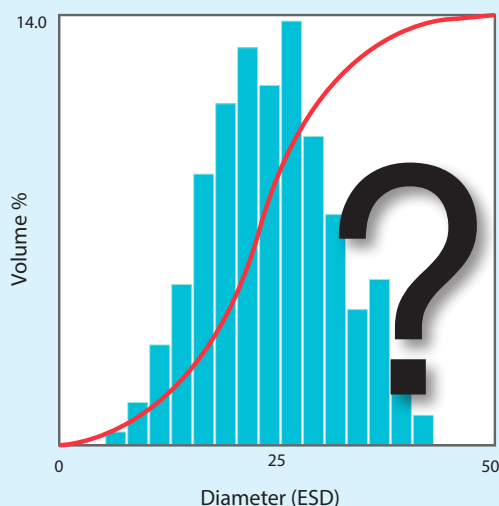
FlowCam Biologics DIPA System



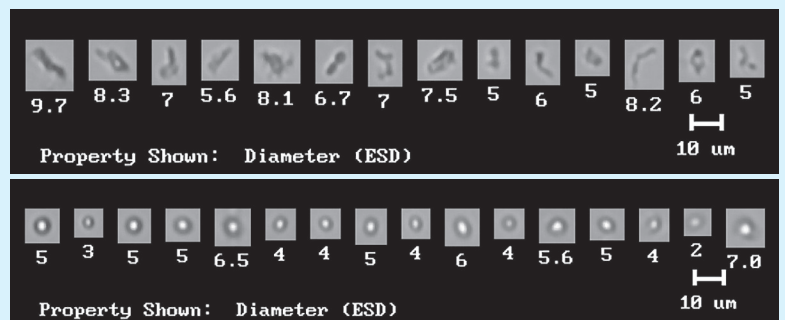
### FlowCam® Biologics Applications

- Detection & Measurement of Protein Aggregates and Other Particulates
- Formulation Research & Development
- QC Diagnostics
- Stability Studies and Shelf-Life Simulation

## What's Under the Curve?



### Protein or Silicone?



Typical volumetric-based particle analysis techniques, like laser diffraction and light obscuration, do not provide particle shape information - they assume all particles are a sphere. FlowCam Biologics can distinguish between protein aggregates and silicone droplets based upon particle shape, even in the 2µm to 10µm size range (due to superior image quality) as shown above.

## Application Focus: Protein Aggregate Characterization Using FlowCam® Biologics

Initial uses of DIPA technology in protein therapeutics were concentrated toward particle counting (concentration), based on historical demands of USP <788> using light obscuration (LO). DIPA offered more accurate concentration readings due to its ability to detect transparent particles which LO could not.

Along with our customers, we have discovered much of the nuances of using DIPA to characterize biologics over the last several years, and all of this knowledge has been incorporated into the FlowCam Biologics package. For instance, it has been found that the grayscale threshold used to isolate particles from the background can cause the instrument to miss particles entirely or “fractionate” large particles into many smaller ones for counting<sup>1,2</sup>. This can lead to major errors in concentration reporting, as shown in Figure 1.

A good deal of the concentration error is introduced merely by not having high quality images and low sensitivity thresholding. Additionally, fractionation of large particles is very evident in the larger size bins of Figure 1, as demonstrated visually in Figure 2.

FlowCam Biologics has optimized settings built-in for properly thresholding based on years of experience, so you can rest assured that we have already done all the research for you, and will give you the optimum setup from the start.

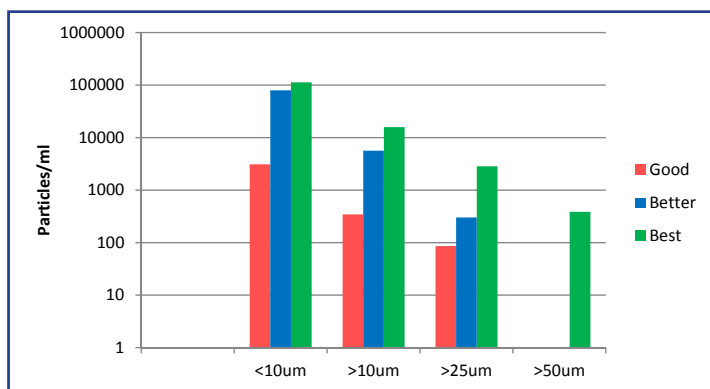


Figure 1: Differences in measured size distributions caused by variations in grayscale thresholding for the same sample.

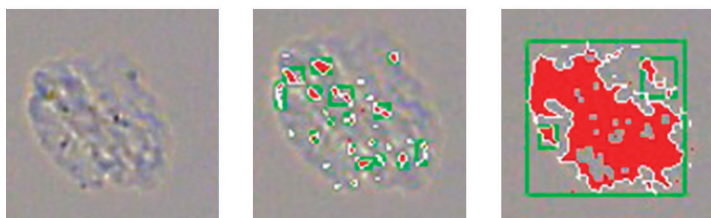


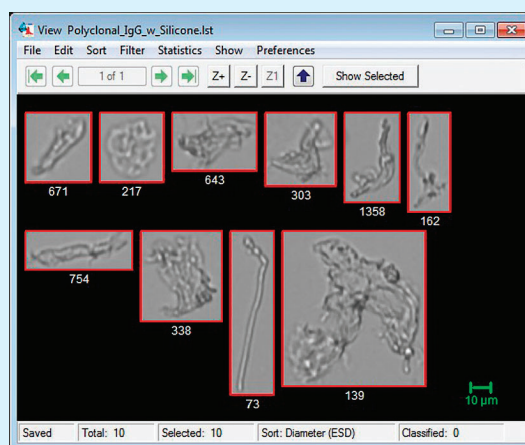
Figure 2: Fractionation of large protein aggregate caused by improper thresholding. The left image is the original, the center image shows fractionation of the large particle into many smaller ones, whereas the right image shows proper thresholding producing a single large particle (green box outline).

FlowCam Biologics is a complete system optimized for characterization of sub-visible particulates in biologics. It comes ready-to-use for the application, complete with specific training, IQ/OQ and 21 CFR compliance.

### See What You've Been Missing... Request a FREE sample analysis.

Simply send us your fluid sample, and we will provide:

- A Web-based interactive presentation of the results.
- Histograms and scattergrams showing the size and distribution of particles.
- An Excel spreadsheet with all the measurement data, including count, length, width, and ESD.
- Digital images of the cells and particles in your sample.



Protein aggregates imaged by FlowCam Biologics.

Call us at 207.289.3200 or submit your request on-line at [www.fluidimaging.com](http://www.fluidimaging.com).

1.) Brown, L (2014), The Importance of Thresholding In Imaging Analysis of Protein Aggregates, *Proceedings of 2014 AAPS National Biotechnology Conference*.  
2.) Pedersen, JS, Persson, M.(2014), Unmasking Translucent Protein Particles by Improved Micro-Flow Imaging™ Algorithms, *J. Pharm Sci*, 103(1), 107-114.