Case STUDY

CHAUVIN ARNOUX INDATECH

Type of product: **LED SPECTROMETER**
Product name: **SPOT4Line**

DOWNSTREAM PROCESS OPTIMIZATION for BIOTECH

Keywords: Downstream, cell harvesting, Lysis, virus, DNA, lipid, id. extraction, protein, antibodies,

Downstream process: optimize cell disruption quality using spectral measurement

Cell Disruption is an essential part of biotechnology and the downstream processes linked to biological product manufacturing. It is used to extract the required product from the cells. Its efficiency and performance are critical because the affect the processes and efficiency downstream.
Various disruption methods are available, depending on whether the user wants to focus on extracellular or intracellular products.

Usually, the operator takes samples during the process and analyzes the liquid in the laboratory to understand and choose the best technique.

Objectives

Direct in-line measurement would help to find out more about the process and optimize quality, stability and production time, as the results of cell harvesting may vary. It is even more critical when the processes are continuous.

CA INDATECH solutions

The SPOT4Line LED spectrometer is the solution because it takes into account both the physical changes (size and number of particles) and the chemical changes (color and UV absorbance).

Dedicated to in-line, real-time monitoring of the critical parameters and quality attributes of a liquid flowing in pipes, this in-situ technology offers several advantages compared with off-line techniques.

For example, SPOT4Line **can be used for real-time monitoring at each stage of protein/virus release during the Cellular Disruption / Lysis phase**. Indeed, once the cell culture process has finished, the cells need to be broken up using various processes (mechanical, chemical, thermal, etc.) to release the products of interest.
It is in these critical phases that the SPOT4Line sensor becomes involved.
This sensor **performs optical measurements from UV to near infrared from several angles.** Mathematical models (Chemometrics) can then be applied to the results to define a trajectory for the process and determine an optical signature (a sort of fingerprint) for each key stage.

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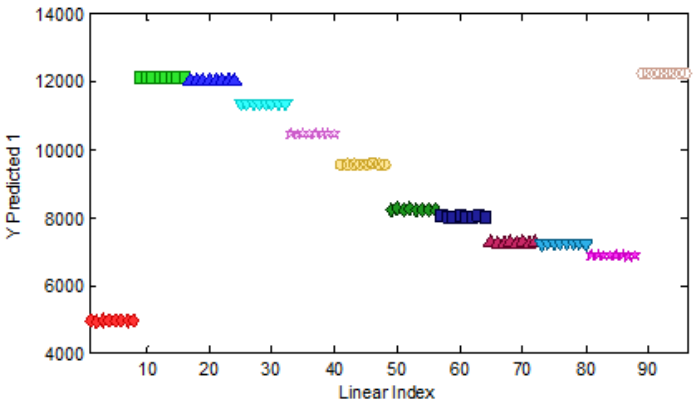
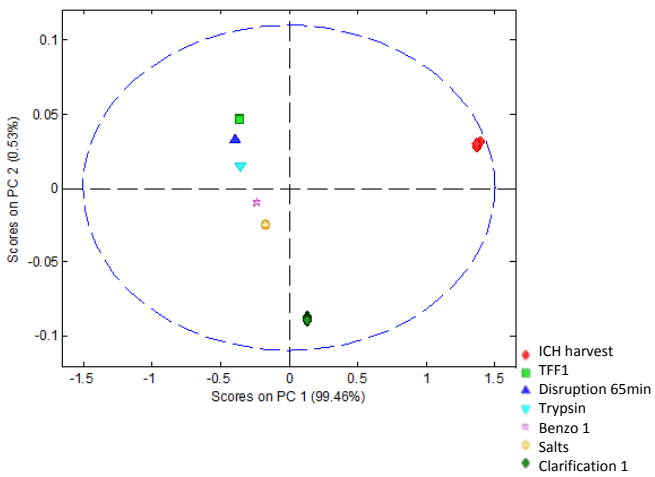
Advantages of SPOT4Line

In this cellular disruption use case, the process first involved breaking cell agglomerates and then the cells themselves in order to release the virus into the solution (process taking around 80 minutes).
This cellular 'soup' or slurry was then mixed with various products such as Trypsin and Benzonase in order to complete disruption.

Continuous measurements: SPOT4Line provided the results in real time whereas, formerly, the R&D team had to wait for two weeks for the sampling results.
The time saving was therefore unbeatable, enabling them to set up real-time checking for better end-product quality. **Measurements of the physical and chemical properties:** the SPOT4Line optical sensor successfully measured various chemical and physical attributes. Even though the liquid reached a high **turbidity value** at the end of the process, the measurement was still possible and the result was reliable. This is due to the specific measurement in transmission and backscattering mode.

The figures below show the different stages:





The yellow color also enabled them to trace the release of the product of interest in the medium, while overcoming the turbidity effect taken into account by the sensor.
Other information was also obtained using chemometric tools (PLS toolbox).
Analysis of the multiple-variable data was performed using PCA (principal component analysis) to generate an MSPC (multistatistical process control) model. This mathematical model was integrated directly in the sensor.

SPOT4Line
find out more

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