

ICP - Mass Spectrometry



Key Features:

- Ease-of-use
- Speed
- Flexibility
- Automation

Syngistix Nano Application Software Module for Single Particle ICP-MS

Introduction

The Syngistix™ Nano Application Module is the first commercially available software that combines real-time single particle

acquisition with fast data processing for routine analytical use. This vertical module is an extension of PerkinElmer's Syngistix for ICP-MS software and NexION® series of ICP-MS instruments that allows for fast continuous data acquisition (100,000 points/sec at 10 μ s dwell time), thanks to a combination of unique hardware, patented software and scientific knowhow for the analysis of nanomaterials. These capabilities provide users with several important nanoparticle characteristics such as inorganic composition, concentration, size, size distribution, and agglomeration, as well as the ability to differentiate between ionic and particulate fractions – all through a single interface that eliminates the need for labor-intensive data processing.

The Syngistix Nano Application Module incorporates all single particle analysis needs into an intelligent workflow. The Analysis panel (Figure 1) contains all the parameters necessary to set up methods and batches: analyte drop-down menu, analytical profile selection (Standard or Reaction), multi-point calibrations (both ionic and dissolved) and automated transport efficiency calculation, among others. In addition an “Advanced” button allows access to even more parameters, including threshold override and user-defined binning size and range. The patented data processing algorithm allows real-time background correction, enabling instant data visualization of both pulse intensity vs.

time and the intensity histogram displaying the frequency vs. peak area. This powerful combination of method and data acquisition parameters provides a great deal of flexibility for a wide variety of laboratory operations.

The Results panel (Figure 2) allows users to review and interact with the data once it has been processed. Options include changing the threshold and bin sizes, setting integration parameters, and applying both ionic and particle calibrations, among others. With this intelligent workflow, users will be able to focus on what matters most – the results.

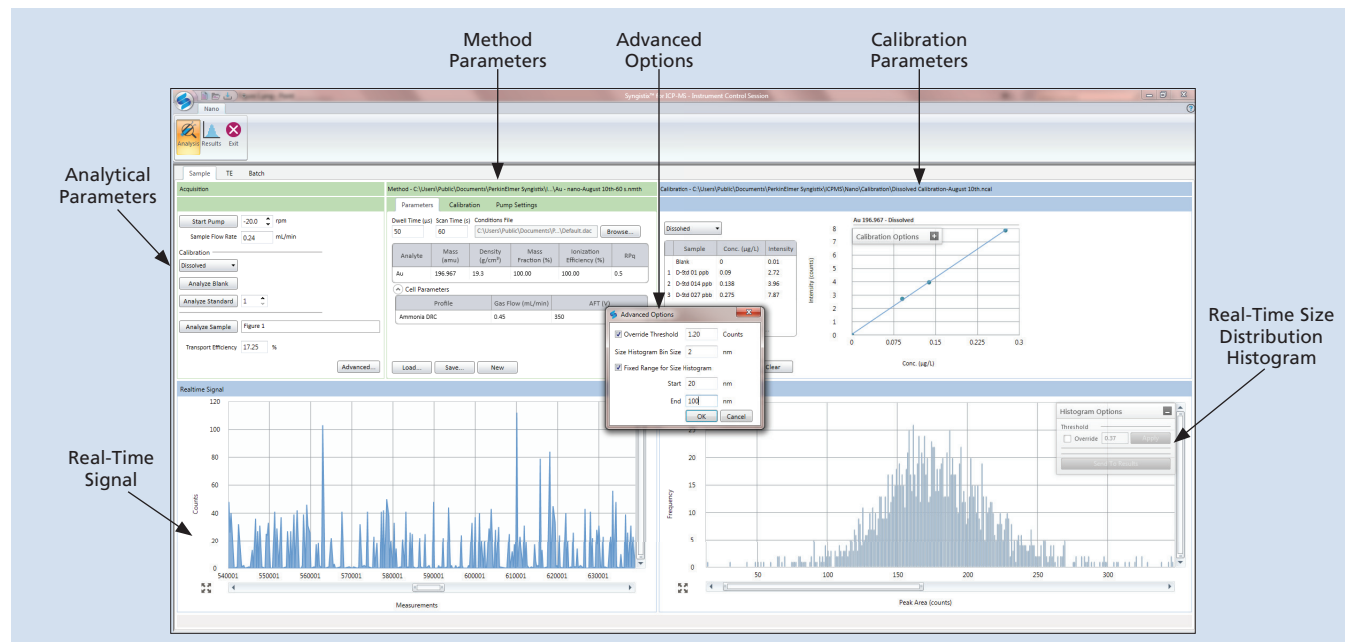


Figure 1. The Analysis panel, featuring acquisition, method, and calibration parameters, as well as advanced options and real-time views of the signal and distribution histogram.



Figure 2. The Results panel, featuring method parameters, file information, both dissolved and particle calibration curves, and a scrolling list of results which reflects changes to the integration window on the size distribution histogram.

With the Nano Application Module, data can be viewed as it is being acquired in real-time: individual nanoparticle events are displayed and converted to a background-corrected intensity histogram which continuously updates during data acquisition, thanks to the Syngistix Nano Module's patented algorithm for automated threshold detection. Figure 3 is a snapshot of the Analysis panel taken during data acquisition, showing both the real-time signal and histograms. The real-time display of results is unique to the Syngistix Nano Module and provides users with

instant information on the sample being analyzed, including whether further dilution is necessary to avoid particle coincidence.

Using the Batch functionality available in the Syngistix Nano Module, sample lists with multiple methods and calibrations (ionic and/or particulate) can be created and run automatically, allowing for high throughput, maximum flexibility, and eliminating the need for user intervention. An example of this Batch functionality feature is displayed in Figure 4.

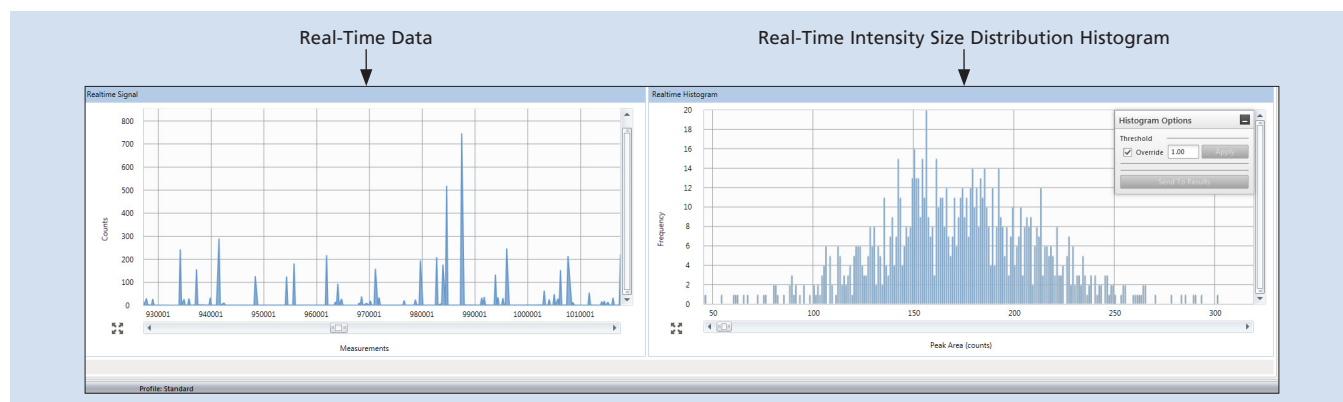


Figure 3. A snapshot of the Analysis panel taken during acquisition showing both the real-time data (zoomed-in to show individual pulses) and the real-time distribution histogram.

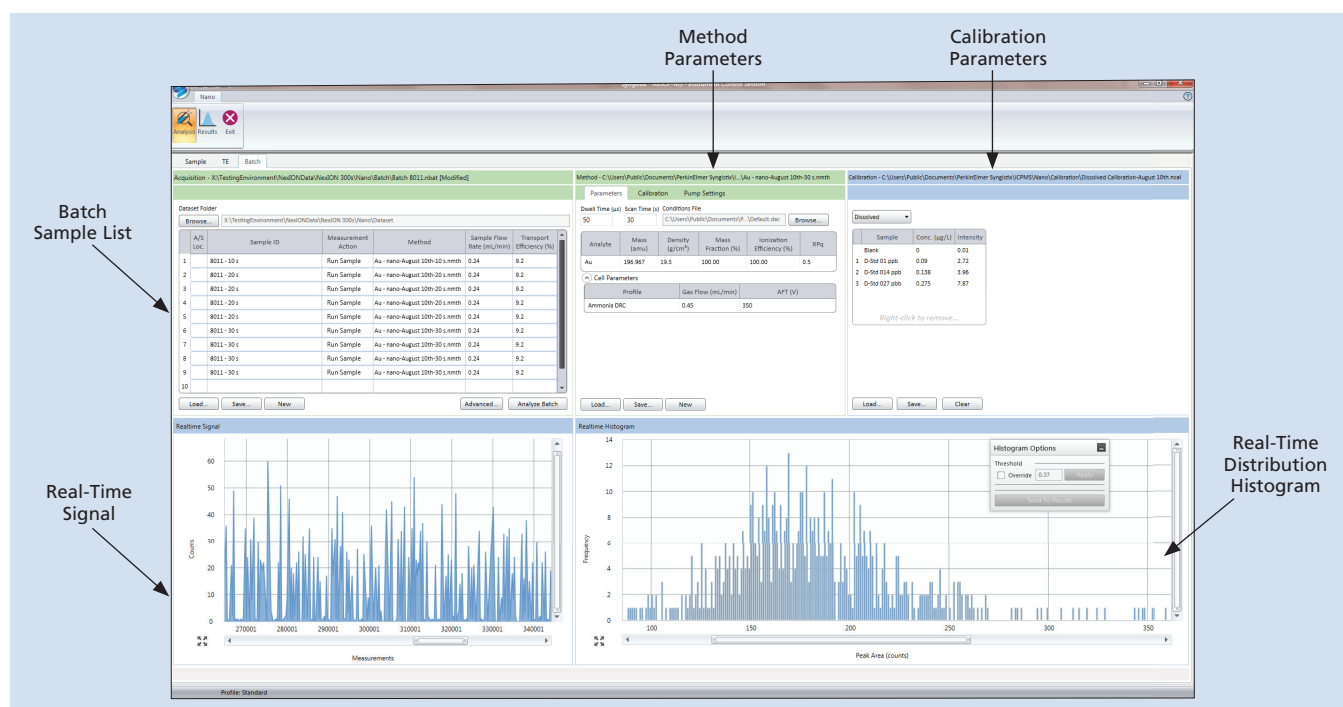


Figure 4. Analysis panel featuring the Batch sample list, allowing for unattended analysis when using an autosampler.

Once data acquisition has been completed, the results environment allows the user to review the data, both through a Results table and accompanying histograms. These formats allow for ease of verification, offering a multitude of additional information, such as most frequent size (nm), mean size (nm), number of peaks detected within an acquisition period, mean particle counts, particle concentration (part/mL), mean dissolved counts, mean dissolved concentration ($\mu\text{g/L}$) and the binning range. The user can

interact with the data in the histogram for each sample and adjust a variety of parameters, including the dynamic fitting window, bin range, and peak fit (Gaussian, log normal, maximum intensity). Whenever changes are made to the histogram, the Results table is instantly updated, with the changes appearing in green, as shown in Figure 5. The original data remains, so the user can quickly compare the effects of the changes.



Figure 5. Results panel displaying reprocessed data (in green, in the scrolling list of results), reflecting changes made to the adjustable integration window.

Last but not least, the Syngistix Nano Module provides two different types of export functions allowing data to be shared with collaborators or colleagues:

- The Results table can be exported for quick review
- All the information on a single sample (including sample data, size and intensity histograms, as well as calibration information) can be exported for post processing and other data manipulations.

PerkinElmer's Syngistix Nano Application Software Module is the ideal tool for laboratories analyzing nanomaterials. This unique application module allows the differentiation and quantification between the dissolved and particulate fractions of the same analyte. In a single analysis, particle composition, concentration, size, and size distribution can be determined without the need for subsequent data processing. Coupled with the NexION series ICP-MS systems, the Syngistix Nano Application Module is the world's first single particle ICP-MS dedicated analysis software, delivering speed, flexibility, automation, and ease-of-use.