

# Nanotrap™ Biomarker Discovery Platform

ENRICH, PRESERVE, AND SCREEN  
LOW-LEVEL BIOMARKERS



# Rapidly Resolve Complex Samples

*The Nanotrap™ Biomarker Discovery Platform provides researchers a simple solution to complex problems by offering the capability to enrich, preserve, and screen low-level biomarkers directly from complex biological samples.*

Biomarkers for early disease detection and therapeutic development are in high demand. The discovery process is hindered by several complex challenges, including wide sample dynamic range, limited instrument sensitivity and labor intensive data mining. Such barriers require researchers to implement various sample fractionation and enrichment strategies. These strategies must address several concerns.

Firstly, biological fluids (including human plasma, sera, urine, and saliva) contain a wide range of protein concentrations. High-abundance, less-relevant proteins mask the presence of disease-specific biomarkers in biomarker discovery experiments. Secondly, potential biomarkers are susceptible to degradation by proteases, enzymes or analytical processes, potentially removing these biomarkers as candidates for disease detection. Additionally, the fractionation strategies must be scalable to a wide variety of protein concentrations as well as biological sample volumes and types.

The Nanotrap Biomarker Discovery Platform provides affinity capture and amplifications of low-level biomarkers, excludes abundant proteins, protects harvested biomolecules from degradation and integrates all aspects of the discovery process.

## **Biomarker Challenges:**

*Complex fractionation and enrichment*

*Difficult to analyze low-level analytes*

*Samples contain many abundant proteins*

*Sample processing requires automation*

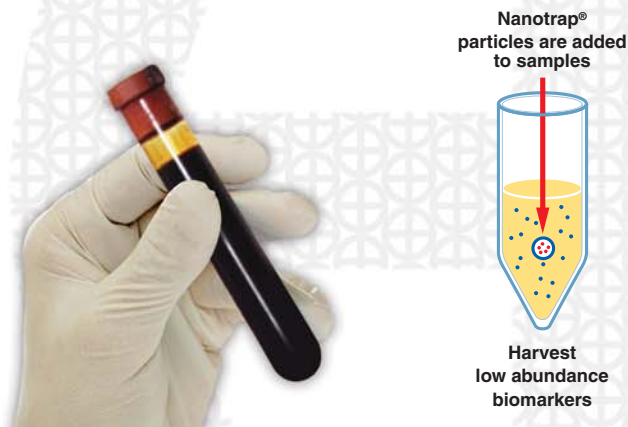
*Potential biomarkers may degrade*

**The Nanotrap Biomarker Discovery Platform offers a fully integrated solution for discovery, identification, and validation.**

**[www.BiomarkerDiscovery.com](http://www.BiomarkerDiscovery.com)**

Simplify Your Workflow, Accelerate Discovery,

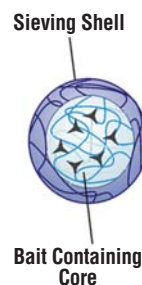
## Introducing the Nanotrap™ Biomarker Discovery Platform



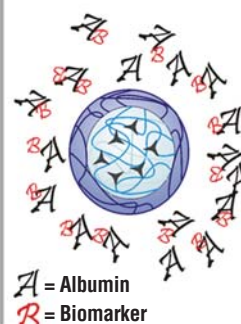
Now Capture the

Nanotrap™ (Ceres Nanosciences) Particles are core shell hydrogel particles<sup>1</sup> with porous interiors containing various affinity selector baits and size exclusion exteriors. These particles deliver affinity selection and size exclusion in a single step, enabling the harvesting of low-abundance biomarkers directly from complex samples. These particles offer simplified fractionation and enrichment, serving as molecular mops which purify, concentrate, size-exclude, and preserve the low-abundance proteome.

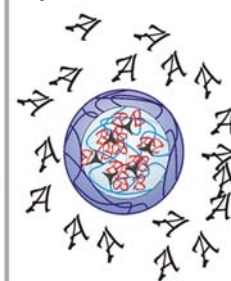
### Structure of Core Shell Particles



### Core Shell Particles in Solution



### Biomarkers Harvested by Core Shell Particles



## Nanotrap™ Advantages:

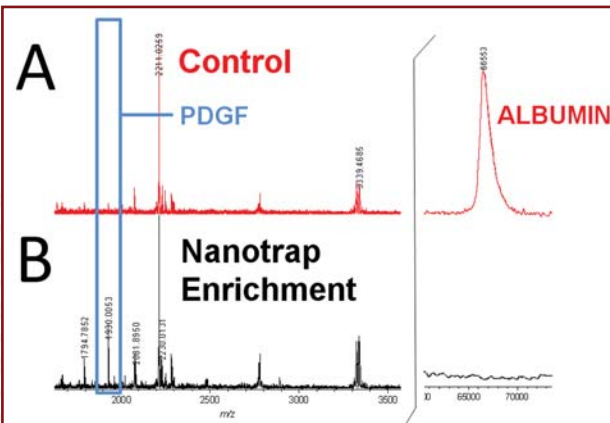
One-step fractionation and enrichment

Bind low-level compounds

Exclude undesired molecules

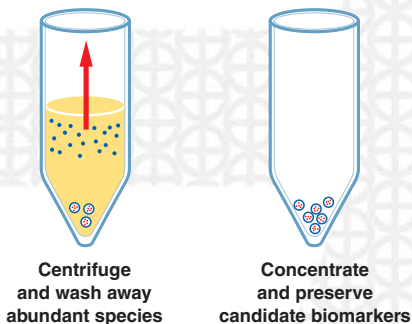
Automated sample processing

Protect trapped analytes



One-step enrichment of Platelet Derived Growth Factor (PDGF) peptide (1930.0 Da) using nanotrap particles. PDGF (60ng) in the presence of albumin (600ng) was processed with nanotraps to sequester and enrich the extremely labile PDGF protein. Comparison of MALDI mass spectra of a control (A) to a sample processed with nanotraps (B) demonstrates the capability to exclude abundant, high molecular weight proteins (e.g. albumin) and simultaneously amplify a low-level PDGF peptide (highlighted in blue), resulting in an 8-fold increase in signal intensity (left).

# and Mine the Low-Abundance Proteome



## Impossible...

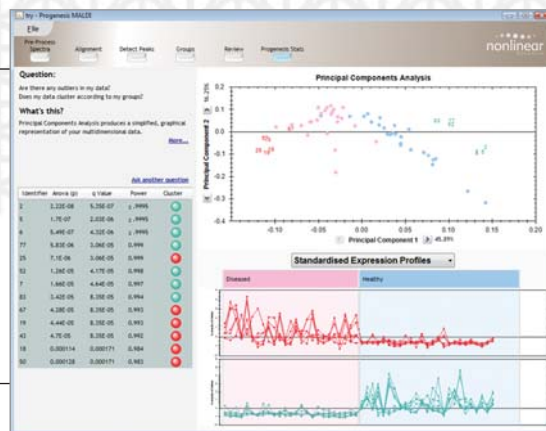
Shimadzu AXIMA MALDI's offer the highest sensitivity, widest mass range, and highest energy CID for peptide fragmentation. Nanotrap enriched samples are analyzed rapidly and reproducibly in a fully automated format.



*Disposable Fleximass-DS targets (SONY DADC) are available for contamination-free analysis and sample archiving.*



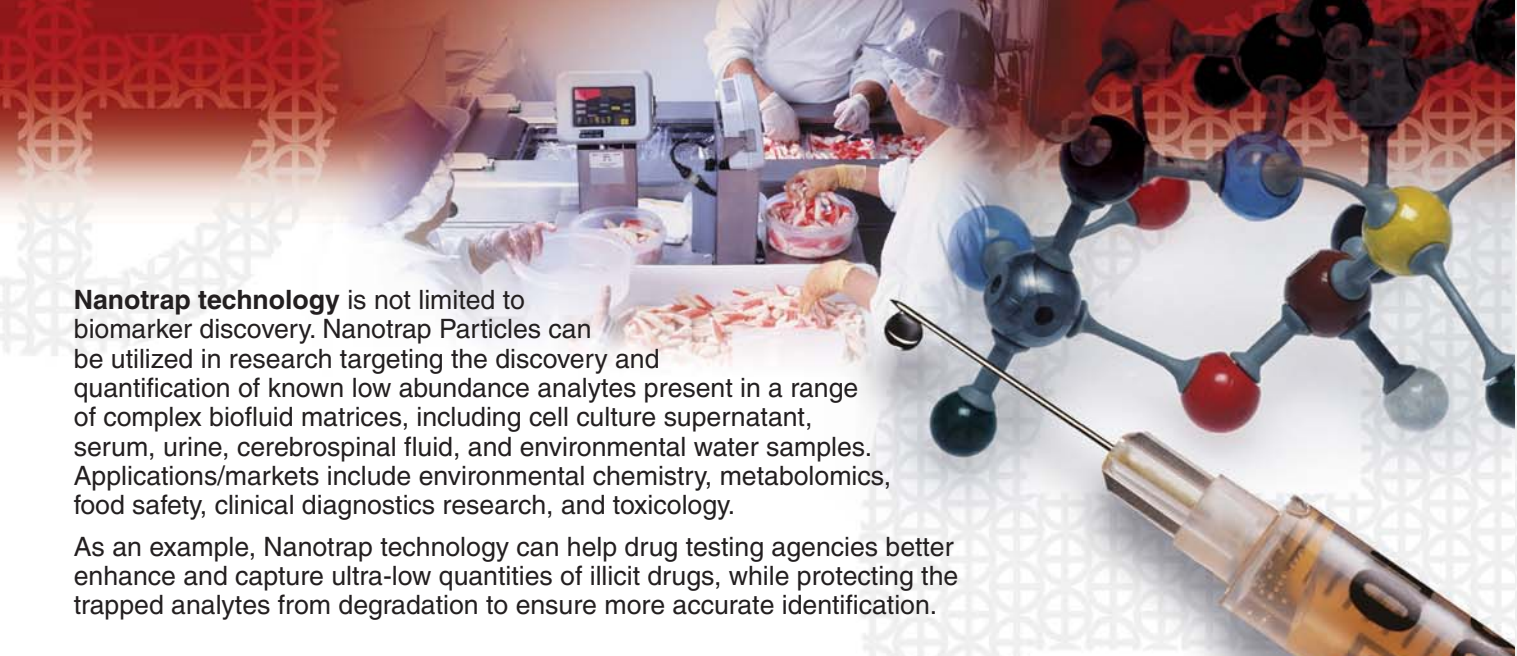
Progenesis MALDI bioinformatics software (Nonlinear Dynamics, UK) combines flexible data processing with reliable and unique peak detection and alignment algorithms to ensure high quality sample comparisons. The rigorous statistical tests and easy to interpret output displays provide confident, reliable results. Progenesis MALDI software is a fully integrated component of the Nanotrap Biomarker Discovery Platform, adding speed, objectivity, and statistics to your discovery process.



**Give the Nanotrap™ Biomarker Discovery Platform a Try...**

**Contact Us Today to Set Up a Trial!**





**Nanotrap technology** is not limited to biomarker discovery. Nanotrap Particles can be utilized in research targeting the discovery and quantification of known low abundance analytes present in a range of complex biofluid matrices, including cell culture supernatant, serum, urine, cerebrospinal fluid, and environmental water samples. Applications/markets include environmental chemistry, metabolomics, food safety, clinical diagnostics research, and toxicology.

As an example, Nanotrap technology can help drug testing agencies better enhance and capture ultra-low quantities of illicit drugs, while protecting the trapped analytes from degradation to ensure more accurate identification.

## Integrated Solutions to Accelerate Research

*In addition to our Nanotrap™ Biomarker Discovery Platform, we offer a wide range of solutions to address your application requirements. These include:*

### Tissue Imaging

Integration of an AXIMA Series MALDI with the CHIP-1000 Chemical Printer creates a powerful platform for tissue imaging. The CHIP allows deposition of discrete droplets minimizing diffusion and maintaining localization of components within the tissue. Seamless export of sample location to an AXIMA MALDI enables routine profiling or imaging experiments.



### LC-MALDI

LC-MALDI experiments may be easily performed using proprietary software and full integration with the high-capacity LC spotting robot, the AccuSpot. The software suite allows the fully automated acquisition of LC-separated samples deposited onto MALDI targets and the subsequent identification of proteins via MS/MS of the peptides detected.



### 2D LC

Shimadzu is well-known for their modular HPLC systems. The modular components interact with the precision of an integrated system while allowing users to design and upgrade a system to fit their needs, making them ideal as Mass Spec front ends. Various 2D-HPLC configurations are available to address specific applications, including online proteomics, bioanalysis, protein analysis, and nano LC.



## Nanotrap™ Biomarker Discovery Platform

A fully integrated biomarker discovery platform designed to rapidly enrich, preserve and screen the low-abundance proteome. This platform combines the unique harvesting capabilities of nanotraps with reliable AXIMA MALDI MS<sup>2</sup> detection and powerful, integrated Progenesis MALDI discovery/validation informatics. Trade in your old MALDI system today for the ultimate upgrade!

## Nanotrap™ Particle Kits

Nanotrap particle kits offer unique capabilities for enrichment, concentration and purification of biomarkers in complex biofluid samples. White particles are optimal for concentrating low-molecular weight cationic peptides and proteins in a range of biological fluids including serum, plasma urine, saliva, and cerebrospinal fluid. Blue particles have high affinity for most proteins and are best used to fractionate and concentrate low-abundance proteins and peptides.

*Visit [www.BiomarkerDiscovery.com](http://www.BiomarkerDiscovery.com) for more information or to request a demonstration.*



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