



Malvern

| Material relationships



PARTICLE SIZE



PARTICLE CONCENTRATION

NANOSIGHT RANGE

Visualize and measure nanoparticle
size and concentration

VISUALIZE AND MEASURE NANOPARTICLE SIZE AND CONCENTRATION

The NanoSight series of instruments utilize Nanoparticle Tracking Analysis (NTA) to characterize nanoparticles from 10nm - 2000 nm* in solution. Each particle is individually but simultaneously analyzed by direct observations of diffusion. This particle-by-particle methodology produces high resolution results for particle size distribution and concentration while visual validation gives users extra confidence in the data. As well as particle size and concentration, protein aggregation and viscosity can all be analyzed while a fluorescence mode provides detection of labeled particles

Key Benefits of a NanoSight System

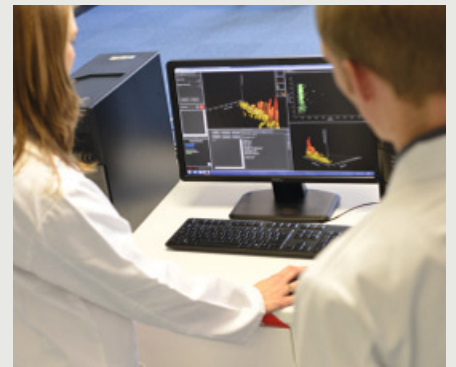
- Simultaneous measurement of multiple characteristics saving on time and sample quantities
- Visual validation of results gives extra confidence
- User friendly software with easy set up of SOPs for routine use
- Minimal sample preparation
- The option of automated multiple sample analysis when used with a syringe pump or autosampler
- Multiple options on each instrument gives exceptional versatility and choice
- Minimal consumables reduce running costs on a day to day basis
- High resolution particle sizing technique, ideal for polydisperse systems

Applications

- Development of drug delivery systems
- Viral vaccine research
- Nanotoxicology and biomarker detection
- Protein aggregation research
- Extracellular vesicle characterization for various disease state studies

Key Specifications

- Size 10 nm - 2000 nm*
- Concentration 10^6 - 10^9 particles per mL
- Fluorescence detection



* dependent on material

SIZE MEASUREMENT WITH NANOPARTICLE TRACKING ANALYSIS

NTA detects and visualizes populations of nanoparticles from 10 nm to 2000 nm on a particle-by-particle, providing high resolution size distributions.

MEASURING SIZE

NTA is a method of visualizing and analyzing particles in liquids, that relates the rate of Brownian motion to particle size. The rate of particle movement is related to the viscosity of the liquid, the temperature and size of the particle and is not influenced by particle density or refractive index.

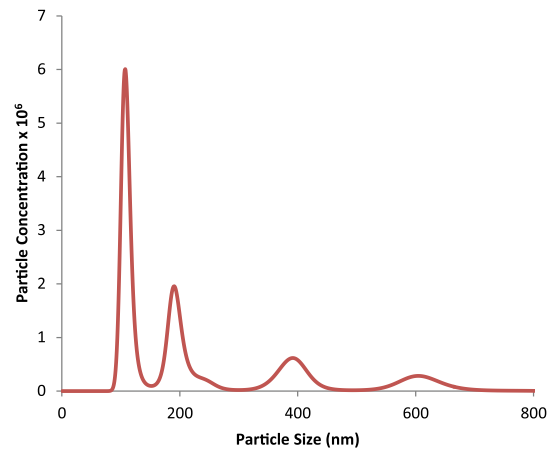
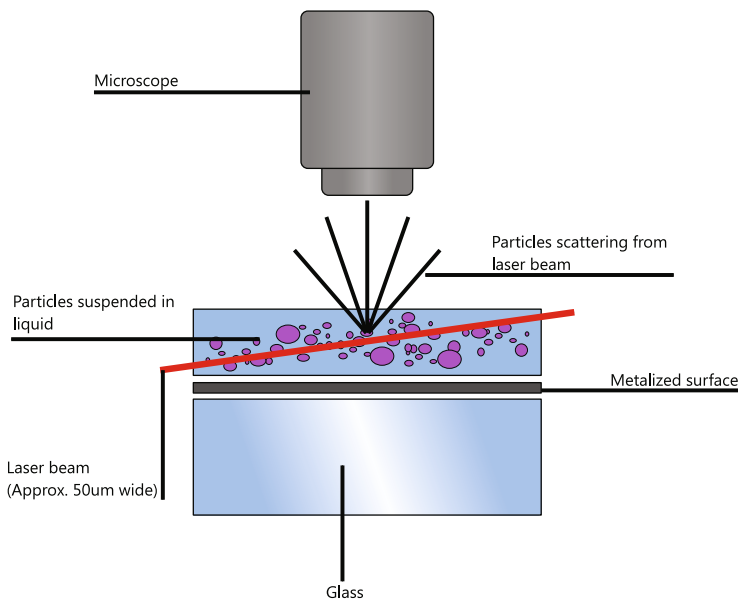
The particles contained in the sample are visualized by virtue of the light they scatter when illuminated by laser light. The light scattered by the particles is captured using a scientific digital camera and the motion of each particle is tracked from frame to frame by the specially developed software.

This rate of particle movement is related to a sphere equivalent hydrodynamic radius as calculated through the Stokes-Einstein equation.

The technique calculates particle size on a particle by particle basis overcoming inherent weaknesses in ensemble techniques. Also, since video forms the basis of the analysis, accurate characterization of real time events such as aggregation and dissolution is possible.

MEASURING CONCENTRATION

NanoSight's unique single particle detection system allows particle concentration to be measured in the 10 nm - 2000 nm diameter range in liquid suspension. The ability to measure concentration and apply this to product performance goes beyond simply measuring particle size and provides the user with a more detailed understanding of their sample. Measuring particle concentration is a requirement across a range of applications.



Graph of a sample with distinct peaks at 100 nm, 200 nm, 400 nm and 600 nm.

NANOSIGHT NS300



This elegant new instrument offers a compact format, with the major benefit of an enhanced high capacity motorized fluorescence disc.

The NS300 is the natural progression from the NS500 and LM10. It takes the most popular features of these instruments and combines them into an easy to use, compact format.

Features

- Motorized fluorescence filter wheel
- Small footprint

www.malvern.com/ns300

Specifications	Options
Laser Wavelengths	405 nm (Violet), 488 nm (Blue), 532 nm (Green), 642 nm (Red)
Temperature Control	5 °C below ambient to 50 °C
Stage	Fixed stage
Focus	Computer controlled motorized focus
Camera	sCMOS
Fluorescence	Computer controlled motorized spinning disc

NANOSIGHT NS500



This versatile instrument offers an adaptable format, with a major benefit of a new enhanced fluorescence capability, giving a truly holistic analysis. The on-board fluidics mean sample loading, cleaning and analysis can be automated allowing multiple analyses to be set up and then run without the operator being present, freeing up valuable researcher time. It comes with a choice of standard CCD or high sensitivity sCMOS camera, temperature control and a choice of laser wavelength.

Features

- Automated sample loading and washing
- Adaptable format

www.malvern.com/ns500

Specifications	Options
Laser Wavelengths	405 nm (Violet), 488 nm (Blue), 532 nm (Green), 642 nm (Red)
Temperature Control	5 °C below ambient to 50 °C
Stage	Computer controlled motorized stage
Focus	Computer controlled motorized focus
Camera	CCD or sCMOS
Fluorescence	Manual push/pull filter holder with two filters

NANOSIGHT LM10



This versatile instrument offers an adaptable format.

The LM10 is a highly flexible and robust instrument that can be upgraded at any time to fit the growing needs of both routine testing and research laboratories. It comes with a choice of cameras, lasers, and filters as well as the option of a temperature-controlled sample chamber.

Features

- Robust adaptable format
- Interchangeable laser modules

www.malvern.com/lm10

Specifications	Options
Laser Wavelengths	405 nm (Violet), 488 nm (Blue), 532 nm (Green), 642 nm (Red)
Temperature Control (with LM14 Laser Module)	5 °C below ambient to 50 °C
Stage	Manual stage
Focus	Manual focus
Camera	CCD or sCMOS
Fluorescence	Manual push/pull filter holder with two filters

ACCESSORIES



Syringe Pump

The NanoSight syringe pump add-on is available for all systems allowing users to perform sample analysis at a constant flow rate offering improved sampling. This single-syringe pump module is highly recommended for the flow-controlled detection of the fluorescent signal from many fluorescently-labeled particles. The NTA software automatically compensates for any flow in the sample whilst analysis is underway.

Application

- Flow detection of fluorescent signal
- Automated multiple analysis of low concentration samples



Autosampler

The NanoSight autosampler accessory can be used with the NS500 to allow the user to load and measure a large number of pre-prepared samples automatically without user intervention. Samples are sequentially loaded into the NS500 sample chamber for measurement with a pre-programmed wash cycle between each sample.

Uses

- Analysis of multiple dilution runs
- Analysis of similar samples for QA or to assess batch to batch variation
- Analysis of different sample types where a protocol for measurement has already been prepared

NANOSIGHT SOFTWARE



The software supplied with all NanoSight systems is specifically designed to meet the needs of researchers and technicians from all industries. It is designed to be easy to use for both new and experienced users. With easily set up standard operating procedures (SOPs) for routine work as well as access to raw data for the more experienced user to enable in-depth analysis of results.

Features

- SOP development
- Standard or customized reporting
- Full access to raw data if required
- Complete control of standard accessories within the software

NTA KEY FEATURES

- High resolution particle size distribution algorithm
- Advanced image analysis, particle detection and tracking
- Integrated scripting option for SOP development
- Basic statistical parameter output
- Vibration detection and correction
- Integrated hardware control and communication
- PDF and CSV document export options

GLOBAL SUPPORT WHERE AND WHEN YOU NEED IT



When you purchase a Malvern product we understand that this is only the first stage of a collaborative relationship that lasts for the lifetime of the instrument and we want you to achieve the maximum return from your investment. At Malvern we are committed to providing the highest quality support, from simply answering occasional questions and supplying software updates through to delivering a comprehensive support package with priority call out and fixed costs of ownership.

Within our organization we not only have scientists who are leaders in their chosen fields, but also the accumulated knowledge and

experience of more than 45 years in materials characterization across a very broad range of industries. Our customers can access this global technical and applications expertise through a variety of convenient channels and in formats structured to ensure the widest possible availability, anywhere in the world. Dedicated Helpdesk teams provide telephone and email support, ensuring you get a complete answer to any questions. Our specialists deliver training via convenient online e-learning, classroom participation at a Malvern facility or on-site in your workplace. We help with validation documentation, provide expert applications support and offer a range of service contracts appropriate to individual needs.

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Making material relationships work better

NANOSIGHT INSTRUMENT SPECIFICATIONS

	LM10	NS300	NS500
Stage Type			
Manual	•		
Automatic			•
Fixed		•	
Camera			
Standard CCD	•		•
High-Sensitivity sCMOS	•	•	•
Laser Wavelengths			
55 mW at 405 nm	•	•	•
45 mW at 488 nm	•	•	•
50 mW at 532 nm	•*	•	•
40 mW at 642 nm	•	•	•
Size			
Size Range	10 - 2000 nm**		
Concentration			
Concentration Range	10 ⁶ - 10 ⁹ Particles per ml		
Temperature			
Temperature Control	•*	•	•
Temperature Range	5°C below ambient to 50°C		
Additional Options			
Fluorescence	•	•	•
Autosampler			•
Syringe Pump	•	•	•
Multiple Filter Array		•	

	LM10	NS300	NS500
Sample Volume			
Sample Volume Requirements	0.3 ml	0.3 ml	0.6 ml
Solvent			
Solvent	Non-corrosive solvent + water		Aqueous samples only
Dimensions			
Dimensions (H * W * D)	42 cm * 20 cm * 26 cm	40 cm * 25 cm * 40cm	53 cm * 51 cm * 46 cm
Weight			
Instrument Weight	7 kg	12 kg	42 kg
Packed Weight	14 kg	25 kg	52 kg
Power			
Power Requirements	110 - 220 V*	110 - 220 V	
Connectivity			
IEEE 1394a (CCD)	•		•
IEEE 1394b (sCMOS)	•	•	•
USB	•*	•	•

* with the addition of the LM14 laser module

** dependent on material type



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Patents:

Optical detection and analysis of particles
W02013021185

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