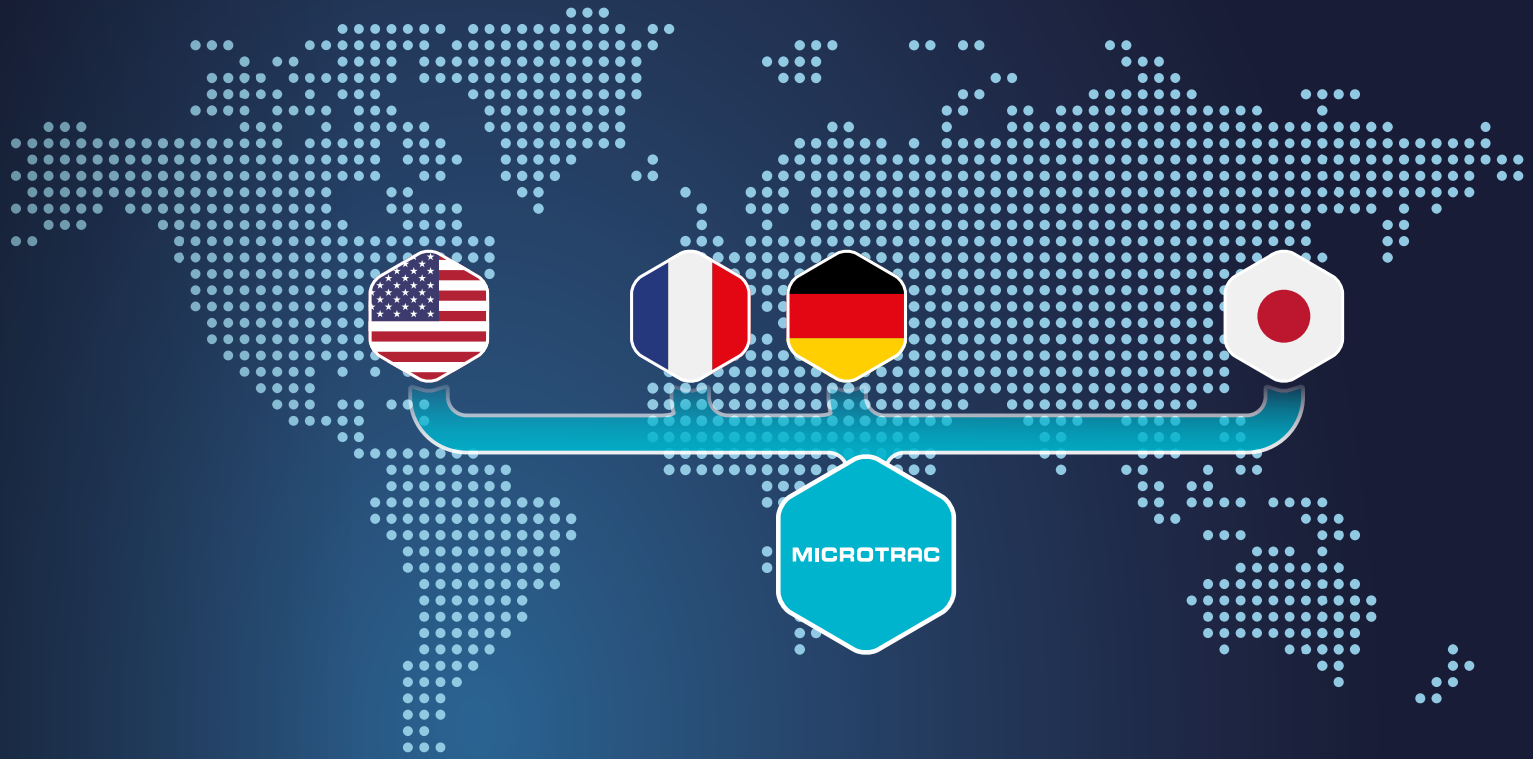
MICROTRAC
a VERDER company

PRODUCT OVERVIEW



I PARTICLE SIZE & SHAPE
I STABILITY & SHELF-LIFE
I SURFACE AREA, PORE SIZE & CATALYSIS

EXPERT IN PARTICLE CHARACTERIZATION



MICROTRAC

PARTICLE CHARACTERIZATION AT ITS BEST

MICROTRAC is your preferred partner for the comprehensive characterization of particulate systems. We provide our customers with advanced technologies to obtain consistently reliable results. Innovation and quality are at the core of everything we do.

As part of Verder, we provide worldwide support through a network of subsidiaries and distributors.



Our three areas of expertise

MICROTRAC: YOUR SINGLE-SOURCE PARTNER FOR PARTICLE CHARACTERIZATION

SIZE & SHAPE

Know your particles. Control your quality. Drive your research forward.



Size & Distribution | Shape

Our expertise in particle size distribution and shape analysis powers precise quality control and cutting-edge R&D. Two core technologies make it possible: **Dynamic Image Analysis (DIA)** on the **CAMSIZER**, and the unique combination of **Laser Diffraction (LD)** and **Dynamic Image Analysis** on the **SYNC** systems.

Together, they cover every size range from 10 nm to 135 mm, for dry and wet samples alike. Advanced light scattering, state-of-the-art cameras, and sophisticated software deliver outstanding accuracy and repeatability, every single measurement.

STABILITY & SHELF LIFE

Particle size, zeta potential, stability: master all three.



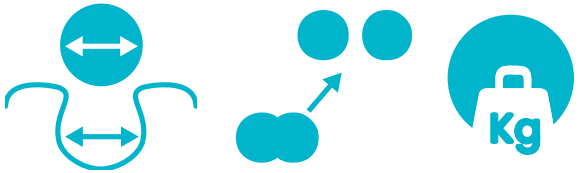
Particle size | Zeta potential | Stability & Shelf-Life

When it comes to colloids and formulations, these are the parameters that matter. With **NANOTRAC, STABINO**, and **TURBISCAN**, MICROTRAC covers them all on powerful, complementary technology platforms. Using **Dynamic Light Scattering (DLS), Static Multiple Light Scattering (SMLS)**, and **Zeta Potential (ZP)**, our systems accelerate R&D and secure quality control for the highest product standards.

The result: measurements without dilution, with high accuracy and at high speed, so you can make confident decisions based on reliable data.

POROSITY & CATALYSIS

Uncover what's inside: surface area, porosity, and catalytic performance.



Surface Area & Pore size | Catalysis | Density

MICROTRAC analyzers are renowned for their precision in **gas and vapor adsorption measurements**. They determine BET surface area and pore size distribution for porous and non-porous materials alike. Built on cutting-edge gas adsorption technology, they are widely used in R&D, Quality Control, and Quality Assurance.

Trusted worldwide and backed by the craftsmanship and quality of Japanese engineering, the **BELSORP** and **BELPORE** analyzers deliver the accurate gas and vapor adsorption analysis you need.

GLOBAL PRESENCE - WORLDWIDE SUPPORT

Our competence centers and production sites in Osaka (Japan), Haan (Germany), Newtown, PA (USA) and Toulouse (France) bring MICROTRAC expertise close to our customers. Backed by a worldwide network of subsidiaries, sales representatives and distributors, we provide local support wherever you are.

PARTICLE SIZE & SHAPE

Laser Diffraction

LASER DIFFRACTION (LD) is a leading technique for analyzing particle size in both research and industry settings. It is renowned for its precision, versatility and its broad range of applications measuring particle sizes from 10 nanometers to 4 millimeters. The particle size is measured by detecting the angular intensity of the scattered light. Small particles scatter light at large angles, while large particles scatter light at small angles relative to the laser beam.

The **SYNC** uses a state-of-the-art laser diffraction architecture with a unique Tri-Laser arrangement. The scattered light can be measured at various angles up to 163 degrees and with up to 151 channels. All data is collected continuously throughout the measurement and analyzed using MICROTRAC's innovative modified Mie algorithms for high precision and accurate particle size distribution. While the Laser Diffraction measurement is taking place, a high-speed camera is also taking live images of the sample. This patented synchronous measurement of the same sample, in the same sample cell, at the same time is unique to the **SYNC**.

THE NEW SYNC SERIES – FLEXIBLE SOLUTIONS IN PARTICLE SIZE AND SHAPE ANALYSIS

The MICROTRAC **SYNC SERIES** offers unparalleled flexibility in particle size and shape characterization. From simple, manual sample dispersers to full autosampling capability, the user can choose the size range, measuring technology and software capabilities to suit their unique analytical requirements and budget. Using MICROTRAC's patented Synchronous measurement technique, classic Laser Diffraction Analysis and a Dynamic Imaging Measurement are performed on the same sample, in the same sample cell, at the same time, and in wet or dry mode.



0.1 µm - 2 mm

SYNC GO

PARTICLE SIZE MADE SIMPLE

- best cost/benefit ratio for straightforward applications and limited budgets
- 3 red solid-state lasers: low cost of ownership through reduced maintenance
- dry and wet range 0.1 – 2,000 µm
- manual sample delivery: **FLOWSYNC GO** (wet) or **TURBOSYNC** (dry) with plug-and-play exchange
- optional: integrated camera for synchronous size and shape measurements



0.02 µm - 4 mm

SYNC PLUS

PARTICLE SIZE AND SHAPE IN THE SAME OPTICAL BENCH

- patented tri-laser optical arrangement with 3 red solid-state lasers
- dry range 0.1 – 4,000 µm, wet range 0.02 – 2,800 µm
- automatic sample delivery with standard **FLOWSYNC**: programmable fill, flow, measure and rinse sequences
- synchronous measurement reveals particle shape, morphology, dispersion efficiency, agglomerates and outliers



0.01 µm - 4 mm

SYNC PRO

ACCURATE MEASUREMENT AT THE SUB-MICRON SCALE

- ultimate configuration for particle size and shape analysis
- 1 red and 2 blue solid-state diode lasers (not blue LEDs) for unsurpassed sub-micron detection
- dry range 0.1 – 4,000 µm, wet range 0.01 – 2,800 µm
- automatic sample delivery with all automated features of the dispersion units
- **AI** adoption: component differentiation in mixed materials, contamination detection, customized AI models
- optional: integrated camera for synchronous size and shape measurements

new product *measurement range* *for dry samples* *for wet samples* *add-on for existing instrument* *product is CE certified*

PARTICLE SIZE & SHAPE

Dispersion Modules & Accessories & Aerosol Measurement



150 mL - 300 mL

FLOWSYNC GO

SAMPLE DISPERSION CONTROLLER

- manual wet sample dispersion device
- fully solvent compatible for aqueous and non-aqueous suspensions
- impeller speed and drain function controlled by **DIMENSIONS LS**
- flexible filling volume



200 mL

FLOWSYNC

AUTOMATED SAMPLE DISPERSION DEVICE

- fully automated wet sample dispersion device
- programmable auto-sequences: fill, pre-dispersion, set zero, ultrasonic, loading, measurement, rinse
- fully solvent compatible for aqueous and non-aqueous suspensions



40 mL

FLOWSYNC MINI

LOW VOLUME AUTOMATED SAMPLE DISPERSION CONTROLLER

- fully automated small volume wet sample dispersion device.
- liquid volume of 40 mL
- without ultrasonic



dry powder

TURBOSYNC

AUTOMATIC DRY POWDER DISPERSER

- dry dispersion device for the **SYNC** platform
- compressed air, controlled by two automatic regulators, disperses the powder; sample is collected in a vacuum cleaner.



8 mL

SVC SMALL VOLUME CELL

SMALL VOLUME FRACTION CELL

- for extremely valuable samples, very small sample amounts or very valuable suspending fluids
- fitted with an impeller
- placed in the sample cell holder of the **FLOWSYNC GO** or **FLOWSYNC**



up to 64 samples

AUTOSAMPLER

AUTOMATED SAMPLING PLATFORM

- robotic arm introduces sample vials with dry powders or suspensions to the **FLOWSYNC**
- robotic arm, sample tray and **SYNC** system fixed on one platform
- vial washing facility ensures complete sample transfer; sequence fully controlled by the instrument software



0.5 µm – 2 mm

AEROTRAC II

SPRAY AND DROPLET ANALYZER

- analyzer for droplets, spray particles, powder, mist, etc.
- accurate particle analyses at short intervals (0.02 - 500 ms)
- equipped with a semiconductor laser
- different measurement modes to support various applications
- including multiple scattered light correction software as standard

measurement range *for dry samples* *for wet samples* *add-on for existing instrument* *product is CE certified*

PARTICLE SIZE & SHAPE

Dynamic Image Analysis

Information about particle size & shape is an important aspect of process and quality control and R&D. All **DYNAMIC IMAGE ANALYSIS (DIA)** systems by MICROTRAC determine the particle size faster and more precisely than alternative methods like sieving and laser diffraction and offer additional understanding about the particle shape at the same time.

Thanks to the versatile DIMENSIONS software **MICROTRAC DIA** analyzers can emulate and replace the sieve analysis, giving the exact same results.

The unique dual camera measuring setup of the **CAMSIZER 3D / X2+** makes it possible to measure an extremely wide dynamic size range accurately, without having to switch measuring ranges or make hardware adjustments. The sample is transported to the measurement field by a vibratory feeder. During the measurement, the basic camera records large particles, while the zoom camera records the small ones.

The **CAMSIZER 3D** detects particles in free fall several times in different orientations (particle tracking) so that the shape of the particles can be determined with the highest accuracy.



0.9 µm - 8 mm

CAMSIZER X2+

(with X-DRY module & X-JET cartridge)

- dual camera system enables analysis of wide particle size ranges
- size and shape analysis
- detection of oversized and undersized particles and "out of shape" particles
- air pressure dispersion for agglomerating powders
- alternative to sieve analysis and laser diffraction



10 µm – 8 mm

X-FALL CARTRIDGE

(for X-DRY module)

- contact-free dispersion of free-flowing, non-agglomerated particles
- complete sample recovery
- no contamination



0.9 µm - 1 mm

X-FLOW MODULE

- X-Change module for suspensions & emulsions
- integrated ultrasonic module
- resistant to organic solvents
- automatic fill and rinse
- liquid volume 200 mL to 700 mL



20 µm – 30 mm

CAMSIZER 3D

- dynamic image analyzer for free-flowing granules and bulk materials
- patented 3D analysis allows detection of thickness, width and length of every particle.
- dual camera system enables analysis of wide particle size ranges



30 µm – 5 mm

CAMSIZER S1

- 12 Mpixel camera for efficient analysis: high-resolution, excellent repeatability
- easy operation for QC requirements with high sample throughput
- alternative to sieve analysis



160 µm – 135 mm

CAMSIZER XL

- replaces sieve analysis for large particles
- size and shape information for each particle: more than 40 morphological parameters (incl. 3D)
- for robust industrial use

new product *measurement range* *for dry samples* *for wet samples* *add-on for existing instrument* *product is CE certified*

AI-POWERED PARTICLE CLASSIFICATION

From Images to Intelligent Classification

A SINGLE MEASUREMENT, RICHER INSIGHT

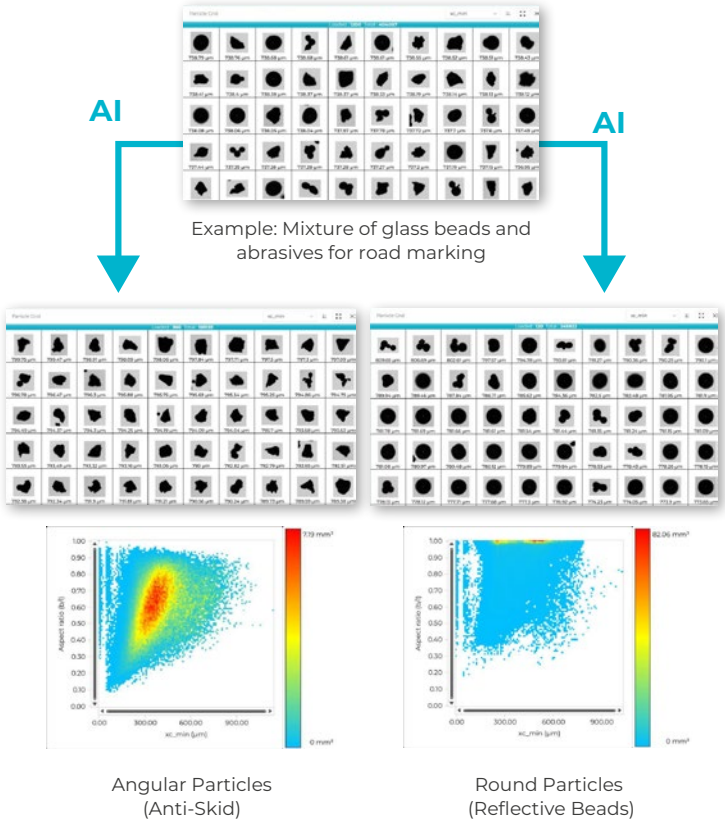
The **CAMSIZER** and **SYNC** series combine **DYNAMIC IMAGE ANALYSIS** with AI Filters in DIMENSIONS to automatically separate particle populations in mixed samples. Using large numbers of individual particle images, they can distinguish particles even when size distributions overlap — based on size, shape, transparency or direct image information.

Each classified population can be reviewed immediately in the Particle Viewer for transparent and objective validation. **DIMENSIONS** then recalculates size and shape distributions for every class and quantifies its volume share, revealing component ratios, contaminants and defective fractions.

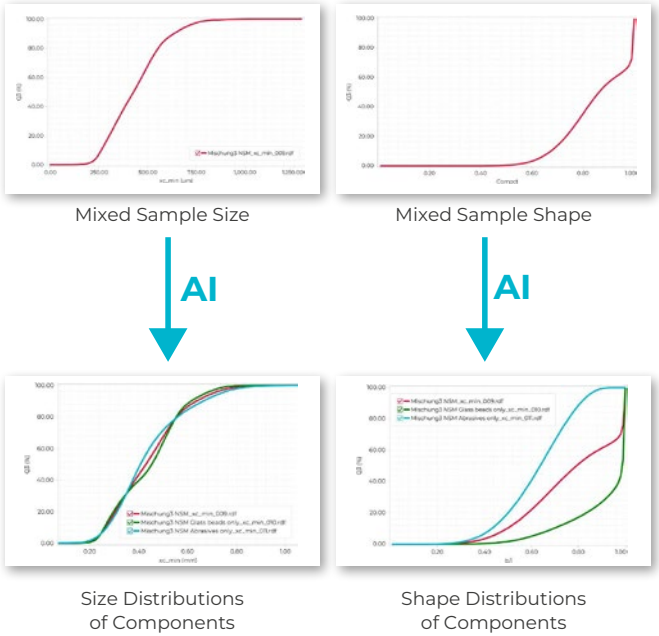
This enables robust quality control, batch-to-batch comparison and reliable detection of small outlier populations in powders, grains, pellets and abrasives. User-trainable filters can be reused for routine QC or R&D, delivering deeper insight from a single analysis.

SMARTER QC, DEEPER INSIGHT.

AI FILTERS SEPARATE PARTICLE POPULATIONS



AI Classification



Class-specific results

FROM AUTOMATIC CLASSIFICATION TO CLASS-SPECIFIC SIZE, SHAPE AND VOLUME RESULTS.

The same data set can be filtered, validated and re-evaluated in seconds.

The MICROTRAC solutions cover a wide range of **APPLICATIONS**. Our analysis systems for particle size & shape are used in numerous industry segments, including the agricultural industry, geology, for catalysts, coal & carbon black, building materials, glass, metal powders, plastics, as well as in the chemical, pharmaceutical and food industries.



PARTICLE SIZE & SHAPE

Applications



COATINGS
Paint, inks, pigments...



CONSTRUCTION MATERIAL
Sand, gravel, cement, gypsum, limestone, glass beads...



PHARMACEUTICALS
Pellets, granulates, active ingredients, excipients...



ENERGY
Battery materials, coal & coke, wood chips...



CHEMICALS
Activated carbon, catalysts, polymers, superabsorbent, refractory products, supporting agents, minerals ...



FOOD
Salt and sugar, ground coffee, dairy products, beverages ...

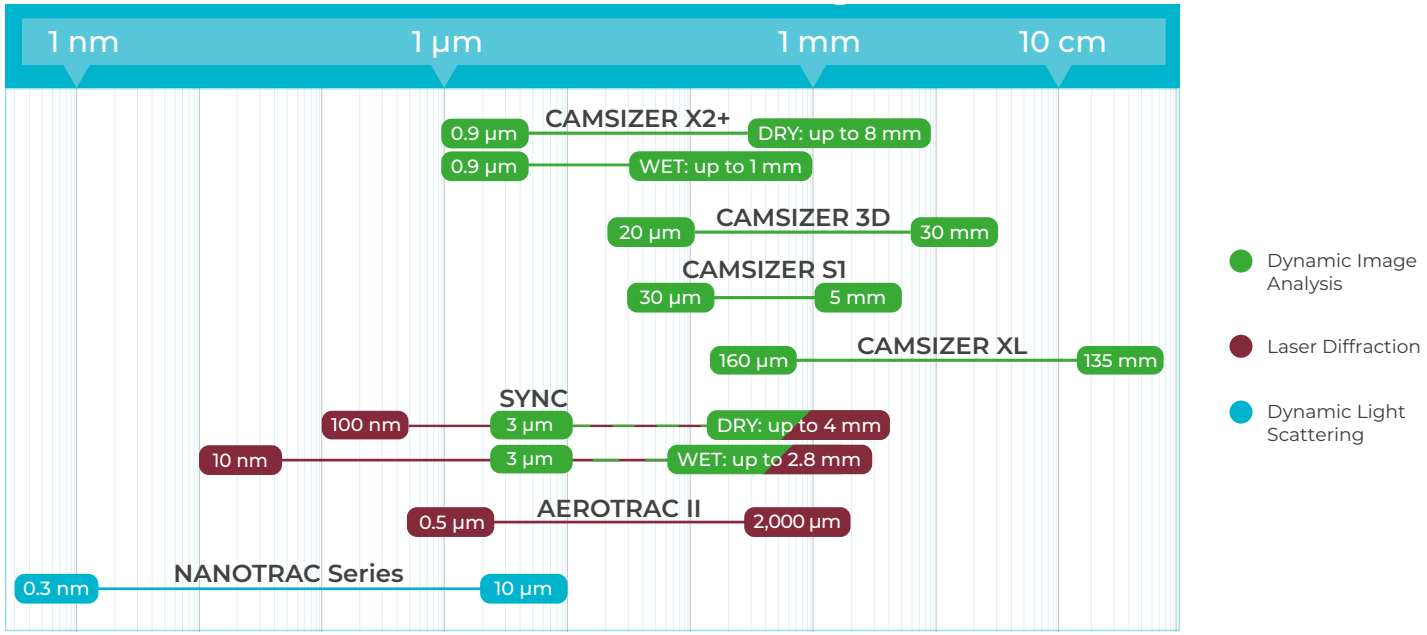


ADDITIVE MANUFACTURING
Metal, plastic and ceramic powders for SLS (PBF), material jetting, binder jetting, sintering, ...



OTHERS
Abrasives, ceramics, extrudates, seeds, fertilizers...

Particle size measurement range



COLLOIDS AND FORMULATIONS

Particle Size & Zeta Potential



0.3 nm – 10 µm

NANOTRAC FLEX

- external “dip-in” probe with 180° backscatter
- allows for turning any vessel into a sample cell
- small volume, as little as one drop of liquid
- universal solvent compatibility
- wide concentration range from ppm to 40 vol %



0.3 nm to 300 µm

STABINO ZETA

- zeta and streaming potential in one measurement
- integrated titrator
- suitable for particles from 0.3 nm to 300 µm
- wide concentration range from 0.01 to 40 vol %
- can be combined with NANOTRAC FLEX for particle size analysis



0.3 nm to 300 µm

DUO

- simultaneous size and stability measurements
- no additional dilution required
- rapid, sequential measurements in one workflow
- direct correlation between particle size distribution and zeta potential results
- each instrument can be operated independently or seamlessly together as a single integrated solution



0.3 nm – 10 µm

NANOTRAC WAVE II

- particle size with fixed optics and removable sample cell (Teflon or stainless steel).
- zeta potential via electrophoresis
- reference beating and 180° backscatter

measurement range *for wet samples* *product is CE certified*

MICROTRAC's innovative approach to **DYNAMIC LIGHT SCATTERING (DLS)** is based on a unique probe design. By focusing the laser probe at the material interface, the benefits of a short path length are combined with Reference Beating and 180° backscatter, delivering excellent accuracy, resolution and sensitivity. The DLS signal is evaluated by using a Fast Fourier Transform.



TURBISCAN offers the ability to investigate the dispersion state, the stability and the shelf-life of liquid dispersions (emulsions & suspensions) and formulations without any dilution, even on highly concentrated samples (up to 95% v/v).

STATIC MULTIPLE LIGHT SCATTERING (SMLS) is based on measuring the transmission and backscattering intensities versus the sample's height and aging time. It offers an extraordinary resolution to detect size and concentration variation. Therefore, particle diameter evolution (like aggregation, flocculation, coalescence) and concentration change (like sedimentation, creaming, phase separation) can easily be detected and monitored, up to 1,000 times faster than visual observation.

SMLS is in perfect agreement with ISO/TR 13097's recommendation regarding shelf-life and stability measurement as a direct optical method that does not require sample preparation (such as dilution) and is the leading technology to measure **stability** and **shelf-life.**

COLLOIDS AND FORMULATIONS

Stability and Shelf-Life



1 sample
from RT to 60 °C

TURBISCAN LAB

- Conc. up to 95%, from 10 nm up to 1 mm
- fast destabilization detection
- Turbiscan Stability Index (TSI), phase separation kinetics, mean particle size kinetics and particle size distribution
- 21 CFR Part 11 compliant



3 samples
from +20 °C to +60 °C

TURBISCAN TRILAB

- Conc. up to 95%, from 10 nm up to 1 mm
- fast destabilization detection
- Turbiscan Stability Index (TSI), phase separation kinetics, mean particle size kinetics and particle size distribution
- 21 CFR Part 11 compliant



6 samples
from +4 °C to +80 °C

TURBISCAN TOWER

- Conc. up to 95%, from 10 nm up to 1 mm
- fast destabilization detection
- Turbiscan Stability Index (TSI), phase separation kinetics, mean particle size kinetics and particle size distribution
- 21 CFR Part 11 compliant



54 samples
from RT to 60 °C

TURBISCAN AGS

- From 1 nm up to 1 mm, conc. up to 95%
- 3 independent storage racks
- fast destabilization detection
- Turbiscan Stability Index (TSI), phase separation (sedimentation, creaming, clarification) kinetics, mean particle size kinetics and particle size distribution



1 sample
from RT to 60 °C – mixing

TURBISCAN DNS

- From 1 nm up to 1 mm, conc. up to 95%
- stability and dispersibility via mixing and circulating function
- Turbiscan Stability Index (TSI), online particle sizing and particle size distribution

for wet samples *online analyzer for process loops* *product is CE certified*

COLLOIDS AND FORMULATIONS

Applications



CHEMICALS & POLYMERS

Surfactants, stabilizers, polymers and biopolymers, fillers, pigments, latexes, solvents, ...



PHARMACEUTICALS

Injectables, parenterals, vaccines, drug delivery systems, skin treatments, inhalers, cough syrups, ophthalmic suspensions, ...



COATINGS, PAINTS & INKS

Water-based, solvent-based, resins, varnishes, inks, primers, protective and special coatings, ...



BATTERY & ELECTRONICS

Anode & cathode slurries, CMP slurries, multilayer capacitors, LCD and LED displays



FOOD & BEVERAGES

Flavor emulsions, beverages, milk and dairy products, vegetable drinks, plant protein, wine & beers, additives, gums and stabilizers, ...



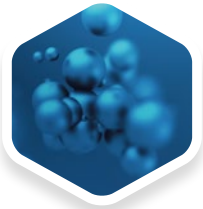
HOME & PERSONAL CARE

Creams & lotions, moisturizers, sunscreens, detergents, fragranced formulations, cleansers, foundations, makeup, nail polishes, ...



OIL & LUBRICANTS

Water-in-oil demulsification, enhanced oil recovery, drilling fluids, crude oils, heavy fuels, fuel & oil additives, metal-working fluids, lubricating agents, ...



AND MANY MORE

Agrochemicals, building materials, colloidal suspensions, nanoparticles...

TURBISCAN SMART ANALYSIS

TURBISCAN Stability Index (TSI)

The TSI is a Turbiscan-specific parameter designed for formulators to compare and characterize the physical stability of various formulations with a single click and a single, comparable and reproducible number. It enables the quantification of any type of destabilization, thanks to a one-click calculation that is a robust and completely user-independent tool.



MICROTRAC's **STABILITY AND DISPERSIBILITY** instruments can analyze a very wide variety of samples: opaque or clear, highly concentrated and very dilute, from nanoparticles to large flocs (mm), emulsions, suspensions, colloids, foams, ...



VISIT OUR APPLICATIONS DATABASE

Interested to hear more about applications in each industry, visit the MICROTRAC website

START EXPLORING!

www.microtrac.com/applications

DIMENSIONS
MEASUREMENT & EVALUATION SOFTWARE

EVERYTHING UNDER CONTROL WITH DIMENSIONS

DIMENSIONS is Microtrac's proprietary measurement and evaluation software for the dynamic image analysis and laser scattering product lines as well as the Turbiscan product range. The software comprises clearly structured Workspaces for method development, operation of the analyzer, result presentation, evaluation of several analyses, and recalculation and Image/Particle display.

Individual Workspaces can be separated from the program and transferred to a second monitor to give you full control of all relevant processes and parameters. The Workspaces for the result evaluation remain accessible during the entire duration of the analysis.

ONE LAYOUT AND STRUCTURE AND OPERATING PHILOSOPHY FOR MULTIPLE TECHNOLOGIES

FUNCTIONS OF THE DIMENSIONS SOFTWARE

- Simple method development
- Clearly structured result presentation
- Integrated data management
- Recalculation of measured results
- Comprehensive evaluation
- ... and much more!

DIMENSIONS LS
ALL SOFTWARE REQUIREMENTS IN ONE POWERFUL SOLUTION



The **DIMENSIONS LS** software is available for the following instruments:

- **NANOTRAC FLEX** & **NANOTRAC WAVE II** (including Zeta)
- **SYNC**

DIMENSIONS LS Operating Software provides a workspace environment for method development, measuring, saving, recalling, exporting and processing particle size and shape data. Users can switch easily from one workspace to another in real time. The particle viewer provides a detailed description of each individual particle. Full software features are available on all versions of the **SYNC** platform.

Any of the sample dispersion devices can be exchanged with any **SYNC** optical bench in less than 30 seconds with the platform's Plug'n'Play feature.

DIMENSIONS IA

NEW MEASUREMENT & EVALUATION SOFTWARE FOR MICROTRAC CAMSIZER



The **DIMENSIONS IA** software is available for the following instruments:

- **CAMSIZER 3D**
- **CAMSIZER X2+**
- **CAMSIZER S1**

DIMENSIONS IA is the new measurement and evaluation software for Microtrac **CAMSIZER** image analyzers. It combines four dedicated workspaces for method development, instrument control, result presentation, and comparative data evaluation. Users can detach workspaces and display them on a second monitor, allowing results and comparisons to remain visible during a measurement.

The software enables detailed particle size and shape analysis, with numerous morphological parameters available for each particle. Its enhanced Particle X-Plorer supports the visualization and evaluation of particle images through advanced filtering tools. **DIMENSIONS IA** also provides customizable report templates, integrated user management, and compatibility with data and methods from previous software versions.

DIMENSIONS TS

ROBUST SOFTWARE, ROBUST RESULTS



The **DIMENSIONS TS** software is available for the following instruments:

- **TURBISCAN TOWER**
- **TURBISCAN TRILAB**
- **TURBISCAN LAB**

Data acquisition, analysis, and export are seamlessly managed with **DIMENSIONS TS**, the dedicated and intuitive software designed for the TURBISCAN range. Engineered for efficiency, **DIMENSIONS TS** is continuously optimized to deliver faster, clearer, and more actionable insights – helping users obtain reliable results in just a few clicks.

This intuitive software controls multiple instruments from a single PC, providing smooth navigation from setup to analysis. Powered by the TSI algorithm, it delivers fast stability comparisons and advanced tools for analyzing migration rates and particle size evolution. Multi-user and multilingual, it features easy copy-paste data export, full 21 CFR Part 11 regulatory compliance, guided calibration verification, and free continuous updates for long-term confidence.

The **SPECIFIC SURFACE AREA** is calculated via BET theory. This theoretical model can be applied to either single-point or multi-point adsorption measurements. The single-point BET is often used for quality control applications. More accurate data can be obtained by multi-point BET.

The **PORE SIZE DISTRIBUTION** via gas adsorption is measured through N_2, Ar or CO_2 isotherms as a standard, enabling analysis of the pore size from several hundred nanometers down to the molecular size range.

The following methods can be utilized for **CATALYST EVALUATION**: temperature-programmed measurements (TPD / TPR / TPO), pulse chemisorption, single-point BET and analysis of breakthrough curves.

MATERIALS CHARACTERIZATION

Surface Area & Pore Size Distribution



⌀ 0.7 nm – 500 nm (opt. 0.35 ~)
0.01 m²/g or more

BELSORP MINI X

- simultaneous measurement of up to 4 samples
- short-time measurement by “Gas Dosing Optimization” function
- high reproducibility with Advanced Free Space Measurement (AFSM™) and AFSM™2



⌀ 0.35 nm – 500 nm
0.0005 m²/g or more

BELSORP MAX G

- micro- / meso- / macropore measurement (BET) with 1 sample port
- measurement without He gas via the new Advanced Free Space Measurement 2 (AFSM2™)
- low specific surface area evaluation by Kr adsorption at 77.4 K
- high-performance PSD analysis



⌀ 0.35 nm – 500 nm
0.0005 m²/g or more

BELSORP MAX X

- highest throughput with simultaneous measurement of up to 4 samples
- Advanced Free Space Measurement: AFSM™ and AFSM2™ (Helium-free)
- low specific surface area evaluation by Kr adsorption at 77.4 K
- special models: MAX X HT; MAX X HP



0.01 m²/g or more

BELSORP MR1

- fast & precise single-point BET via flow adsorption method
- auto zero function with highly sensitive thermal conductivity detector (TCD)
- calibration valve, Dewar elevator & cooling fan

measurement range *pore size diameter* *uses gases* *uses vapors* *product is CE certified*

MATERIALS CHARACTERIZATION

Catalyst Evaluation, High-Pressure Gas Adsorption & Accessories



BELCAT II

- fully automated catalyst analyzer (TPD / TPR / TPO / Pulse), breakthrough curve measurement available
- precise gas control by 3 high-performance mass flow controllers
- automatic gas injection system for calibration
- measurable gas/vapor: H_2, O_2, CO, CO_2, NO, N_2O, NH_3, H_2O, VOC, etc.
- measurement temperature: -120 °C – 1,100 °C



BELSORP HP

- high-pressure gas adsorption analyzer
- maximum pressure: 13.5 MPa
- compact design, easy-to-use interface
- operating temperature range: -10 °C to 800 °C; optional: -196 °C
- H_2, CO_2, O_2, N_2, non-corrosive gas



1 amu – 200 amu

BELMASS II

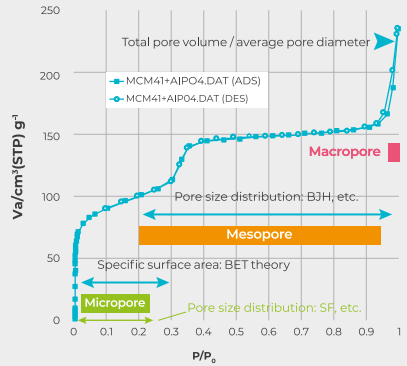
- mass spectrometer for both qualitative and quantitative gas analyses
- heated hose enables the analysis of vapors
- built-in vacuum pump
- provides information on desorbed compounds in gas/vapor mixtures and their breakthrough curves when combined with **BELCAT II**

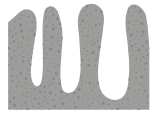


BELCRYO PRO

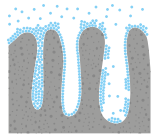
- High-stability temperature control (±1 - 10 mK) for precise adsorption measurements across 35 to 473 K for the **BELSORP** series

ADSORPTION / DESORPTION ISOTHERM

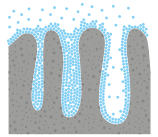




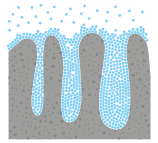
BEFORE ADSORPTION



MONOLAYER FORMATION / MICROPORE FILLING



MULTILAYER FORMATION / CAPILLARY CONDENSATION



FILLING ALL PORES / ADSORPTION INTO VOIDS

new product *measurement range* *uses gases* *uses vapors* *product is CE certified*

MATERIALS CHARACTERIZATION

Density Measurement & Sample Preparation

The gas displacement method is used for the **DENSITY MEASUREMENT**. An inert gas, such as nitrogen or helium, is used as the displacement medium. The gas is directed to the closed sample compartment and then expands into an empty compartment with a defined volume. The pressure difference allows the exact sample volume to be determined. The sample density can be calculated from the measured sample volume and the mass.

MICROTRAC provides optional systems for **SAMPLE PREPARATION**. All models guarantee high reproducibility of the sample's condition.

The sample pretreatment can be done independently of the measurements.



BELPYCNO

- quick & reliable true density measurements via gas displacement
- highly precise measurement with variable cell volumes (1 cm^3 - 10 cm^3)
- sample cell cap without grease
- convenient one-hand operation via touch screen
- measurable gas: He, N_2 or other inert gases



BELPYCNO L

- fully automated density & volume measurement of powders, granulates, porous materials, mixtures, pastes and liquids
- multi-volume capability for easy choice of best configuration
- built-in accurate ATC (Automatic Temperature Control)
- variable sample volume (4 cm^3 - 150 cm^3)



BELPREP VAC III

- vacuum / heat degassing pretreatment device for specific surface area & pore distribution analysis (flow / heat optional)
- can be operated independently to perform pre-processing parallel to the measurement
- 6 pretreatment ports



BELPREP VAC II

- vacuum / heat degassing pretreatment device for specific surface area & pore distribution analysis (flow / heat optional)
- can be operated independently to perform pre-processing parallel to the measurement
- 3 pretreatment ports

uses gases *product is CE certified*

MATERIALS CHARACTERIZATION

Mercury Porosimetry



Hg CE

330 µm – 15 µm, 3000 µm with ultramacropore dilatometer ∅ 180 µm – 3.8 µm, 1,000 µm with ultramacropore dilatometer

BELPORE LP

- automatic sample degassing & vertical mercury filling, maximum pressure: 400 kPa
- 5 dilatometer models for various sample dimensions & shapes
- particle size can be determined automatically by second intrusion
- measurement of wet samples possible
- avoids any risk of powder elutriation via special proportional valve



Hg CE

40 µm – 0.01 µm ∅ 15 µm – 0.0036 µm

BELPORE HP

- operates up to a maximum pressure of 414 MPa
- particularly suited for ceramics, sintered metals, very hard materials, and solids with porosity in the macro- and mesopore range
- highly recommended for R&D and QC labs
- high accuracy and reproducibility via PASCAL method



Hg CE

40 µm – 0.015 µm ∅ 15 µm – 0.0065 µm

BELPORE MP

- operates up to a maximum pressure of 228 MPa
- automatic autoclave opening / closing simplifies operation
- different dilatometer sizes to cover all materials & sample types
- for heterogeneous & homogeneous materials with low as well as high porosity

particle size diameter *pore size diameter* *uses mercury porosimetry* *product is CE certified*

MERCURY POROSIMETRY is the most widely used method for determining the pore size distribution of solids in the range of macro- and mesopores. This technique provides reliable information about the pore size distribution, sample volume and the apparent density of most porous materials, regardless of their type and shape.

The method is based on the intrusion of mercury into a porous system under applied pressure. Using the Washburn equation, the corresponding pore size can be calculated from the pressure.

MICROTRAC's **BELPORE** series uses the PASCAL method for pressure build-up control. With this method an optimized speed of the pressure build-up is set and controlled automatically. This allows for shorter measuring times with guaranteed equilibrium conditions.



VISIT OUR APPLICATIONS DATABASE

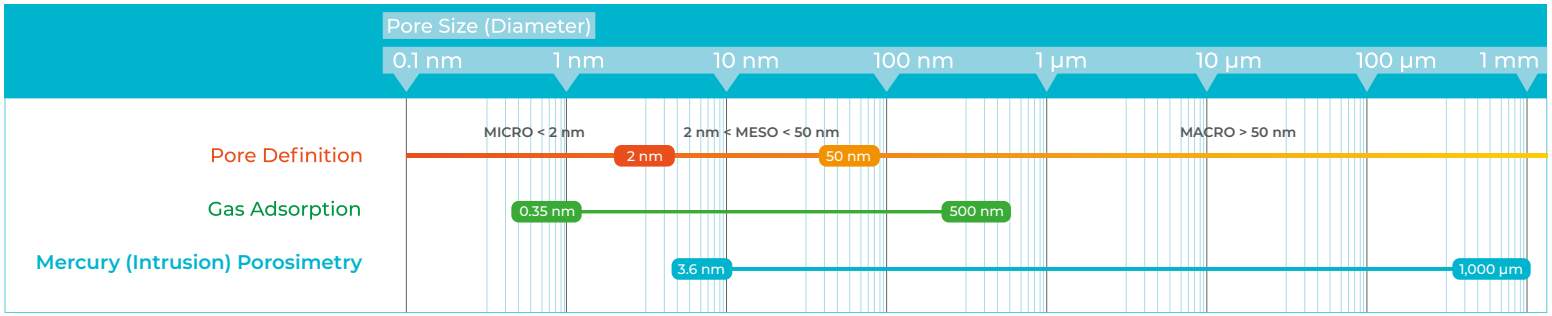
Interested to hear more about applications in each industry, visit the MICROTRAC website

START EXPLORING!

www.microtrac.com/applications

MATERIALS CHARACTERIZATION

Applications





CATALYSTS



BATTERIES



CARBON



PHARMACEUTICALS



COSMETICS



CEMENT



TONER



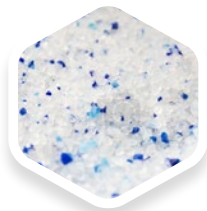
PIGMENTS



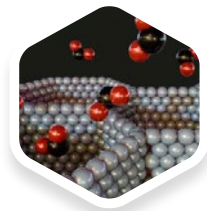
CERAMICS



SEMICONDUCTORS



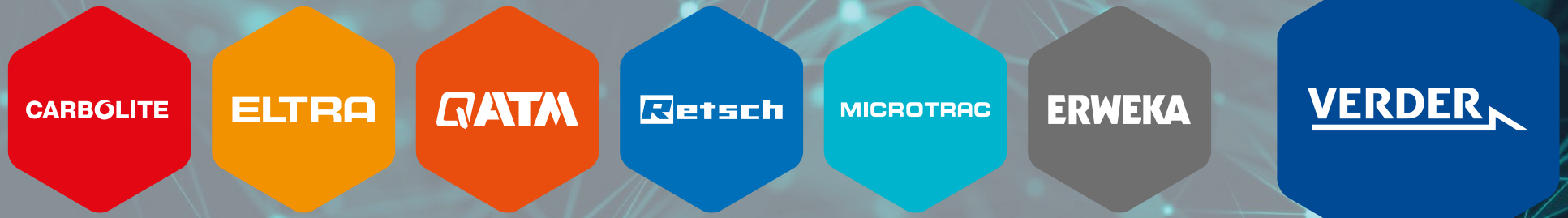
ADSORBENTS



MOFs / PCPs

VERDER – ENABLING PROGRESS

MICROTRAC is part of Verder, the scientific division of the Verder Group. Five more companies are part of the scientific division: Retsch, Carbolite Gero, QATM, Eltra and Erweka. Together we set new standards in the development and manufacturing of lab and analysis equipment, as well as sample preparation tools, which are used in areas such as quality control, research and development.



For more details about the extensive MICROTRAC product portfolio please visit our website: **www.microtrac.com**

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VERDER

ENABLING PROGRESS

Verder is composed of leading laboratory equipment companies active in sample preparation and analysis for quality control as well as research & development purposes.

As trusted solution partner, Verder Scientific enables thousands of companies to ensure economic, technological and environmental progress by mastering their scientific applications. Together, we make the world a healthier, safer and more sustainable place.

CARBOLITE
ELTRA
Retsch
QATM
MICROTRAC
ERWEKA

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