In Focus: Laser Particle Sizer ANALYSETTE 22

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In the field of particle size measurement laser diffraction techniques have established a tremendous reputation in manufacturing, research and development in a wide variety of scientific disciplines covering every range of size measurement from the nanometer up to several millimetres. Why? Because it offers advantages over other techniques by providing fast analysis times, good reproducibility, ease of operation and calibration, large measurable particle size ranges in one single measurement. These advantages coupled with flexibility, low maintenance, user friendly, and competitive pricing have ensured its success.

FRITSCH GmbH have successfully developed and manufactured Laser Particle Sizers for over 20 years and has emerged as one of the most experienced companies in this field making a considerable contribution to the further development of laser diffraction through its invaluable innovations. The most significant example of this was the introduction of the Inverse Fourier Optic principle which had been known for a long period of time. The advantage of the Inverse Fourier Optic in laser diffraction was first recognised and patented by FRITSCH which was later included in the laser diffraction standard ISO 13320-1 under the title "Reverse Fourier Optic".

The use of the Inverse Fourier Optic enables variations of the measurement range without the need to exchange the imaging lens. The measurement range of the instrument is determined by the positioning of the measurement cell between the laser and the detector. Hence, other than for the conventional optical set-ups, no exchange of lenses is necessary. It is also possible to adapt the measurement range to the respective sample system in a manner similar to a zoom lens, making optimum use of the entire sensor surface in each case. Nothing could be easier and considerably increases the flexibility of the instrument resulting in very good differentiation of particles with only a small size difference (i.e. higher resolution). If the same sample is also measured at various cell positions, the resolution is increased still further, detecting even minute differences in the particle size.

With the four systems COMPACT, MicroTec, MicroTec XT and NanoTec, the ANALYSETTE 22 product series covers a wide range of applications to suit customers' varied requirements.

With the ANALYSETTE 22 COMPACT, FRITSCH provides a solution for sample materials in the particle size range from 0.3 to 300 µm who require a particularly easy-to-use bench model instrument with an extremely attractive price-performance ratio.

The MicroTec expands the measurement range to 0.1 to 600 µm or with the “extended version“ MicroTec XT even as far as 0.1 to 2000 µm.

In addition to the expanded measurement range, the MicroTec and MicroTec XT also provide users with information about the shape of the analysed particles. This is based on the fact that non-spherical particles tend to scatter light in specific spatial directions. A sensor specially developed to FRITSCH's specification measures the shape-sensitive portions of the diffraction image and, based on this, the analysis software of the ANALYSETTE 22 can determine the elongation ratio for the d_{50} value of the previously recorded size distribution. This means that one single measurement can determine both the particle size distribution and the ratio of spherical to elongated particles.

In addition to the MicroTec and the MicroTec XT, the option of shape analysis is also available with the ANALYSETTE 22 NanoTec, the flagship Laser Particle Sizer model at FRITSCH. At 2000 µm, the NanoTec offers the same high measurement limit as the MicroTec XT but also extends the lower limit down to 0.01 µm, in other words 10 nm. This meaningful entry into the nano range is made possible by yet another refinement from FRITSCH: A second laser beam passes the sample through a micro-sized hole in the centre of the detector and this light is scattered backwards by particles in the nanometre range. Thus the entire detector surface is used even in the nano range and the resolution and sensitivity are not unnecessarily reduced by a smaller number of sensor elements.

To transform exceptional optic into an excellent overall system, it is essential to ensure high-quality sample preparation and sample feeding. All members of the ANALYSETTE 22 family are available with dry and/or liquid dispersion units. One special advantage of the MicroTec and NanoTec is the fully automatic switching between the different dispersion modules. For measurements with solvents, a special dispersion unit is available for the MicroTec/NanoTec that can either be fully integrated into the system or used as a separate free standing module alongside the main instrument but which is still controlled via the integral operating software.

The package is rounded off by the new Laser Particle Sizer Software LaPaSS. Based on a relational database which stores all inputs, parameters and results for later inspection, LaPaSS offers an intuitive user interface that allows control of the instrument via freely programmable “Standard Operating Procedures (SOPs).

Identical measurement processes can be individually created for frequently used sample types: Reports, layouts and the results of statistical analyses according to ISO 13320-1 can be easily exported to Microsoft Excel. LaPaSS also conforms to CFR 21 part 11 and can naturally perform analysis according to both, the Fraunhofer, and the Mie theory.

FRITSCH Laser Particle Sizers of the ANALYSETTE 22 family: Competence in measurement.