

Particle Size Analyzer Application Topics

Single Nano Particle Size Analyzer IG-1000

No. 3

Influence of Contamination

The completely new Single Nano Particle Size Analyzer IG-1000 uses a new particle size measurement technology "Induced Grating (IG) Method."

The measurement of particle size is performed at measurement sites such as laboratories. Even if samples are handled carefully, the intrusion of minute amounts of large particles and air-borne dirt (contamination) cannot be avoided. Accordingly, the influence of contamination on measurement can be considered an important factor of a measuring instrument.

The new measurement technology, the IG method, uses diffracted light and not scattered light. Because the intensity of diffracted light signals (i.e. the square root of the intensity of diffracted light signals) caused by particles in the same volume is not dependent on particle size, measurement is hardly affected by minute amounts of large particles.

On the other hand, the intensity of scattered light caused by the size of particles in the same volume is roughly proportional to the particle size to the power of 3. Accordingly, scattered light from large particles is extremely strong, which means that minute amounts of large particles considerably affect measurement. Table 1 shows the relationship between signal size and particle size in each respective measurement technology.

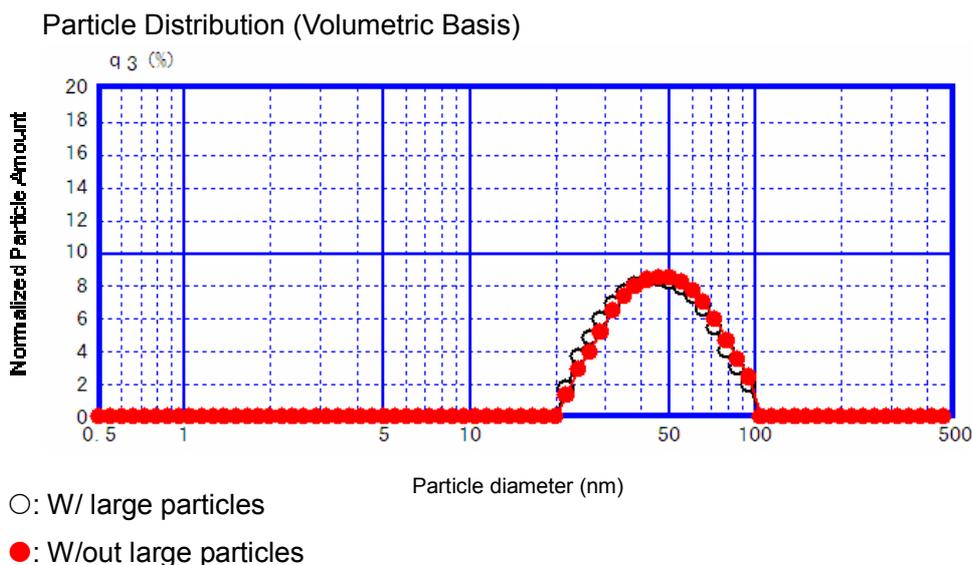
| Measurement technology \ Particle size | 1nm | 100nm |
|--|-----------------------|-------|
| IG method | 1 | 1 |
| Scattered light method | $\frac{1}{1,000,000}$ | 1 |

Table 1. Relationship between signal size and particle size

* Comparison of all signal size caused by particles in the same volume

We prepared a sample mixture of 1- μm particles added to 46-nm particles and performed measurement on the IG-1000 to look into the influence of large particles on measurement. The ratio of the mixture was roughly one 1- μm particle to 800,000 46-nm particles. Graph 1 shows the measurement results.

We found that, when compared with non-intrusion of large particles, there was hardly any influence caused by intrusion of large particles. This contamination resistance is one of the outstanding features of the IG method which uses diffracted light. In this way, the IG-1000 provides great advantages: it is resistant to the intrusion of large particles, stable data can be obtained in actual working environments, and samples can be easily handled.



Graph 1. Measurement Results of Sample Containing Large Particles
(Minute intrusion of 1- μm particles in polystyrene latex 46-nm particles)

(Reference)

Due to the nature of scattered light, when contamination 20 times larger than the sample particle is mixed at a ratio of 800,000:1, scattered light of about 80 times the scattered light from the sample particles is considered to be generated by the contamination and greatly affect measurement.

NOTES:

* This Application News has been produced and edited using information that was available when the data was acquired for each article. This Application News is subject to revision without prior notice.



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