

Analysis to Separate Mixed Samples of the Same Size but Different Materials

Introduction

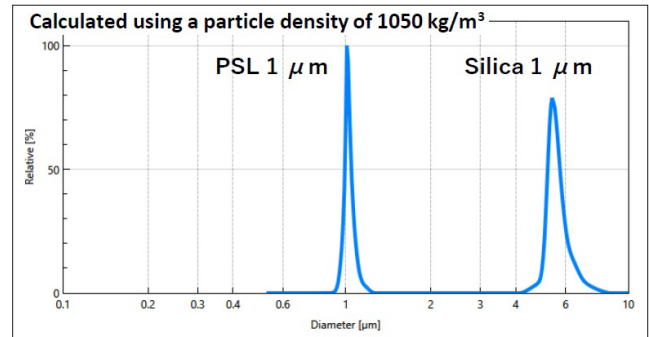
In general particle size analyzers, particles of the same size are measured as the same size regardless of material, making it difficult to separate particles of different materials when they are mixed together.

The centrifugal sedimentation particle size analyzer measures the sedimentation speed and converts it into a particle size value using the density information of the particles. Therefore, particles of the same size but with different densities will have different settling speed and can be measured separately.

Polystyrene latex (PSL) and silica, both of which are used as NIST-traceable 1 μm standard particles, were mixed and measured on a Partica CENTRIFUGE centrifugal nanoparticle analyzer. Since the creation of a particle size distribution (PSD) requires calculations at one density, calculations were performed at each density of PSL and silica.

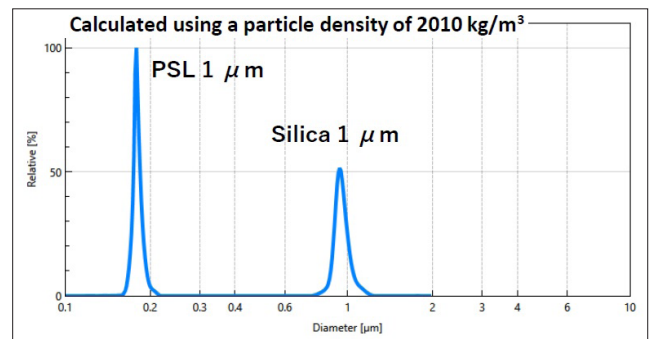
Measurement Condition

Sample	Mixture of (1) and (2) below (1.) PSL: Average diameter 1.03 μm (No.4010A) Concentration: approx. 1%, 2 drops Density: 1050 kg/m ³ , RI: 1.579 (2.) Silica: Average diameter 0.99 μm (No.8100) Concentration: approx. 2%, 1 drop Density 2010 kg/m ³ , RI: 1.450
Method	Line start <ul style="list-style-type: none"> 2-6% sucrose density gradient solution Sample volume: 10 μL
PSD Basis	Volume
Calculation Setting	Custom, Extinction coefficient correction: OFF, Smoothing: ON



Calculated with a particle density of 1,050 kg/m³ of PSL.

The left peak appears at 1 μm and is derived from PSL particles. The right peak is derived from silica particles.



Calculated with a particle density of 2,010 kg/m³ of silica.

The right peak appears at 1 μm and is derived from silica particles. The left peak is derived from PSL particles.

Conclusion

By using Partica CENTRIFUGE, it is possible to obtain the particle size distribution of a mixture of particles of the same size made of different materials in a separated form.

The particle size of each component can be easily checked after measurement by recalculating with the density of the material to be determined. In the analysis of mixtures, unlike conventional particle size analyzers, it is possible to obtain results that depend on the particle size of each component.