

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 5721-a
No. +++

Polystyrene Latex Particles (100 nm, Monodisperse)

This certified reference material (CRM) is produced in accordance with the NMIJ's management system and in compliance with ISO 17034 and ISO/IEC 17025. This CRM is intended for use in the calibration and control of the precision of particle size measuring instruments including a differential mobility analyzer (DMA), and validation of particle size measurement methods.

Certified Values

The certified values of this CRM are given in the table below. The number average diameter and particle size distribution width are expressed as an electrical mobility-equivalent diameter and an electrical mobility-equivalent standard deviation of size distribution, respectively, of polystyrene latex (PSL) particles. The uncertainty of the certified values are the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor (k) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

	Certified value (nm)	Expanded uncertainty (nm)
Number average diameter	100.5	2.6
Particle size distribution width	2.4	1.0

Analysis

The certified values of this CRM were determined from particle size distribution measurements by the electrical mobility analysis. In the electrical mobility analysis, the PSL particles were aerosolized using an electrospray aerosol generator, and the electrical mobility distribution of the PSL particles was obtained by measurement with a DMA. Then the number average diameter and particle size distribution width of the PSL particles were calculated from the electrical mobility distribution using the moment method.¹⁾

- 1) K. Ehara, G. W. Mulholland and R. C. Hagwood, *Aerosol Sci. Technol.*, 32, 434-452, 2000.

Metrological Traceability

The DMA that was used for the determination of the certified values was calibrated with reference PSL particles of which the volume equivalent diameter was determined by NMIJ's primary, electro-gravitational aerosol balance method^{2,3)}, and a flowmeter and a voltmeter that were traceable to the International System of Units (SI). In the determination of the volume equivalent diameter of the reference PSL particles by the electro-gravitational aerosol balance method, the voltmeter, gauge block and hydrometer were traceable to the SI. The certified values, therefore, are traceable to the SI.

- 2) K. Ehara, K. Takahata and M. Koike, *Aerosol Sci. Technol.*, 40, 514-520, 2006.
- 3) K. Ehara, K. Takahata and M. Koike, *Aerosol Sci. Technol.*, 40, 521-535, 2006.

Expiration of Certification

This certificate is valid for one year from the date of shipment, provided that this CRM is stored in accordance with the instructions given in this certificate.

Description of the Material

This CRM is in the form of a 10 mg/mL water suspension of PSL particles, including less than 1 mg/mL of sodium azide as a preservative. A unit of the CRM consists of 10 mL in a translucent polypropylene bottle.

Homogeneity

The homogeneity of this CRM was determined by size distribution measurement by the electrical mobility analysis for 5 bottles randomly selected from among 50 bottles. The homogeneity between the bottles is not significant and is reflected in the uncertainty of the certified values.

Instructions for Storage

This CRM should be stored at a temperature between 4 °C and 30 °C without allowing it frozen, in the original, tightly closed bottle, and shielded from direct sunlight.

Instructions for Use

This CRM is for laboratory use only under clean conditions and at a temperature between 4 °C and 30 °C. In order to prevent drying the suspension, the cap of the bottle should be tightly closed after use. Be aware of potential aggregation of particles when diluting this CRM with water or salt solutions. The CRM should be gently inverted several times before use.

Precautions for Handling

Refer to the safety data sheet (SDS) on this CRM before use. If the CRM comes into contact with the eyes, rinse with a large amount of running water. If the CRM comes into contact with skin, rinse with running water. If the CRM leaks, clean using paper or cloth if necessary. Follow the relevant laws upon disposal of the CRM.

Preparation

The PSL particle suspensions of this CRM were prepared by JSR Life Sciences Corp., Japan.

NMIJ Analysts

The technical manager for this CRM is SAKURAI H., and the production manager and the analyst are TAKAHATA K.

Information

If substantive technical changes occur that affect the certification before the expiration of this certificate, NMIJ will notify the registered customers. Customer registration on the NMIJ Website (given below) will facilitate notification. Technical reports regarding this CRM can be obtained from the contact details given below.

Reproduction of Certificate

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko
President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:
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