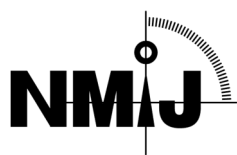


National Institute of Advanced Industrial Science and Technology

## 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 is 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 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 uncertainties of the certified values are the half-width of the expanded uncertainty interval calculated using a coverage factor ( $k$ ) of 2, which gives 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 by using an electrospray aerosol generator, and the electrical mobility distribution of the PSL particles was obtained by measurement with DMA. Then the number average diameter and particle size distribution width of the PSL particles were calculated from the electrical mobility distribution by using the moment method.<sup>1)</sup>

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

**Metrological Traceability**

The DMA used to determine the certified values was calibrated with the reference PSL particles whose volume-equivalent diameter was determined by NMIJ's primary electro-gravitational aerosol balance method<sup>2,3)</sup>, as well as the flowmeter and the voltmeter both of which were traceable to the International System of Units (the SI). In the determination of the volume-equivalent diameter of the reference PSL particles by using 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.

**Sample Form**

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

**Homogeneity**

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

**Instructions for Storage**

This CRM should be stored at temperatures of 4 °C to 30 °C, while keeping it unfrozen, in the original, tightly closed bottle, and protected from direct sunlight.

**Instructions for Use**

This CRM is for laboratory use only under clean conditions at temperatures of 4 °C to 30 °C. In order to prevent the suspension from getting dry, the bottle should be tightly closed after use. It is recommended to be aware of potential aggregation of particles when this CRM is diluted with water or salt solutions. The bottle should be gently turned upside down 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 eyes, it is recommended to rinse with plenty of running water. If the CRM comes into contact with skin, it is recommended to rinse with running water. The CRM, if leaks, should be wiped with paper or cloth, if necessary. The CRM should be disposed of in accordance with applicable laws and regulations.

**Preparation**

The PSL particle suspensions of this CRM were prepared by JSR Life Sciences Corp. in 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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National Metrology Institute of Japan,  
Center for Quality Management of Metrology, Reference Materials Office,  
1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan  
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