thermo
scientific

November 24, 2008

SURF-CAL™ PARTICLE SIZE STANDARDS
NIST Traceable Diameter

1. DESCRIPTION The SURF-CAL™ Particle Size Standards series was designed by Duke Scientific to simplify the job of preparing calibration wafers, in your own facility, to help lower the cost of calibration. Polystyrene latex microsphere sizes correspond with critical sizing marks as defined by the International Technology Roadmap for Semiconductors (ITRS). By depositing PSL calibration particles on specially selected wafers, you can check the performance of a scanning surface inspection system at critical stages of the manufacturing process. The particle standards used in SURF-CAL™ are produced and calibrated by Duke Scientific. They are calibrated with linear dimensions transferred from the standard meter at the National Institute of Standards and Technology (NIST). Specially reserved batches for each particle size assure long-time availability, and minimize calibration curve changes. This product enables you to meet the traceability requirements of ISO 9000 for metrology. You can also compare data from site to site and instrument to instrument by using particle standards from Duke Scientific.

2. SIZE DISTRIBUTION AND PHYSICAL DATA

Catalog Number: PD1600

Standard Deviation	0.016 µm
Coefficient of Variation:	1.0%
FWHM* Distribution:	2.2%
Microsphere Composition:	Polystyrene
Polymer Density:	1.05 g/cm^3
Refractive Index:	1.59 @ 589 nm
Approximate Concentration:	3 x 10^8 particles per milliliter

*Full Width at Half Maximum

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VALUABLE CERTIFICATE – KEEP ON FILE

CERTIFICATE OF CALIBRATION AND TRACEABILITY

This certifies that the calibrated dimension of this product was transferred by optical microscopy from a stage micrometer calibrated by the National Institute of Standards and Technology (Calibration Report #5524). Standard Reference Material 1690, 1692, 1960 and 1961 were used to validate the accuracy and traceability of the calibration method.

Catalog Number: PD1600, SURF-CAL™ Particle Deposition Standards
Certified Peak Diameter: 1.57 µm
Material Batch: PD1600-002
Expanded Uncertainty: ± 0.02 µm
Certification Date: July 10, 2006

Ellen B. Layendecker, Metrology Director
Duke Scientific Products

Void without seal

Packaging Lot #: 268630 **Expiration Date:** DEC'24

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3. MEASUREMENT METHODOLOGY To assure direct traceability to NIST, the certified diameter of this product was transferred by microscopy from NIST calibrated stage micrometer. The uncertainty was calculated per NIST Technical Note 1297, 1994 Edition, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." The uncertainty listed is the expanded uncertainty with a coverage factor of two (K=2). The peak diameter was calculated using approximately the ± 2σ range of the particle size distribution. The size distribution was calculated as the standard deviation of the whole peak. The Coefficient of Variation is one standard deviation expressed as a percentage of the peak diameter. The FWHM distribution was calculated at the width of the particle distribution at half of the peak height of the same distribution, expressed as a percentage of the peak diameter. All numbers were calculated from unrounded values then rounded for the final product label data.

4. CERTIFICATE Except for the purposes of record keeping, this certificate may not be reproduced. Rebottling or relabeling invalidates the certification and traceability of these products.

5. OPERATING INSTRUCTIONS For ease of use, these standards are packaged in an aqueous suspension with a low concentration of surfactant or other non-volatiles. They must be thoroughly dispersed in the bottle to assure statistically consistent samples. To disperse the particles, gently invert the bottle several times, then immerse in a low power ultrasonic bath (≤10 seconds). Before using, be sure no solid material or clumps are visible inside the bottle. Dispense immediately after dispersion by pouring the desired amount into the nebulizer reservoir. If there is material still left in the bottle, cap tightly to avoid the possibility of contamination. ***Do not return unused portions to the bottle from the nebulizer.***

6. SAFETY AND HANDLING PRECAUTIONS Wear a suitable filter respirator when necessary. Avoid inhalation or ingestion of the particles. Only trained scientific personnel should use these products. A Material Safety Data Sheet is included with each package.

7. STORAGE AND DISPOSAL Keep the bottle tightly sealed to avoid contamination. Store the bottle upright. Refrigeration is not required for storage. Do not freeze the suspension. In case of spills, wash or wipe the area thoroughly with a damp cloth. **Caution: surfaces covered with dry spheres may be slippery.** Dispose of any waste residue according to prescribed federal, state, and local guidelines. Each bottle has a limited shelf life and should not be used after its expiration date.

8. LIMITED WARRANTY These products are intended for laboratory use by trained scientific personnel. Determination of their suitability for specific end-use is the responsibility of the user, who assumes all liability for loss or damage arising out of the use of the product. Rebottling or relabeling voids the warranty and certification. Microgenics Corporation's warranty is limited to replacement of defective products if returned with our authorization within 60 days of purchase date.

THE FOREGOING WARRANTY SHALL BE IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MICROGENICS BE LIABLE FOR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES.