



# Certificate of Analysis

## Standard Reference Material<sup>®</sup> 1897

### Specific Surface Area Standard

This Standard Reference Material (SRM) is intended for use in the calibration of instruments used to measure specific surface area (SSA) in the range of 0.1 m<sup>2</sup>/g to 1000 m<sup>2</sup>/g. The SSA of this material was measured using a nitrogen gas static volumetric Branauer-Emmett-Teller (BET) surface area analysis instrument. A unit of SRM 1897 consists of one vial containing approximately 7 g of a silica-alumina compound sieved to pass a 106 μm (number 140) sieve.

**Certified Value:** The results are expressed as the certified values ± the expanded uncertainties (Table 1). The certified values are weighted averages [1] of measurements from ten laboratories. The expanded uncertainties, at the 95 % level of confidence are calculated as  $U = ku_c$ , where  $u_c$  is a combined standard uncertainty for the average, calculated according to the ISO Guide [1,2], and  $k = 2$  is the coverage factor. The value of  $u_c$  in each case includes both a combined estimate of the variation of the averages attributed to each source and an allowance for differences among those averages.

Table 1. Certified SSA Values for SRM 1897

| Measurement Technique | Specific Surface Area                             |
|-----------------------|---|
| Multi-Point           | 258.32 m <sup>2</sup> /g ± 5.29 m <sup>2</sup> /g |
| Single Point          | 253.08 m <sup>2</sup> /g ± 5.34 m <sup>2</sup> /g |

**Expiration of Certification:** The certification of **SRM 1897** is valid, within the measurement uncertainty specified, until **01 November 2012**, provided the SRM is handled and used in accordance with the instructions given in this certificate (see “Instructions for Use”). However, the certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

**Maintenance of SRM Certification:** NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Coordination of the technical measurements leading to the certification of this SRM was provided by S. Jahanmir of the NIST Ceramics Division.

Statistical consultation for this SRM was provided by S.D. Leigh of the NIST Statistical Engineering Division.

Analytical measurements for the certification of this SRM were performed by D.B. Minor of the NIST Ceramics Division.

Support aspects involved with the issuance of this SRM were coordinated through the NIST Measurement Services Division.

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Certificate Issue Date: 10 May 2012  
*Certificate Revision History on Last Page*

Robert L. Watters, Jr., Chief  
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## INSTRUCTIONS FOR USE

The silica-alumina powder is somewhat hygroscopic and the following procedure is recommended for sample preparation prior to analysis. Slowly, 1 °C/minute above 60 °C, heat the sample to 95 °C to 100 °C for a period of 1 hour to 1.5 hours and hold at 95 °C to 100 °C for at least 30 minutes while under a vacuum of at least 50 mTorr. **CAUTION:** The sample may appear to “boil” and possibly lose sample near 100 °C due to rapid de-watering. To prevent sample loss, the use of a large diameter sample bowl is recommended. The sample size should be between 0.25 g to 0.50 g. Cool the sample to ambient temperature under vacuum before analysis. Perform the analysis in accordance with the instructions of the instrument manufacturer or the procedures of your laboratory.

### Participating Laboratories in the Round Robin

SASOL North America, Inc.; Austin, TX

Quantachrome Corporation; Boynton Beach, FL

U.S. Naval Research Laboratories; Washington, DC

Air Products and Chemicals, Inc.; Allentown, PA

Micromeritics Corporation; Norcross, GA

E.I. DuPont de Nemours and Co., Inc., Experimental Station; Wilmington, DE

Guild Associates, Inc.; Dublin, OH

New York State College of Ceramics at Alfred University; Alfred, NY

Eastman Kodak Company, Research & Development Laboratories; Rochester, NY

National Institute of Standards and Technology, Ceramics Division; Gaithersburg, MD

## REFERENCES

- [1] JCGM 100:2008; *Evaluation of Measurement Data — Guide to the Expression of Uncertainty in Measurement* (ISO GUM 1995 with Minor Corrections); Joint Committee for Guides in Metrology (JCGM) (2008); available at [http://www.bipm.org/utis/common/documents/jcgm/JCGM\\_100\\_2008\\_E.pdf](http://www.bipm.org/utis/common/documents/jcgm/JCGM_100_2008_E.pdf) (accessed May 2012); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at <http://www.nist.gov/pml/pubs/index.cfm> (accessed May 2012). See also Heckert, A; Filliben, J.J.; Dataplot Reference Manual, <http://www.itl.nist.gov/div898/software/dataplot/> (accessed May 2012).
- [2] Rukhin, A.L.; Vangel, M.G.; *Estimates of a Common Mean and Weighted Means Statistics*, J.Am. Stat. Assoc., Vol. 93, No. 441, pp. 303-308 (1998).

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| <b>Certificate Revision History:</b> 10 May 2012 (Extension of certification period; editorial changes); 28 April 2011 (Extension of certification period; editorial changes); 12 July 2002 (Original certificate date). |
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*Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail [srminfo@nist.gov](mailto:srminfo@nist.gov); or via the Internet <http://www.nist.gov/srm>.*