



中国计量科学研究院 新材料领域标准物质

NATIONAL INSTITUTE OF METROLOGY, CHINA
CERTIFIED REFERENCE MATERIAL (CRM) —
ADVANCED MATERIALS

专业

Professional

创新

Innovative

准确

Accurate

可靠

Reliable



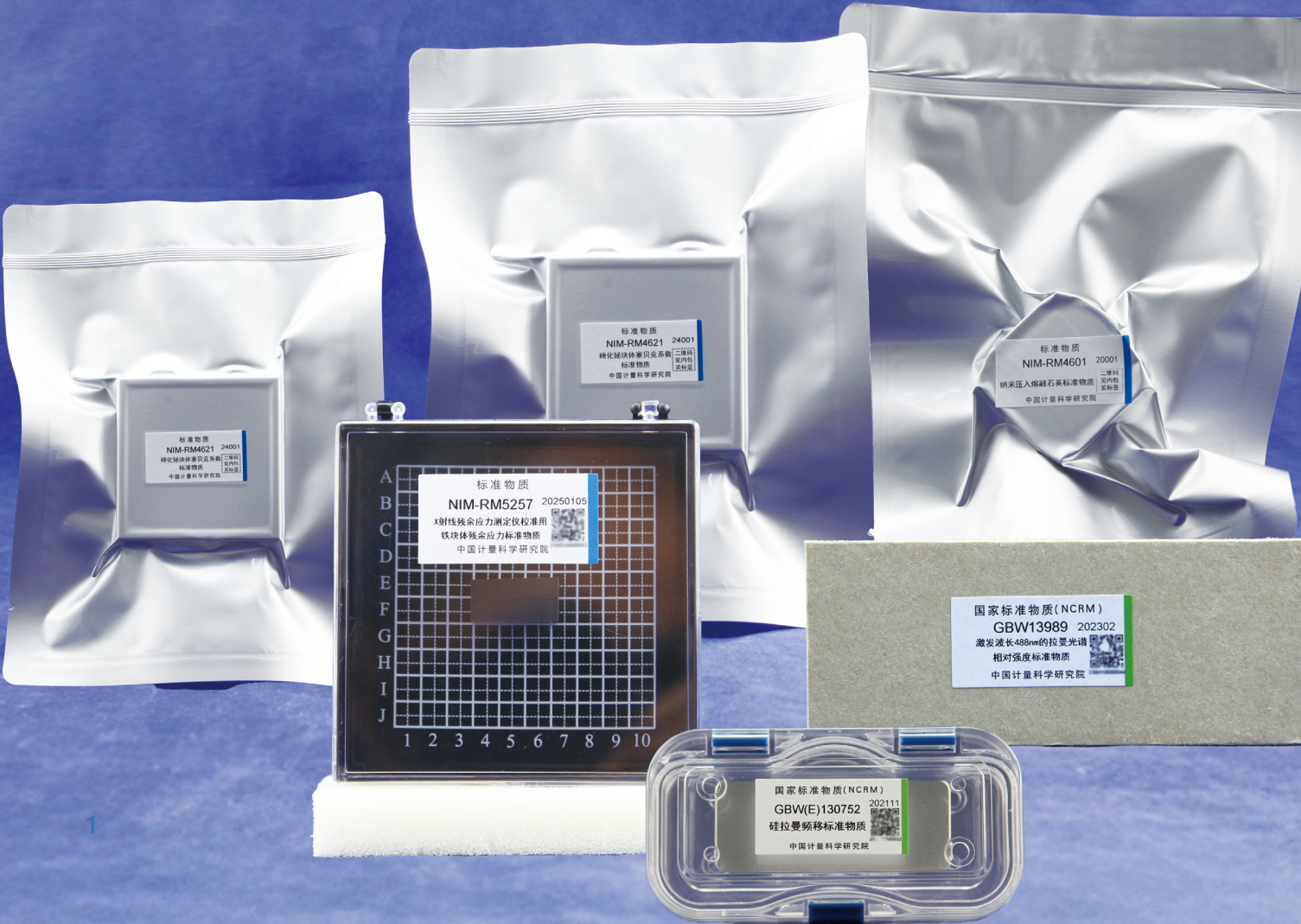
材料计量是研究材料各种固有内在特性和外延特性的溯源性测量技术、保证量值的统一与准确可靠的计量科学。由于材料计量在材料研究开发、生产和应用过程中的质量保证作用，在健康、安全、环境和贸易等社会和经济领域中的服务、保障和支撑功能，材料计量受到许多国家、国际组织和国家计量研究院的高度重视。

中国计量科学研究院新材料计量研究室，基于新材料产业发展需求，以各种战略产业材料为研究对象，开展材料结构、组成、性能三位一体的校准溯源、标准物质、标准方法的研究及产业需求的个性化测量服务。目前已为集成电路、新能源、电子信息、新型显示及化工等领域新材料提供了技术服务。在计量技术和标准化方面取得丰硕研究成果，得到国际同行认可并达到同类国际领先水平。

在技术方面，具备拉曼光谱、薄膜厚度、透射电子显微镜、能谱仪、荧光效率、热电性能、力学性能等各类标准物质的定值和研制能力。先后主导/参加相关的国际15项，测量结果实现了国际等效一致，共有4项测量能力和6项标准物质通过CMC国际同行评审。

在应用方面，相关标准物质与团队制订的拉曼光谱仪、掠入射X射线反射膜厚测量仪器、纳米压入仪、透射电子显微镜等10余项计量技术规范、标准形成配套，可有效支撑相关设备的校准与分析测试。

技术负责人联系方式：任玲玲，010-64526513，renll@nim.ac.cn



Material metrology is a scientific discipline focused on traceable measurement techniques for the inherent and extended characteristics of materials, ensuring the uniformity, accuracy, and reliability of measurement values. Due to its critical role in quality assurance throughout material research, development, production, and application, material metrology plays a vital service, safeguarding, and supportive function in societal and economic domains such as health, safety, environment, and trade. Consequently, it has been highly prioritized by numerous countries, international organizations, and national metrology institutes worldwide.

The Advanced Materials Metrology Research Laboratory at the China National Institute of Metrology (NIM) is dedicated to addressing the needs of the advanced materials industry. Focusing on strategic industrial materials, the laboratory conducts integrated research on material structure, composition, and performance, including calibration traceability, certified reference materials (CRMs), and standardized methodologies. It also provides customized measurement services tailored to industrial demands. To date, the laboratory has offered technical support to new materials in sectors such as integrated circuits, new energy, electronic information, advanced displays, and chemical industries. Significant achievements in metrology technology and standardization have been made, which have gained international peer recognition and reached world-leading levels in this field.

It possesses capabilities for value assignment and CRM development across various measurement techniques, including Raman spectroscopy, film thickness, transmission electron microscopy (TEM), energy dispersive spectroscopy (EDS), fluorescence efficiency, thermoelectric performance, and mechanical properties. The laboratory has actively participated in 15 international initiatives, achieving measurement results consistent with international standards. Among these, four measurement capabilities and six CRMs have been successfully recognized through CMC peer review.

Furthermore, the laboratory has established a series of metrological technical specifications and standards, including Raman spectrometers, glancing-incidence X-ray reflectometry instruments, nano-indentation systems, and TEM, among over ten others. These effectively support the calibration and analytical testing of relevant equipment, ensuring consistency and reliability in measurement processes.

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1. 纳米尺度薄膜厚度标准物质

Nano-scale Film Thickness CRMs

本系列标准物质主要用于薄膜厚度测量仪器的校准。纳米尺度薄膜由于其独特的光学和电学性能而广泛应用，薄膜厚度是其重要参数，与薄膜材料的力学性能、透光性能、表面结构等都有着密切的联系，所以薄膜厚度需要准确测量。目前，国家计量院已研制出多层膜膜厚（GaAs/AlAs超晶格）、二氧化硅薄膜和氮化硅薄膜膜厚标准物质，用于X射线光电子能谱（XPS）、俄歇电子能谱（AES）、二次离子质谱（SIMS）等表面分析技术溅射速率的校准，或者椭圆偏振仪、掠入射X射线反射等各种纳米尺度膜厚测量仪器的校准，以及透射电镜（TEM）、扫描电镜（SEM）放大倍率的校准，以确保样品成分深度变化或厚度、放大倍率等测量结果的准确可靠，满足纳米材料及器件设计、制造等单位的需求。

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These CRMs are intended for the calibration of instruments measuring thin film thickness. Nano-scale thin films are widely applied due to their unique optical and electrical properties. The film thickness is a critical parameter closely related to the mechanical properties, light transmittance, and surface structure of the film material. Therefore, accurate measurement of film thickness is essential.

NIM has developed nano-scale film thickness CRMs for multi-layer film (GaAs/AlAs superlattice), silica thin films, and silicon nitride thin films. These are used to calibrate the sputter rate of surface analysis techniques such as: X-ray Photoelectron Spectroscopy (XPS), Auger Electron Spectroscopy (AES), Secondary Ion Mass Spectrometry (SIMS). Additionally, they are employed to calibrate nano-scale film thickness measurement instruments like ellipsometers and grazing-incidence X-ray reflectivity instrument. They also serve to standardize the magnification accuracy of Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). This ensures reliable and precise measurements of compositional depth profiles, film thickness, and magnification factors. The materials meet the demands of institutions involved in the design, manufacturing, and quality control of nanomaterials and devices.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
1	多层膜膜厚 (GaAs/AlAs 超晶格) 标准物质	Multi-layer thin film thickness CRM of GaAs/AlAs superlattice	GBW13955	Oxide layer: (0.98) nm 1 st layer: (20.12) nm 2 nd layer: 10.60 nm±0.18 nm 3 th layer: 10.06 nm±0.20 nm 4 th layer: 10.58 nm±0.18 nm 5 th layer: 10.07 nm±0.18 nm 6 th layer: 10.58 nm±0.18 nm	2cm×2cm
2	二氧化硅薄膜膜厚标准物质	Thin Film Thickness of SiO ₂	GBW13957	12.56 nm±0.30 nm	
3			GBW13958	20.87 nm±0.36 nm	
4			GBW13959	57.55 nm±0.50 nm	
5			GBW13960	106.1 nm±1.7 nm	

序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
6	氮化硅薄膜膜厚 标准物质	Thin Film Thickness of Si_3N_4	GBW13961	52.67 nm $\pm$ 0.28 nm	2cm $\times$ 2cm
7			GBW13962	104.91 nm $\pm$ 0.32 nm	
8			GBW13963	151.8 nm $\pm$ 1.0 nm	
9			GBW13964	205.0 nm $\pm$ 1.5 nm	
10	氧化铪薄膜膜厚 标准物质	Thin Film Thickness of HfO_2	GBW13979	Surface layer: (2.16) nm HfO_2 layer: 1.07 nm $\pm$ 0.04 nm Al_2O_3 layer: (9.51) nm SiO_2 layer: (0.21) nm	
11			GBW13980	Surface layer: (1.85) nm HfO_2 layer: 4.73 nm $\pm$ 0.04 nm Al_2O_3 layer: (9.41) nm SiO_2 layer: (0.59) nm	
12			GBW13981	Surface layer: (1.89) nm HfO_2 layer: 9.37 nm $\pm$ 0.06 nm Al_2O_3 layer: (9.45) nm SiO_2 layer: (0.21) nm	

2. 钛酸锶单原子台阶高度标准物质

Mono-atomical Step Height CRM of SrTiO_3

本标准物质主要用于校准扫描探针显微镜 (SPM) 和台阶仪等测量设备, 确保这些设备在单原子层厚度 (< 0.5nm) 测量时量值的准确性、可比性。依据国际半导体路线图, 其栅格氧化层厚度已经达到1nm尺度范围, 要准确测量这种小尺度材料的厚度, 需要单原子台阶高度的标准物质。本标准物质是国际上第一个有证的单原子台阶高度标准物质, 可以在排除污染物影响的大气环境中使用, 并且晶格常数稳定, 实现了原子尺度高度的准确测量。

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The CRM is intended for calibrating measurement instruments such as scanning probe microscopes (SPM) and step profilers, ensuring the accuracy and comparability of measurements at mono-atomical layer thickness (<0.5nm). In accordance with the International Technology Roadmap for Semiconductors (ITRS), the grid oxide thickness has reached the 1 nm scale. To accurately measure such nanoscale material thickness, certified reference materials with mono-atomical step height are required. The CRM is the world's first CRM for mono-atomical step height measurements. It can be used in atmospheric environments while excluding contaminant interference, and maintains stable lattice constants, achieving precise atomic-scale height measurements.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
13	钛酸锶单原子台阶 高度标准物质	Mono-atomical Step Height CRM of SrTiO_3	GBW(E)136709	(0.39 $\pm$ 0.29) nm	10mm $\times$ 2mm $\times$ 0.5mm

3. 电子显微测量设备尺寸、成分校准用标准物质

CRMs for Calibrating Component and Structure of Electronic Microanalysis Equipment

此类标准物质主要用于扫描电镜、透射电镜、电子探针等设备的元素含量、能量分辨率的校准，用于透射电镜的放大倍率和尺寸校准。GBW13655与GBW13955配套使用，可以满足透射电镜高、中、低放大倍率的校准。

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These reference materials are mainly used for the calibration of component and energy resolution of scanning electron microscope, transmission electron microscope, electron probe and other equipment, and for the magnification and size calibration of transmission electron microscope. GBW13655 and GBW13955 can meet the calibration of high, medium and low magnification of transmission electron microscope.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
14	X射线能谱仪 / 波谱仪 校准用铝铜薄膜铜元素 含量标准物质	CRM of Cu content in Al-Cu film for X-ray energy dispersive spectrometer/wavelength dispersive spectrometer calibration	NIM-RM2163	铜元素含量: (2.54±0.15)%, Cu content: (2.54±0.15)%	每瓶 1 个样品 1 sample per bottle
15	X射线能谱仪 / 波谱仪 校准用铝铜薄膜铜元素 含量标准物质	CRM of Cu content in Al-Cu film for X-ray energy dispersive spectrometer/wavelength dispersive spectrometer calibration	NIM-RM2164	铜元素含量: (14.64±0.42)% Cu content: (14.64±0.42)%	每瓶 1 个样品 1 sample per bottle
16	X射线能谱仪 / 波谱仪 校准用铝铜薄膜铜元素 含量标准物质	CRM of Cu content in Al-Cu film for X-ray energy dispersive spectrometer/wavelength dispersive spectrometer calibration	NIM-RM2165	铜元素含量: (49.29±0.90)% Cu content: (49.29±0.90)%	每瓶 1 个样品 1 sample per bottle
17	X射线能谱仪 / 波谱仪 校准用纯锰片锰元素含 量标准物质	CRM of manganese content of pure manganese flake for X-ray energy dispersive spectrometer/ wavelength dispersive spectrometer calibration	NIM-RM5251	锰元素含量: (99.6±0.6)% Mn content: (99.6±0.6)%	每个塑料瓶 包含 1 个样品 Each plastic bottle contains 1 sample
18	透射电子显微镜高放大 倍率校准用标准物质	CRM for high magnification calibration of transmission electron microscope	GBW13655	Au{111} 晶面间距: (0.2322±0.0030)nm Au{111} lattice spacing: (0.2322±0.0030) nm	每盒 1 个样品 1 sample per box
19	透射电子显微镜 污染率和漂移率 校准用标准物质	CRM for the calibration of contamination rate and drift rate of TEM	NIM-RM5306	圆孔直径: (764±11)nm Hole diameter: (764±11)nm	每盒 1 个样品, 外包 装为高弹膜塑料盒 1 sample per box, the outer packing is high elastic film plastic box

4. 拉曼光谱校准用标准物质

CRMs for Calibrating Raman Spectroscopy

拉曼光谱具有快速、高效、无损等特点，已广泛应用于环境保护、化工、制药、食品安全、药物检测等领域。拉曼光谱的定性和半定量分析取决于拉曼频移和拉曼相对强度的准确、可靠。目前，国家计量院已研制出拉曼频移和拉曼相对强度2类8种标准物质，可用于(83-3325) cm^{-1} 拉曼光谱范围内拉曼频移的校准，以及激发波长514.5 nm和488 nm的拉曼光谱相对强度的校准，满足拉曼光谱仪测量结果准确、可比的需求。

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Raman spectroscopy, with its fast, efficient, and non-destructive characteristics, has been widely applied in fields such as environmental protection, chemical industry, pharmaceuticals, food safety, and drug testing. The qualitative and semi-quantitative analysis of Raman spectra rely on the accuracy and reliability of Raman frequency shift and Raman relative intensity. Currently, the National Institute of Metrology has developed two categories of eight standard materials for Raman frequency shift and Raman relative intensity. These materials can be used to calibrate Raman frequency shifts across the spectral range of (83-3325) cm^{-1} , as well as to calibrate Raman relative intensities at an excitation wavelength of 514.5 nm. And 488 nm. This addresses the requirement for accurate and comparable measurement results in Raman spectroscopy.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
20	激发波长 514.5nm 的拉曼光谱相对强度 标准物质	Relative Intensity Correction Standard for Raman Spectroscopy: 514.5 nm Excitation	GBW13650	(500-4000) cm^{-1} U=(7-20)%	/
21	激发波长 488 nm 的拉曼光谱相对强度 标准物质	Relative Intensity Correction Standard for Raman Spectroscopy: 488 nm Excitation	GBW13989	(300-5000) cm^{-1} U=(5-16)%	30mm×10mm×1mm
22	硫拉曼频移标准物质	Raman Shift Standards for Spectrometer Calibration: Sulfur	GBW13651	(83.2±2.2) cm^{-1} (153.2±2.2) cm^{-1} (219.2±2.1) cm^{-1} (473.2±2.1) cm^{-1}	0.5g
23	萘拉曼频移标准物质	Raman Shift Standards for Spectrometer Calibration: Naphthalene	GBW13652	(513.7±2.3) cm^{-1} (763.0±2.2) cm^{-1} (1019.8±2.2) cm^{-1} (1146.3±2.3) cm^{-1} (1381.3±2.2) cm^{-1} (1463.5±2.3) cm^{-1} (1576.3±2.2) cm^{-1} (3055.1±2.3) cm^{-1}	0.25g

序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
24	环己烷拉曼频移标准物质	Raman Shift Standards for Spectrometer Calibration: Cyclohexane	GBW13653	$(384.1 \pm 2.3) \text{ cm}^{-1}$ $(426.5 \pm 2.4) \text{ cm}^{-1}$ $(801.9 \pm 2.4) \text{ cm}^{-1}$ $(1028.1 \pm 2.2) \text{ cm}^{-1}$ $(1157.6 \pm 2.4) \text{ cm}^{-1}$ $(1266.4 \pm 2.3) \text{ cm}^{-1}$ $(1444.2 \pm 2.2) \text{ cm}^{-1}$ $(2664.2 \pm 2.2) \text{ cm}^{-1}$ $(2852.4 \pm 2.2) \text{ cm}^{-1}$ $(2923.4 \pm 2.2) \text{ cm}^{-1}$ $(2937.5 \pm 2.2) \text{ cm}^{-1}$	1.5g
25	对乙酰氨基酚拉曼频移标准物质	Raman Shift Standards for Spectrometer Calibration: Acetamidophenol	GBW13654	$(214.1 \pm 2.4) \text{ cm}^{-1}$ $(328.8 \pm 2.3) \text{ cm}^{-1}$ $(391.8 \pm 2.2) \text{ cm}^{-1}$ $(465.3 \pm 2.2) \text{ cm}^{-1}$ $(504.3 \pm 2.4) \text{ cm}^{-1}$ $(651.8 \pm 2.4) \text{ cm}^{-1}$ $(710.9 \pm 2.2) \text{ cm}^{-1}$ $(797.1 \pm 2.4) \text{ cm}^{-1}$ $(834.0 \pm 2.3) \text{ cm}^{-1}$ $(857.5 \pm 2.2) \text{ cm}^{-1}$ $(968.5 \pm 2.3) \text{ cm}^{-1}$ $(1104.6 \pm 2.7) \text{ cm}^{-1}$ $(1168.2 \pm 2.3) \text{ cm}^{-1}$ $(1236.5 \pm 2.3) \text{ cm}^{-1}$ $(1277.7 \pm 2.4) \text{ cm}^{-1}$ $(1324.4 \pm 2.3) \text{ cm}^{-1}$ $(1371.2 \pm 2.4) \text{ cm}^{-1}$ $(1515.2 \pm 2.3) \text{ cm}^{-1}$ $(1561.4 \pm 2.3) \text{ cm}^{-1}$ $(1648.5 \pm 2.6) \text{ cm}^{-1}$ $(2930.4 \pm 2.2) \text{ cm}^{-1}$ $(3064.6 \pm 2.2) \text{ cm}^{-1}$ $(3101.9 \pm 2.4) \text{ cm}^{-1}$ $(3324.6 \pm 2.3) \text{ cm}^{-1}$	0.15g
26	聚苯乙烯拉曼频移标准物质	Raman Shift Standards for Spectrometer Calibration: Polystyrene	GBW13664	$(621.2 \pm 2.1) \text{ cm}^{-1}$ $(795.5 \pm 2.2) \text{ cm}^{-1}$ $(1001.0 \pm 2.1) \text{ cm}^{-1}$ $(1031.2 \pm 2.1) \text{ cm}^{-1}$ $(1154.6 \pm 2.3) \text{ cm}^{-1}$ $(1449.0 \pm 2.1) \text{ cm}^{-1}$ $(1583.2 \pm 2.2) \text{ cm}^{-1}$ $(1602.4 \pm 2.1) \text{ cm}^{-1}$ $(2851.3 \pm 2.3) \text{ cm}^{-1}$ $(2907.5 \pm 2.5) \text{ cm}^{-1}$ $(3055.7 \pm 2.4) \text{ cm}^{-1}$	直径 1cm
27	硅拉曼频移标准物质	Raman Shift Standards for Spectrometer Calibration: Si	GBW(E)130752	$(520.7 \pm 1.2) \text{ cm}^{-1}$	1cm×1cm



5. 荧光相对强度和荧光量子效率标准物质

CRMs for Fluorescence Relative Intensity and Fluorescence Quantum Efficiency

荧光相对强度标准物质应用于荧光光谱仪的荧光相对强度的校准，获得荧光相对强度校准曲线，以确保荧光光谱测量的准确性。荧光量子效率标准物质的应用于采用相对法测量荧光量子效率时作为参比物，以通过测量计算待测样品的荧光量子效率。荧光光谱广泛应用于荧光材料的定性和定量分析，荧光光谱的准确测量对荧光材料的研究和应用起到非常关键的作用。荧光量子效率是评价荧光材料发光性能非常关键的参数。荧光相对强度和荧光量子效率标准物质均采用配套的密封型比色皿封装，使用便捷且量值稳定可靠，实现荧光光谱和荧光量子效率的准确测量。

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The fluorescence relative intensity CRM is applied to calibrate the fluorescence relative intensity of the fluorescence spectrometer, obtaining the fluorescence relative intensity calibration curve to ensure the accuracy of fluorescence spectrum measurement. The application of fluorescence quantum efficiency CRM is to serve as reference materials when measuring fluorescence quantum efficiency using relative methods, in order to calculate the fluorescence quantum efficiency of the tested sample through measurement. Fluorescence spectroscopy is widely used for qualitative and quantitative analysis of fluorescent materials, and accurate measurement of fluorescence spectroscopy plays a crucial role in the research and application of fluorescent materials. Fluorescence quantum efficiency is a crucial parameter for evaluating the luminescence performance of fluorescent materials. The fluorescence relative intensity and fluorescence quantum efficiency CRM are packaged in matching sealed colorimetric dishes, which are convenient to use and have stable and reliable values, achieving accurate measurement of fluorescence spectra and fluorescence quantum efficiency.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
28	硫酸奎宁溶液荧光量子效率标准物质	Fluorescence Quantum Efficiency CRM of Quinine Sulfate Solution	NIM-RM5027	荧光量子效率 η : 0.546±0.052	12.4mm×12.4mm×53mm
29	硫酸奎宁溶液荧光相对强度标准物质	Fluorescence Relative Intensity CRM of Quinine Sulfate Solution	NIM-RM5028	波长 Wavelength: 380 nm~670 nm 量值 Certified Values: 0.005~0.997 CPS/Counts 不确定度 U=0.001~0.032(k=2)	12.4mm×12.4mm×53mm



6. 材料力学性能测量设备校准用标准物质

CRMs for Calibrating Mechanical Property Measurement Equipment

铁块体残余应力标准物质的应力标准值接近于零，适用于 X 射线残余应力测定仪低应力量值范围的校准。纳米压入熔融石英标准物质，用于校准纳米压入仪的压入硬度和压入模量，校准仪器的压头针尖面积函数，确保这些设备在纳米压入测量时量值的准确和可比性，满足微纳米薄膜和器件生产研发和应用单位的量值溯源需求。

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The standard value of the reference material for residual stress of iron block is close to zero, which is suitable for the calibration of the low stress range of the X-ray residual stress tester. Fused silica for the calibration of nanoindentation equipment can be used to calibrate the indentation hardness and modulus of the nanometer indentation instrument, calibrate the indentation head area function of the instrument, ensure the accuracy and comparability of the measurement time value of these devices in the nanometer indentation measurement, and meet the needs of the measurement value traceability of the research and development of micro and nano films and devices production and application units.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
30	X 射线残余应力测定仪 校准用铁块体残余应力 标准物质	CRM of residual stress of iron block for X-ray residual stress testers calibration	NIM-RM5257	残余应力 Residual stress: (15.2±2.8) MPa	长方形块体 Rectangular block
31	纳米压入熔融石英 标准物质	Fused silica for calibration of indentation test	NIM-RM4601	纳米压入模量值 Nanoindentation modulus: (72.6±2.8) GPa ; 纳米压入硬度值 Nanoindentation hardness: (9.5±0.5) GPa	每包装为一块 One piece in each package

7. 碲化铋块体塞贝克系数标准物质

Seebeck Coefficient CRM of Bismuth Telluride Bulk

该标准物质使用已溯源的计量型块体热电材料塞贝克系数测量系统，采用准静态法对标准物质进行定值，并经国外标准物质验证，量值获得国际等效一致。该标准物质具有良好的均匀性和稳定性，可在真空或惰性气氛下对塞贝克系数测量仪器进行校准。碲化铋块体塞贝克系数标准物质，填补了国内空白，可作为参比物提供塞贝克系数标准值，服务仪器校准和验收、新材料研发和性能评价、企业产品质量控制等，确保测量结果准确可比，满足科研项目、企业产品质量提升等热电材料研发和应用中塞贝克系数量值溯源的需求，为国内新能源、微电子、通信等产业提供计量支撑。

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This CRM is obtained by a metrological bulk thermoelectric material Seebeck coefficient measurement system which is traceable, using the quasi-static method that is verified by foreign SRM. The measured values have achieved international equivalent consistency. This RM has good uniformity and stability and can be used to calibrate Seebeck coefficient measurement instruments in vacuum or inert atmospheres. The RM fills the domestic gap and can provide standard values of Seebeck coefficient as reference materials. It serves for instrument calibration and acceptance, new material research and performance evaluation, enterprise product quality control, etc. It can ensure the accuracy and comparability of measurement results and meet the requirements for the traceability of Seebeck coefficient values in thermoelectric materials research and application in scientific research projects, enterprise product quality improvement, etc. It can provide metrological support for domestic new energy, microelectronics, communication and other industries.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
32	碲化铋块体塞贝克系数 标准物质	Seebeck Coefficient CRM of Bismuth Telluride Bulk	NIM-RM4621	(212.80~227.03) $\mu\text{V}/^{\circ}\text{C}$ $U=(3.74\sim3.81)\mu\text{V}/^{\circ}\text{C}(k=2)$	11mm×3mm×3mm

8. 低场核磁直接法固体脂肪含量标准物质

CRM of Solid Fat Content Using LFNMR Direct Method

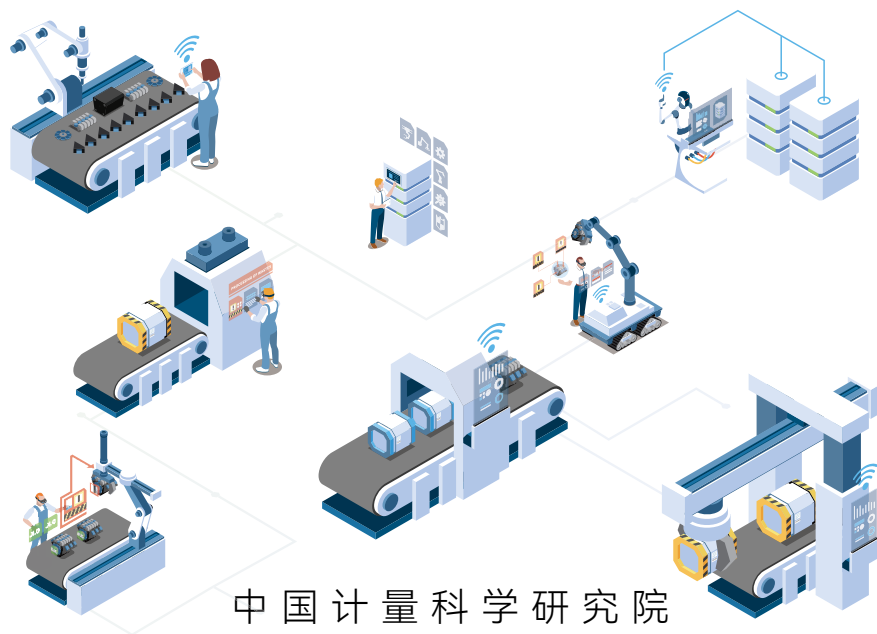
固态脂肪含量标准物质可用于低场核磁共振法（LF-NMR）测量固体脂肪含量（SFC）的校准，为方法验证及质量控制提供核心支持。应用领域包括食品工业中巧克力、乳制品、人造奶油等加工产品的脂肪分析，油脂研发中起酥油、烘焙油脂的工艺优化与品质监控以及质检机构的检测方法标准化和结果溯源。

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The CRM for solid fat content is intended for calibrating solid fat content (SFC) measurements using low-field nuclear magnetic resonance (LF-NMR), providing critical support for method validation and quality control. Application areas encompass fat analysis in processed products such as chocolate, dairy products, and margarine within the food industry; process optimization and quality monitoring of shortenings and baking fats during oil/fat research and development; as well as standardization of testing methods and result traceability for quality inspection agencies.

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序号 No.	名称 Description	名称 Description	标准物质编号 Code	量值 Certified Values	规格 Unit of Issue
33	低场核磁直接法固体 脂肪含量标准物质	Solid Fat Content Using LFNMR Direct Method	NIM-RM5504	B 管固体脂肪含量 solid fat content: (30.1±1.9)% C 管固体脂肪含量 solid fat content: (69.4±1.9)%	一套三根 A set of three tubes



中国计量科学研究院 新材料领域标准物质

NATIONAL INSTITUTE OF METROLOGY, CHINA
CERTIFIED REFERENCE MATERIAL (CRM) —ADVANCED MATERIALS

