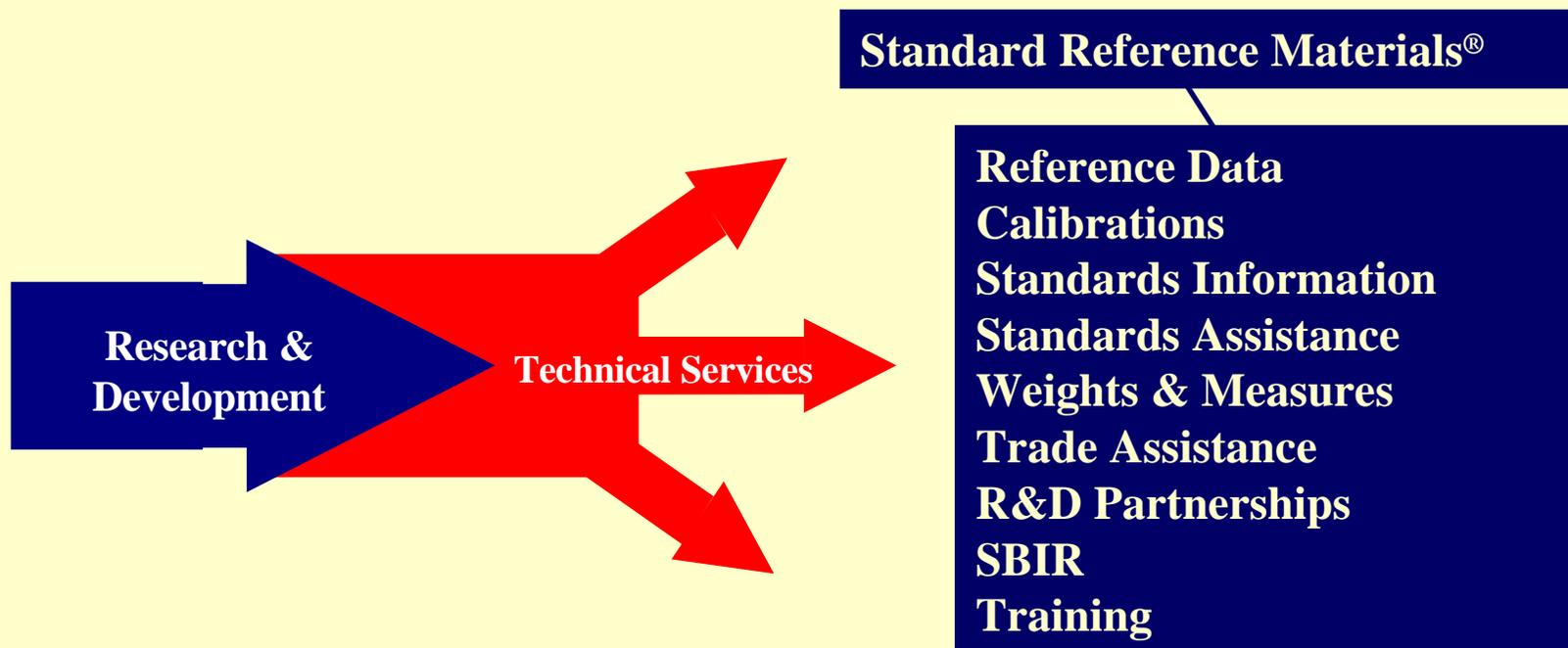


NIST Standard Reference Materials Program



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*Metrology and Modeling of Color and Appearance
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Technology Administration, U.S. Department of Commerce**

Talk Outline

- ❖ NIST SRM Program Overview
- ❖ Organizational Responsibilities
- ❖ SRMP Marketing and Sales
- ❖ SRMP Materials Facilities and Capabilities
- ❖ Individual SRMs of Interest

NIST Standard Reference Materials Program

Mission Statement

Mission- to provide reference materials that are the definitive physical artifacts of measurement traceability in the United States. The Program promotes and supports the development and certification of NIST SRMs essential to industry, academia, and government in order to facilitate commerce and trade and to advance science and technology.

An SRM is produced when:

- It is the best mechanism for linking measurement results to NIST or to a national standard or reference.
- Needed measurement accuracy is not economically or technically feasible or provided elsewhere.
- Industry-wide standards for commerce are needed from a neutral source not otherwise available.
- Continued availability of highly characterized materials from a common source is essential to both science and industry.

Customers' Dollars at Work

SRMP FY99 Budget Distribution (\$ 10.2 M)

Allocations to SRMP Operations (36.8%)^a

Project Coordination - 18.6 %

Inv. Testing & Analysis - 0.1 %

Computer Services - 1.9 %

Preparation/Packaging/
Distribution - 7.1 %

Misc. Inv. Adj. - 0.2 %

Marketing/Sales/
Customer Service - 8.9 %

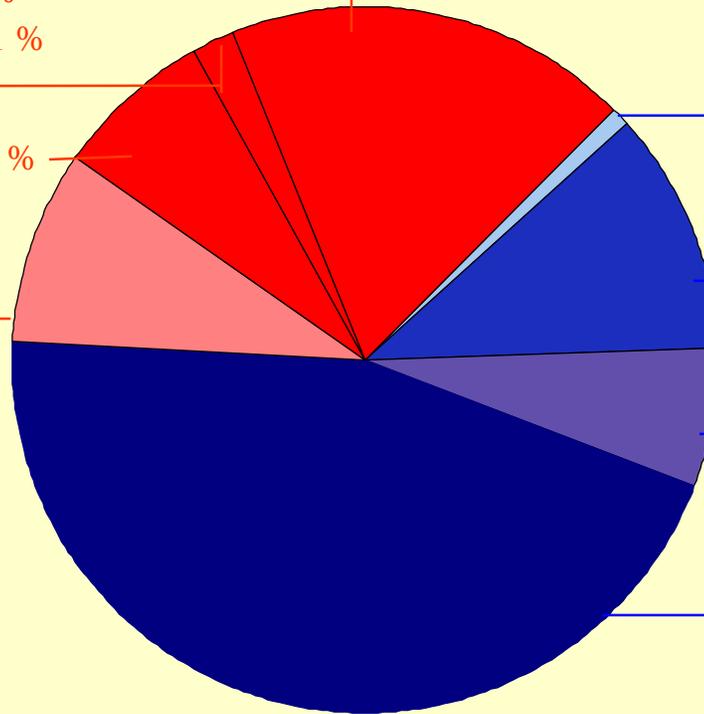
Allocations to NIST Technical Activities (63.2%)^b

0.7 % - Bldg. DEP./DOC Use

11.4 % - Service Development
Support

6.3 % - STRS
(not funded by sales)

45 % - Production/
Certification



^aAllocations are determined by TS and are based on the minimum resources required to deliver SRMs and related services to NIST customers.

^bAllocations are based on priorities set by NIST technical divisions and are the return of income to the Working Capital Fund by each OU through the sale of SRMs.

Responsibility Delegation for Infrastructure and Delivery of NIST SRMs

- ❖ **Technical Laboratories:** Technical responsibility for development, production and certification.
- ❖ **Statistical Engineering Division:** Statistical support for certification.
- ❖ **SRMP:** Business, administrative, and product support responsibilities.

Responsibility for NIST SRM Development and Production

Technical Laboratories

- ❖ Provide technical capabilities sufficient for maintaining existing SRMs and for developing new materials
- ❖ Provide specifications for TS acquisition, preparation, and/or storage of candidate SRM materials
- ❖ Establish technical work plan for certification; provide technical oversight and QA of the measurement process; provide appropriate stability monitoring and documentation
- ❖ Provide strategic plan for perpetuation of each new SRM

Responsibility for NIST SRM Development and Production

Statistical Engineering Division

- ❖ Assist in design of sampling and measurement strategies for certification of SRMs, RMs, and NTRMs
- ❖ Provide technical guidance in the implementation of NIST uncertainty policy
- ❖ Provide data analysis and uncertainty assessment for SRMs

Responsibility for NIST SRM Development and Production

Standard Reference Materials Program

- ❖ Serve as focal point for acquisition, assimilation and dissemination of information from industry and OA's regarding new standards and measurement needs
 - Normative standards organizations
 - Needs assessment workshops/meetings
- ❖ Provide financial tracking and accounting of WCF loans to NIST laboratories for SRM production activities
- ❖ Maintain all documentation regarding production, certification, and distribution of reference materials

Responsibility for NIST SRM Development and Production (Continued)

Standard Reference Materials Program

- ❖ Provide an independent review of process
- ❖ Publish and distribute Certificates in accordance with relevant ISO Guides
- ❖ Market, sell, and distribute SRMs in accordance with relevant safety, transportation and shipping regulations
- ❖ Implement materials acquisition, preparation, packaging and storage

SRMP Support Activities

Single point of customer contacts:

- 5,000 telephone inquiries per year about services, traceability, quality, uncertainty, alternative standards, etc.
- 40,000 SRM telephone inquiries per year
- 15,000 FAX messages per year
- 70,000 visits/month to SRMP home page
- SRM workshops/conferences/exhibitions

Measurement Services Delivered

- 1300 SRMs maintained and supported for 6 Laboratories representing 27 NIST Technical Divisions.
- 50,000 SRM units produced and/or packaged per year.
- 700 SRM units shipped per week.
- process hazardous materials shipping paperwork.

SRMP Marketing

Marketing Strategies:

- Industry interaction:
 - support voluntary standards organizations and industrial consortia through technical involvement
 - assess customer needs and educate users through NIST workshops, meetings, and colloquia
- Face-to-face contact: hold exhibits at targeted trade shows
- Direct mail: send quarterly and other literature to mailing list of interested customers
- Trade journals: submit SRM articles to relevant trade journals and magazines

NIST Standard Reference Materials Program

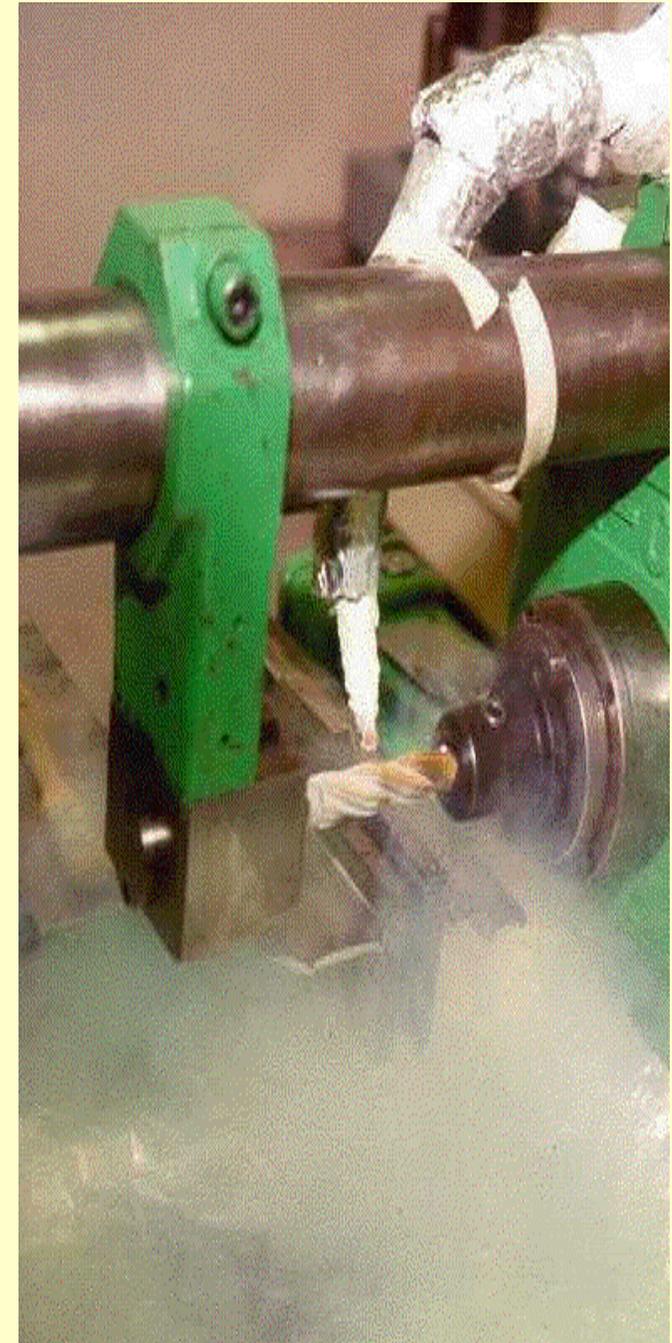
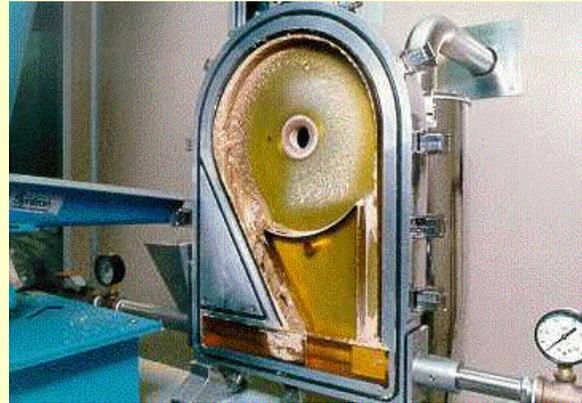
Homepage at <http://www.nist.gov/srm>

Standard Reference Materials Program

- Online SRM catalog with intuitive search capability
- SRM Pricing and status
- Technical contacts
- Certificates and MSDS
- Needs assessment and customer feedback
- Exhibit schedule
- SRM announcements



SRMP Materials Processing



SRMP Materials Facilities and Capabilities

- Experienced, trained personnel, dedicated laboratories and clean room equivalent work spaces for handling a variety of hazardous and non-hazardous materials.
- Staff certified to package and ship SRM units in accordance with all pertinent national/international transportation regulations.
- 100 different solid, liquid, and gaseous materials processed in FY 1999.
- 33,347 SRM units shipped world-wide in FY 1999.

SRMP Materials Capabilities (continued)

Materials Processing:

- Grinding, milling, blending, and classification equipment capable of processing 1 kg to 500 kg quantities in a variety of solid forms (rod, ingots, powders, granules, etc.)
- Blending, mixing, and filtration equipment capable of preparing and producing multi-kg quantities of homogeneous organic and inorganic liquids.
- Training and use of specialty commercial organization contracted with to perform certain material processing jobs.

SRMP Materials Capabilities (continued)

SRM Unit Production:

- Commercial and NIST-built packaging equipment (ampouling machines, powder fillers, inert gas purging, enclosed gloved boxes, etc.) designed to protect the integrity and maintain the stability of processed materials packaged for certification.
- Specialized equipment (walk-in refrigerators, freezers at $-90\text{ }^{\circ}\text{C}$, etc.) to maintain the integrity of unstable bulk materials and packaged units.

SRMP Materials Capabilities (continued)

Future Directions:

- Institute bar coding to identify individual SRM units, perform real-time inventory verification, track SRM orders, and streamline customer database retrievals.
- Expand internal electronic transmittals to include all shipping papers, packing slips and related forms, and data to/from the SRMP mainframe.
- Upgrade and centralize facilities with sophisticated monitoring and backup equipment for the storage of materials requiring special environmental conditions.

Optical Properties SRMs of Interest

SRM	Type	Wavelength Range (in nm)	Unit Size
930e	Glass Filters, Transmittance	440 to 635	3 filters / 4 holders
931f	Liquid Filters, Absorbance	302 to 678	Set of 12 ampules
935a	Potassium Dichromate, UV Absorbance	235 to 350	15 g
1930	Glass Filters, Transmittance	440 to 635	3 filters / 4 holders
2030a	Glass Filters, Transmittance	465.0	1 filter / 1 holder
2031a	Metal-on-Quartz Filters, Transmittance	250 to 635	3 filters / 4 holders
2046	Transmittance Glass Filter, Optical Density = 1	1064	51 x 51 x 1.0 mm
2047	Transmittance Glass Filter, Optical Density = 2	1064	51 x 51 x 2.2 mm
2048	Transmittance Glass Filter, Optical Density = 3	1064	51 x 51 x 3.2 mm
2049	Transmittance Glass Filter, Optical Density = 4	1064	51 x 51 x 4.2 mm
2050	Transmittance Glass Filter, Optical Density = 5	1064	51 x 51 x 5.4 mm
2051	Transmittance Glass Filter, Optical Density = 6	1064	51 x 51 x 6.4 mm
2032	Potassium Iodide, Stray Light	240 to 280	25 g
1921a	Infrared Transmission Wavelength	3 μm to 18 μm	1 polystyrene card
2034	Holmium Oxide Solution, Wavelength	240 to 650	1 sealed cuvette
2035	NIR Transmission Wavelength Standard	971 to 1949	25 mm dia.
2044	White Diffuser (Resin)	250 to 1100	5.1 D x 1

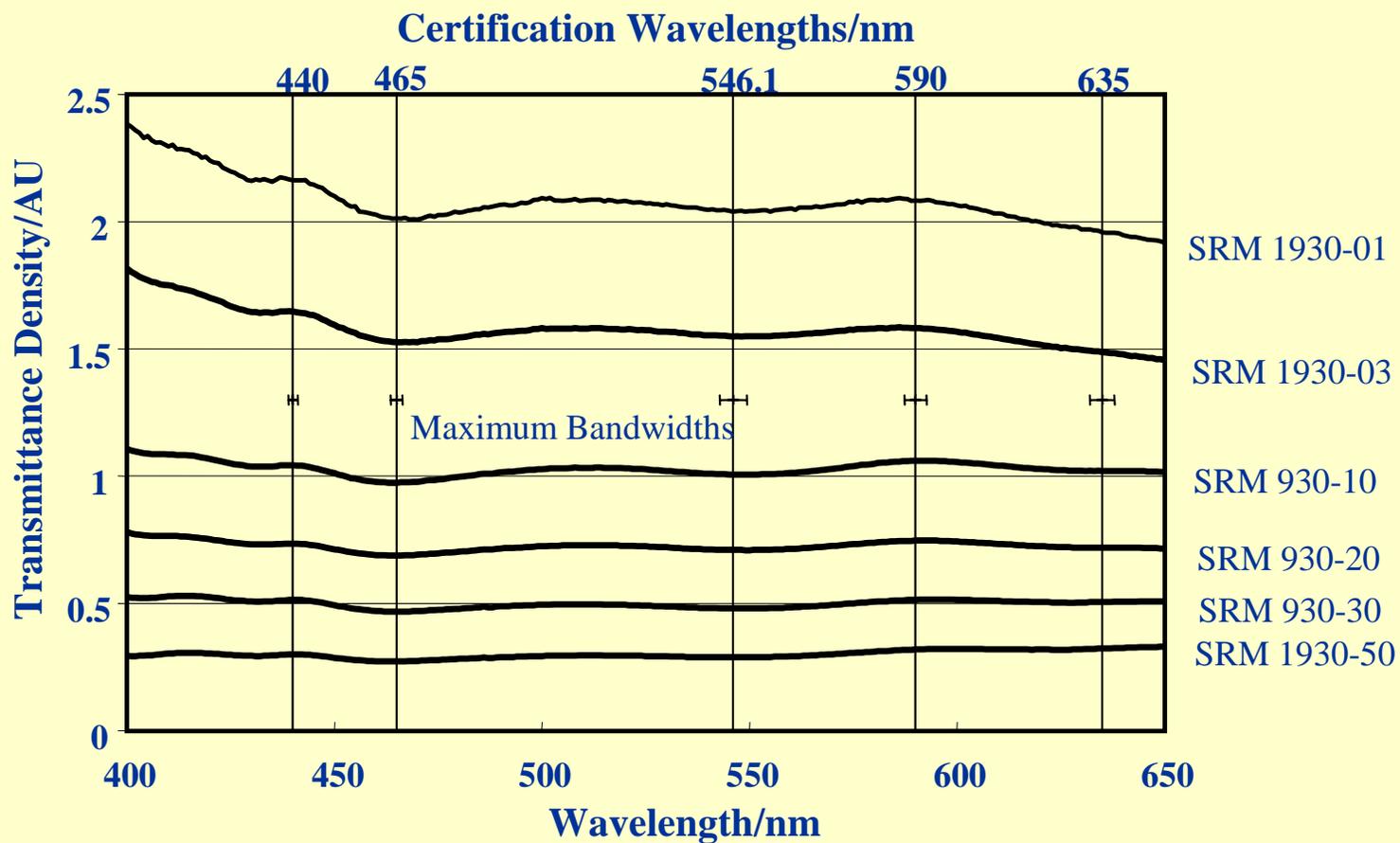
Future SRMs:

SRM 1932 Fluorescien
 SRM 2017 Multiangle White Reflectance
 SRM 2040 BRDF
 SRM 2052 Black Diffuser

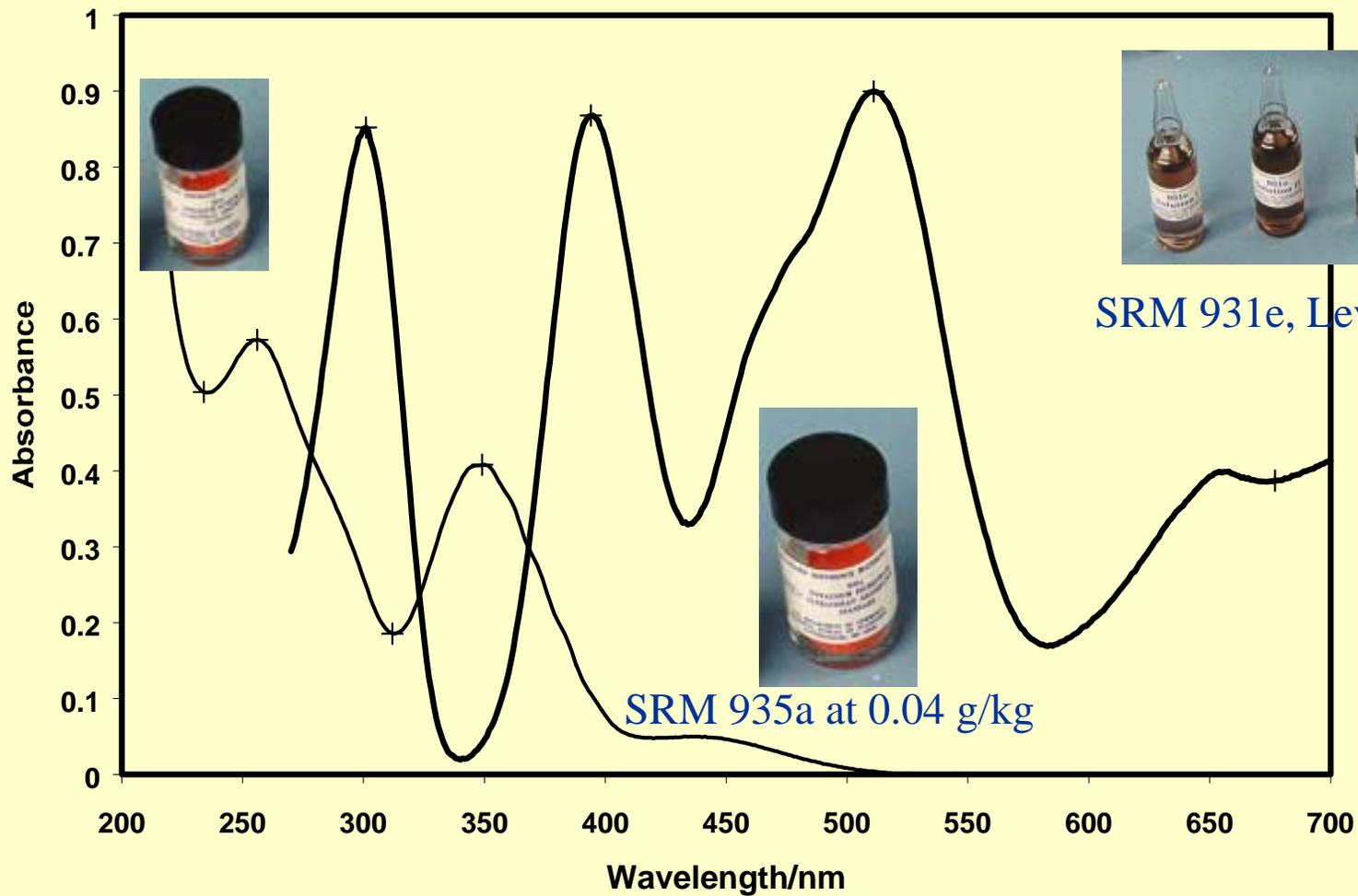
SRMs for Spectrophotometry



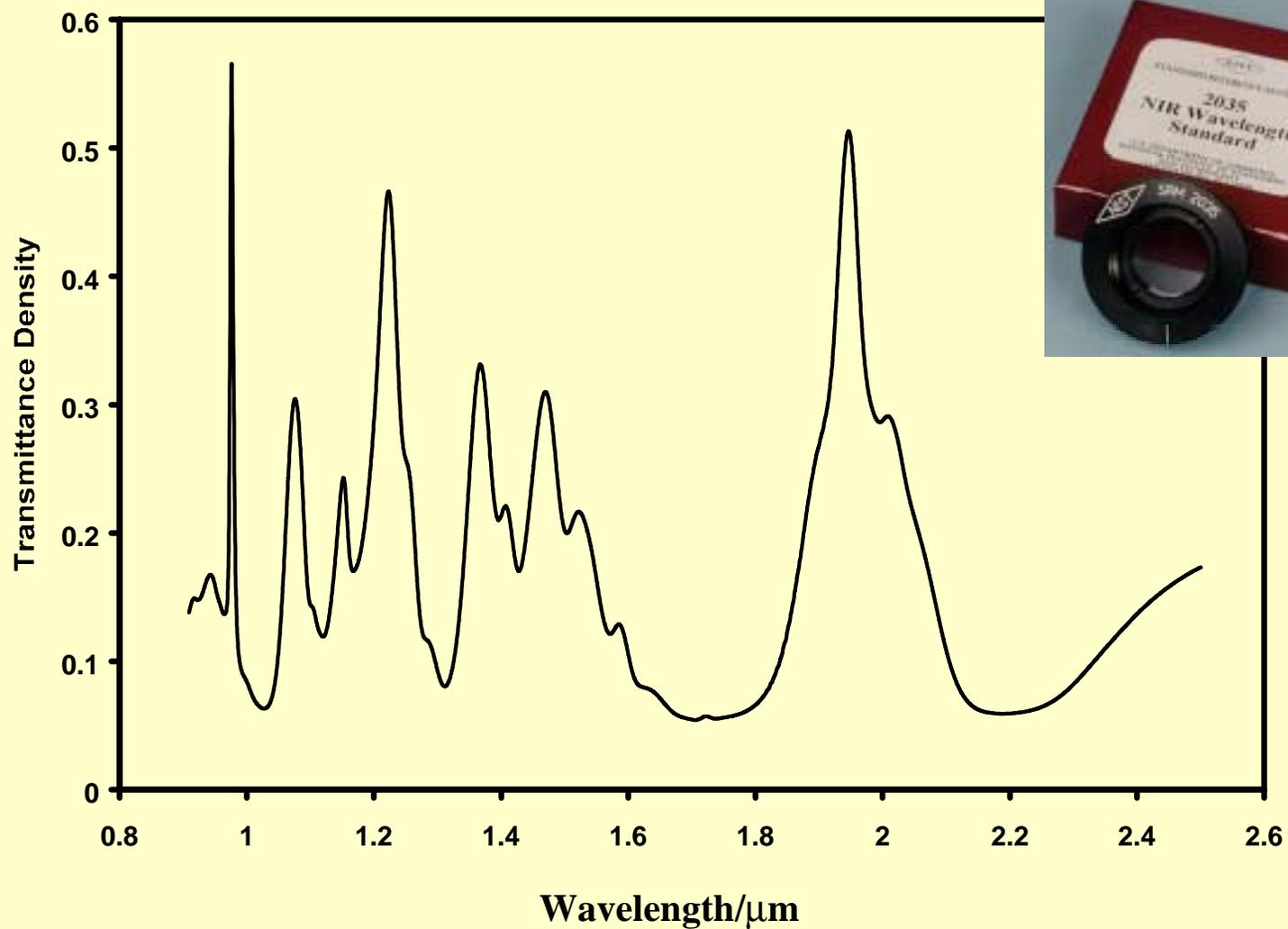
Spectra of Neutral Glass Visible Absorbance Standards



Spectra of Liquid Standards Certified for Specific Absorptivity



SRM 2035 NIR Wavelength Standard



Talk Summary

- ❖ NIST Divisions' Roles in the certification process
- ❖ NIST SRMP Groups' responsibilities and capabilities
- ❖ Individual SRM examples

Questions?