U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate

Standard Reference Material 1920

Near Infrared Reflectance Wavelength Standard

from 740 to 2000 nm

This Standard Reference Material (SRM) is intended for use in establishing the accuracy of the wavelength scale of reflectance spectrophotometers in the spectral range from 740 to 2000 nm. SRM 1920 consists of a mixture of rare-earth oxides of dysprosium, erbium, and holmium sealed behind an infrared transmitting window in a 30 mm diameter by 6 mm deep cavity. The sealed holder is 51 mm diameter by 12 mm. The infrared transmitting window is 2 mm in thickness. The front surface of this window is slightly recessed below the surface of the black anodized aluminum holder (see Figure 1). The reflectance spectrum of SRM 1920 is illustrated in Figure 2. The certified wavelengths of minimum reflectance, expressed in nanometers (nm), are given in Table 1 for spectral bandwidths of 2, 3, 4, 5, and 10 nm for 37 reflectance bands. The uncertainty of these wavelengths of minimum reflectance is estimated to be no greater than $\pm$ 1.0 nm at the measurement temperature of 25 °C $\pm$ 5 °C, and includes the random and systematic errors of the measurement procedures. Details concerning the materials, instrumentation, and method used in the certification of SRM 1920 are available in Reference 1.

The reflectance measurements given in the certificate and investigations on the various parameters that might influence the results were performed by V.R. Weidner, P.Y. Barnes, and K.L. Eckerle, NBS Radiometric Physics Division.

The overall direction and coordination of the technical measurements leading to certification were performed under the chairmanship of K.D. Mielenz and J.J. Hsia, NBS Radiometric Physics Division, Center for Radiation Research.

The technical and support aspects involved in the issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R.L. McKenzie.

Reference:

1. Weidner, Victor R., Barnes, Patricia Y., Eckerle, Kenneth L., "A Wavelength Standard for the Near Infrared Based on the Reflectance of Rare-Earth Oxides", NBS Journal of Research, in press.

Gaithersburg, MD 20899
July 1, 1986

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

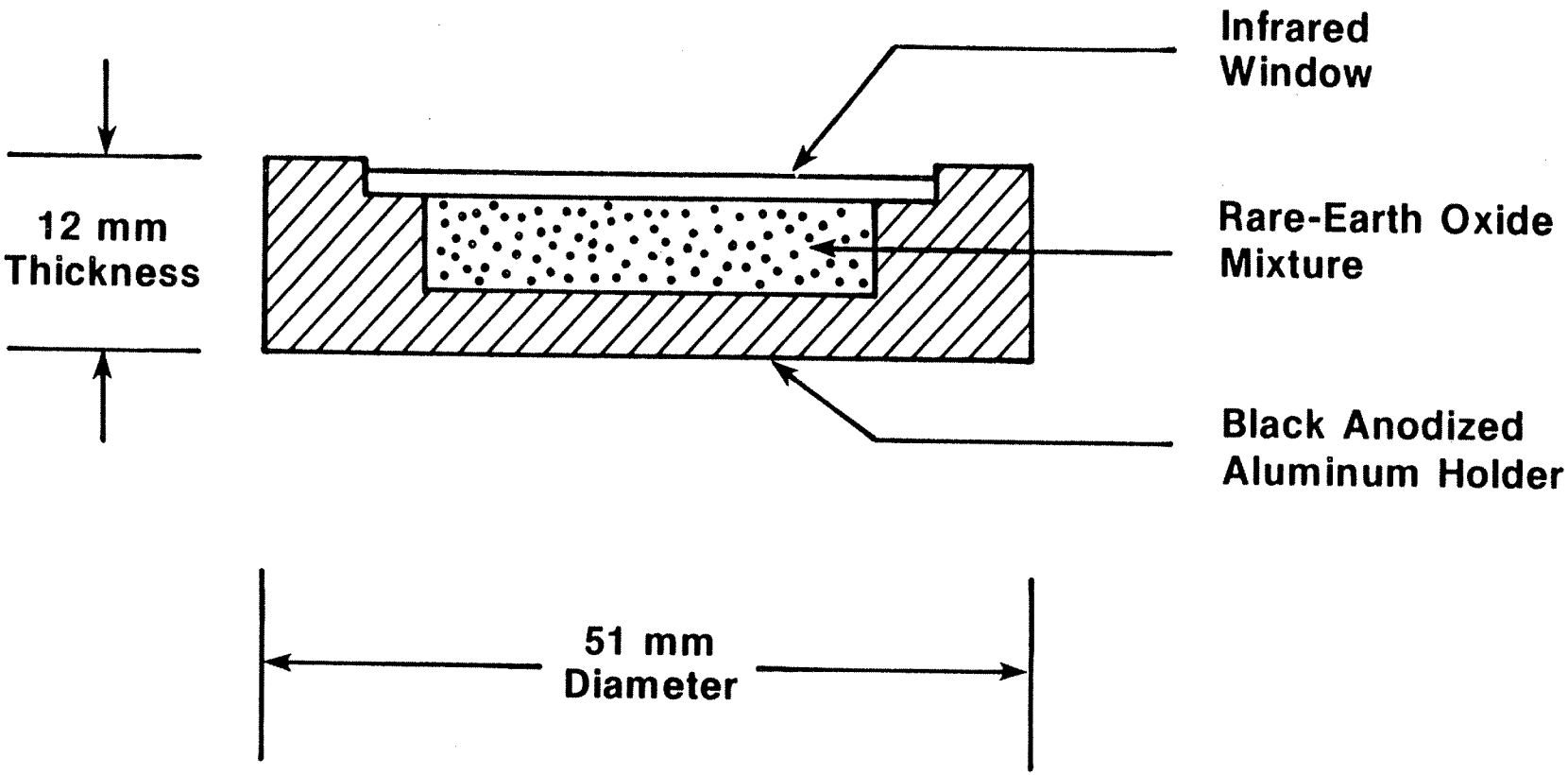

Fig. 1 Cross-Section of SRM 1920 Holder

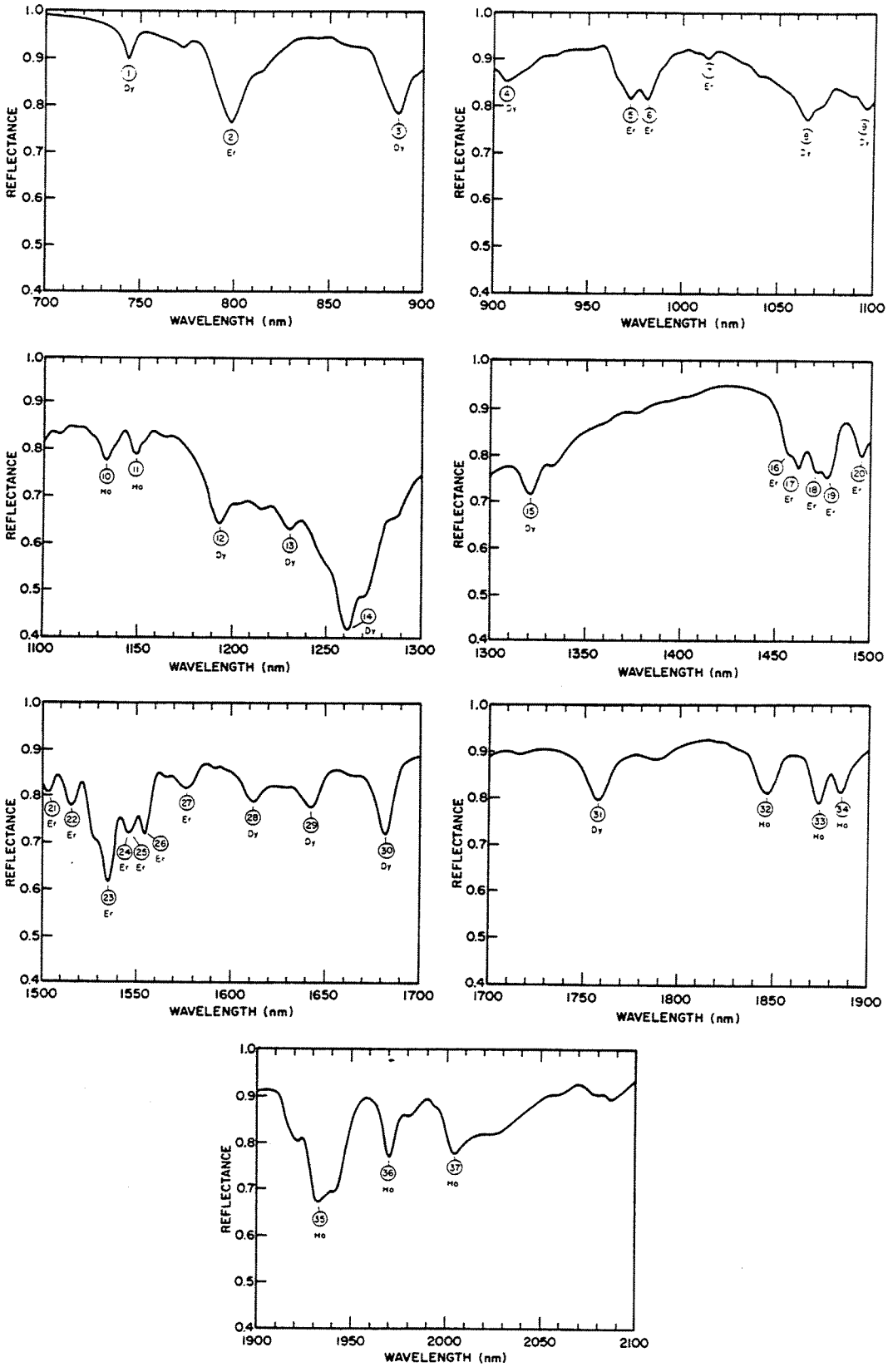

Fig. 2 Reflectance Spectrum of SRM 1920, Near Infrared Reflectance Wavelength Standard.

Table 1. The adopted wavelengths of minimum reflectance for the rare-earth oxide mixture at 25 °C and for spectral bandwidths (SBW) of 2, 3, 4, 5, and 10 nm.

Rare-earth oxide	Band No.	SBW 2 nm	SBW 3 nm	SBW 4 nm	SBW 5 nm	SBW 10 nm
Dy_2O_3	1	—	743.0	743.4	743.4	—
"	2*	—	799.0	799.0	798.6	798.0
"	3*	887.2	886.9	886.7	886.7	886.5
"	4	906.3	906.8	907.5	907.3	—
Er_2O_3	5	970.6	971.3	971.6	971.6	—
"	6	979.6	980.8	980.8	980.8	—
"	7	1012.9	1013.2	1012.9	1012.8	—
Dy_2O_3	8	1064.7	1065.0	1065.0	1064.9	—
"	9	1095.6	1096.0	1096.2	1096.4	—
Ho_2O_3	10*	1132.2	1132.3	1132.4	1132.9	1132.9
"	11*	1148.1	1148.4	1148.5	1148.7	1148.6
Dy_2O_3	12	1192.9	1192.7	1192.9	1192.9	—
"	13	1230.2	1230.2	1230.2	1230.3	—
"	14*	1261.0	1260.9	1260.8	1260.8	1261.8
"	15	1320.7	1320.7	1320.8	1320.7	1320.2
Er_2O_3	16	1456.2	1456.4	1456.7	—	—
"	17	1461.7	1461.9	1462.2	—	—
"	18	1471.2	1471.6	1471.6	—	—
"	19	1477.4	1477.6	1477.5	—	—
"	20	1494.8	1494.9	1495.0	1495.0	—
"	21	1503.4	1503.5	1503.5	—	—
"	22	1516.0	1516.0	1515.9	1515.7	—
"	23*	1535.5	1535.6	1535.6	1535.4	1534.6
"	24	1544.7	—	—	—	—
"	25	1548.1	—	—	—	—
"	26	1555.1	1555.0	1554.8	—	—
"	27	1577.1	1577.2	1577.2	—	—
Dy_2O_3	28	1611.8	1611.7	1611.7	1611.9	—
"	29	1642.7	1642.7	1642.5	1642.5	—
"	30*	1682.6	1682.3	1682.2	1682.2	1681.4
"	31*	1757.6	1757.8	1757.9	1757.8	1757.6
Ho_2O_3	32*	1847.5	1847.3	1846.9	1847.0	1847.3
"	33	1874.3	1874.0	1873.8	1874.0	—
"	34	1885.0	1885.3	1885.7	1885.5	—
"	35*	1930.9	1931.6	1932.2	1932.5	1935.5
"	36*	—	1970.6	1970.7	1970.8	1970.8
"	37	—	2004.5	2005.9	2005.8	2006.3

The uncertainty in the wavelengths of minimum reflectance are believed to be no greater than ±1 nm.

* (preferential bands)