U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate

Standard Reference Material 477

Glass Fluorescence Source

This Standard Reference Material (SRM) is a glass disk intended for use as a target source in the measurement of semiconductor-detector window absorption in x-ray energy spectrometers in accordance with Standard Test Procedures for Semiconductor X-Ray Energy Spectrometers, 759, of the American National Standards Institute and the Institute of Electrical and Electronics Engineers, and Publication 759 of the International Electrotechnical Commission.

Characterization of the attenuation of the detector window and dead layer can be accomplished by using the following x-ray emission lines emitted from SRM 477 when fluoresced by a ^{55}Fe exciting source which emits MnK_α and MnK_β x rays (see the figure attached):

Ba (keV)	Ca (keV)	Si (keV)	Mg (keV)	Zn (keV)
L_{α_1} (4.47)	K_α (3.69)	K_α (1.74)	K_α (1.25)	L_α (1.01)
L_{β_1} (4.83)	K_β (4.01)			
L_{β_2} (5.16)				

The attenuation is characterized for each x-ray emission line by the ratio of the total number of counts in the peak of the emission line to the total number of counts in the peak of the backscattered MnK_α line (5.90 keV) of the ^{55}Fe source. Because the attenuation is a function of x-ray energy, the fluoresced lines of Ba, Ca, and Si are the most useful with a 50 mCi ^{55}Fe source (see the figure attached). The fluoresced lines of Mg and Zn can be used in characterizing so-called windowless systems. If an exciting source other than ^{55}Fe is used the attenuation may be determined with the ZnK_α line at 8.63 keV, which can also be fluoresced from SRM 477, since it will be attenuated very little by beryllium windows.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R.K. Kirby.

Washington, D.C. 20234
February 23, 1983

George A. Uriano, Chief
Office of Standard Reference Materials

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The glass from which SRM 477 is made is chemically stable at room temperature and its surface can easily be cleaned. The nominal composition of this glass is given for information only:

Oxide	Weight Percent	Element	Atomic Percent
SiO_2	(42.5)	Si	(14.7)
MgO	(20.0)	Mg	(10.3)
B_2O_3	(10.0)	B	(6.0)
Li_2O	(4.0)	Li	(5.6)
ZnO	(20.0)	Zn	(5.1)
CaO	(1.5)	Ca	(0.56)
BaO	(2.0)	Ba	(0.27)

No significant differences were found between the composition of the six rods from which this lot of material was cut when tested by x-ray fluorescence spectrometry.

This glass was prepared by D.H. Blackburn of the Center for Materials Science and the x-ray fluorescence measurements were made by P.A. Pella of the Gas and Particulate Science Division, Center for Analytical Chemistry.

This SRM was proposed by the Nuclear Instruments and Detectors Committee of the IEEE Nuclear and Plasma Science Society, David C. Cook, Chairman, and Louis Costrell, Secretary.