

191 Series Reflectometers for Thin Film Measurements

The 191 Gonioreflectometer Heads measure the spectral reflectance of surfaces over the range of 380 to 1100 nanometers. Different models cover both specular reflectance, and diffuse reflectance, or both. The illumination and collection microscopes are mounted in a calibrated semi-circular sector assembly with independent angular adjustment capable of measuring angles down to 20 degrees included angle, 10 degrees incident angle. Small area illumination and collection viewing allow the unit to separate front and back surface reflections of thin samples.

A quartz halogen lamp provides illumination through the illumination microscope. Reflected light from the test piece is collected in the collection microscope integrating cavity. The 191 is coupled via a fiber optic probe to the Gamma Scientific RadOMA spectroradiometer.

The 191C comes with a viewing eyepiece that is inserted in place of the integrating cavity for checking system alignment and a low reflectance glass sample traceable to N.I.S.T. Standards. Specular reflectance calibration data is provided in increments of 10nm from 300 to 2000 nanometers at angles of an incidence of 10 to 45 degrees in 5 degree increments. They are provided in the form of ASCII text files directly compatible with Light Touch Software. Tabular listings are also made available.



FEATURES

- Angular Reflectance measurements from 380-1700 nm (200-2000 nm with 191Q)
- Calibrated glass sample
- Viewing eyepiece
- Minimum included angle of 20° (10° incidence angle)
- Fixed angle and variable angle models available
- Diffuse and specular reflectance
- Fiber Optic coupling to measurement equipment
- Regulated quartz Halogen illumination lamp

ACCESSORIES

- 191Q - Quartz Optics and Choice of Xenon, Deuterium, or Tungsten Lamps
- RS-22 - Xenon Illumination Lamp available
- 191FB - Fixed Angle customer specified
- 191P - 191C with selectable S & P Polarizing filters
- 191D - 191C for use with RadOMA™
- 191-OP2 Adjustable mounting stand
- 191-OP3 Inverted mounting stand
- 191-OP4 Specular reflectance reference sample (low reflectance 4% nominal)
- 191-OP5 Specular reflectance reference sample (high reflectance 89% nominal)



GAMMA SCIENTIFIC

8581 Aero Drive San Diego, CA 92123 Ph (858) 279-8034 Fax (858) 576-9286

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191 Series Reflectometers for Thin Film Measurements

Illumination Microscope Adjustment Angle:	+50° to -30° +/-1°
Collection Microscope Adjustment Angle:	+50° to -30° +/-1°
Minimum Included Angle of the two Microscopes:	20°
Illumination Spot Size (Area of Analysis):	0.01 x 0.03 in. (254 x 760 microns) - standard 0.0004 x 0.0004 in. (10 x 10 microns) - optional
Measuring Area of Collection Microscope:	0.07 x 0.1 in. (1.78mm x 2.54mm)
Visual Magnification of Collection Microscope:	10x
Calibrated Glass Sample:	2.5 in. (63mm) BK-7 Glass Standard. Specular spectral reflectance values every 10nm from 300-2000nm at angles of incidence of: 108 to 458 in 58 increments. Reflectance values for both S and P polarizations and average reflectance are given.
Objective Magnification:	1x
Rotational Adjustment of Sample Table out of the plane of the Illuminating & Collecting Microscopes:	+4°; -8°
Rotational Adjustment of Both Microscopes Relative to Sample:	10°
Minimum Radius of Curvature:	0.25 in. (6.35 mm)
Sample Size:	Without a stand (contact with sample): 1.9 in. (48mm) diameter minimum With OP2 Adjustable Stand: 4.0 in. (102mm) diameter maximum, 0.2 in. (5mm) diameter minimum, 1.5 in. (38mm) maximum thickness, 0.06 in. (1.5mm) minimum thickness With OP3 Stand 1.9 in. (48mm) dia. minimum.
Maximum Thickness of Sample When Using OP2 Stand:	0-1.5 in. (3.8cm)
Spectral Characteristics of Illuminating Microscope:	Tungsten Halogen Approx. 2900K Xenon and Deuterium also available
Wavelength Range:	380-1700nm
Optical Head (191C)	Height: 4 in. (10.2cm) open; 6 in. (15.2cm) closed Width: 12 in. (30.5cm) open; 4.2 in. (10.7cm) closed Length: 6.5 in. (16.5cm) Weight: 3.0 lbs. (1.37kg)



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