# Optical Data Associates, LLC



## Instruments & Accessories

- Agilent Cary 7000 UV-Vis-NIR Grating Spectrophotometer [SPM] with Universal Measurement Accessory [UMA]
- Agilent Cary 5000 UV-Vis-NIR Grating Spectrophotometer [SPM]
- Perkin-Elmer 983G™ IR Grating Spectrophotometer [SPM] - 2 systems
- ThermoScientific iS10 FT-IR Spectrophotometer [SPM]
- Agilent Eclipse UV-Vis-NIR Grating Fluorometer
- Micromap™ 512 Non-Contact Optical Profilometer
- BYK-Gardner Haze-Gard Hazemeter
- Hunterlab ColorQuest & Minolta CR-200 Colorimeters
- China Laboratories GM-268 Glossmeter
- Hunterlab D48D Glossmeter for 20° and 60°
- Horiba IG-320 Gloss Meter for 60°
- Fisher Scientific Abbé Refractometer

### Agilent Cary 7000 UV-Vis-NIR Grating Spectrophotometer [SPM] with Universal Measurement Accessory [UMA]

In 2013, ODA was the first US company to acquire the Agilent Universal Measurement Accessory [UMA]. which converts the Agilent Cary 5000 UV-Vis-NIR SPM described below into the Agilent Cary 7000 system. ODA was involved in the development of the system during two visits to the factory in Melbourne, Australia and served as a beta site for the system prototype. The system employs a highly automated concentric rotary table with an accuracy of 0.02° that is cantilevered from the sample compartment. The sample is mounted on the inner ring and can be rotated to any angle; the detector arm can rotate to almost any angle, except where it would block the beam, on the outer ring. A wire grid polarizer on a separate rotator provides automatic beam control for s, p, or any intermediate polarization state. The detector is silicon/InGaAs element hybrid with a range of 250 to 2500 nm with the polarizer and 200 to 2800 nm without it.

The Cary 5000 is a double-beam, double-grating SPM with a $0.2 < \lambda < 3.30$ µm range. This instrument is considered the state-of-the-art in commercially available SPMs; it was introduced in 2003 and one was acquired by ODA in 2004. The standard sources are deuterium and tungsten-halogen lamps, but mercury and other lamps can be substituted in the source turret. Its monochromator is driven by a stepping motor for accurate normalization and background subtraction. The instrument self-calibrates in wavelength on every initialization with its deuterium lamp. The sample compartment is large and flexible. The detectors are a UV-enhanced PMT and a cooled PbS cell.

### Agilent Cary 5000 UV-Vis-NIR Grating Spectrophotometer [SPM]

This system was acquired new in 2018 and is basically the same as the system described above, with upgraded electronics. This provides ODA with a new flagship system to back up the Cary 5000. The much older Cary 500 could no longer be maintained and was surplused. This instrument is usually configured with the Agilent Spectralon™ 150 mm diameter side-looking integrating sphere.

### Accessories for both of the above instruments:

- Agilent Spectralon™ 150 mm diameter side-looking integrating sphere
- Labsphere Spectralon™ 150 mm diameter side-looking integrating sphere
- Labsphere Spectralon™ 150 mm diameter down-looking integrating sphere
- Agilent transmittance sample holders with a variety of apertures,
- Agilent double-beam V-W absolute reflectance,
- Harrick single-beam V-N absolute reflectance,
- Harrick single-beam 45° reflectance factor,
- Harrick single-beam variable angle reflectance factor
- Agilent reference beam attenuator
- Avian Technology powder cells
- Perkin-Elmer 10 cm gas cell
- Harrick Glan-Taylor polarizers
- Hansen & Associates single-beam cryostat

### Standards for both of the above instuments:

- Avian Technologies SPFS-02c specular reflectance
- Labsphere USRS-99-020 total reflecftance
- NRC [Canada] PO-1583 didymia glass wavelength

### Perkin-Elmer 983G™ IR Grating Spectrophotometer [SPM]

The PE 983G is favored by many optical fabricators and coaters over all FTIR systems for its photometric accuracy and stability; it is the best commercially available dispersive SPM ever made, even though production ended in the 1980s. Its 2 <

λ < 56 μm spectral range complements that of the Agilent Cary 7000 and 5000. It employs a Globar source and a thermocouple detector; four gratings on a turret cover the wide spectral range. This model is employed by the National Physical Laboratory of Great Britain to produce the world's most widely used IR primary reflectance standard mirrors

### Accessories:

- Perkin-Elmer double-beam [two single-beam] specular reflectance factor
- Wilks double-beam [two single-beam] 30/45/60° specular reflectance factor
- Harrick single-beam Praying Mantis™ diffuse reflectance
- Daedal and other precision x-y stages and œ stages,
- Hansen & Associates single-beam cryostat

### Standards:

- Perkin-Elmer polyethylene wavelength
- Perkin-Elmer and other metal mesh transmittance/absorptance
- NPL [UK] first surface Al mirror specular reflectance

## ThermoScientific iS10 FT-IR Spectrophotometer [SPM]

This instrument was obtained in 2017 to replace the aging Nicolet 560; it extends our IR capabilities to diffuse transmittance and reflectance measurements. To that end, it is equipped with a Labsphere Infragold™ 102 mm diameter integrating sphere. Its 2 < λ < 25 μm range overlaps that of the Cary 5000, and its high sensitivity complements the high accuracy of the Perkin-Elmer 983G.

### Accessory:

- Labsphere Infragold™ 102-mm diameter integrating sphere

### Standard:

- Infragold™ High R Standard

## Agilent Eclipse UV-Vis-NIR Grating Fluorometer

ODA acquired a Varian Eclipse fluorometer in early 2003. This system can generate excitation and emission spectra over a 190 < λ < 1100 nm spectral range. It can accommodate both solids – 15° incident/75° exitent angles – and liquids in cuvettes – 90° reflectance angles. The system can operate at slit widths ranging from 1.5 to 5 nm, and with various filter and attenuator programs, and can make zero order measurements in both excitation and emission. It has a broader spectral range than the FluoroMax 2, described below.

### Standard:

- Olavene fluorescence standard

## Micromap™ 512 Non-Contact Optical Profilometer

In 2001, ODA totally upgraded its Micromap noncontact optical profilometry system. Based on Moire interferometry, the system can assess rms, average, and peak-to-valley roughnesses and step heights ranging from a few tenths nm to about 37 μm through a user-friendly, versatile Windows 2000 software interface. The sample area measured can be as large as 1 mm square with horizontal resolution of about 1 μm or as small as 0.3 mm square with a horizontal resolution of about 0.5 μm.

### Standard:

- VLSI Standards Inc. SHS-880 QC Thickness Standard

## BYK-Gardner Haze-Gard Hazemeter

This hazemeter is widely accepted as one of the standard instruments for measuring haze, as well as clarity and visual transmittance. It conforms to ASTM D-1003. The instrument can accommodate samples up to 5 inches thick and can reach the center of a disk up to 15 inches in diameter.

### Standards:

- BYK-Gardner Standards with Nominal Haze Values of 1, 5, 10, 20, and 30

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