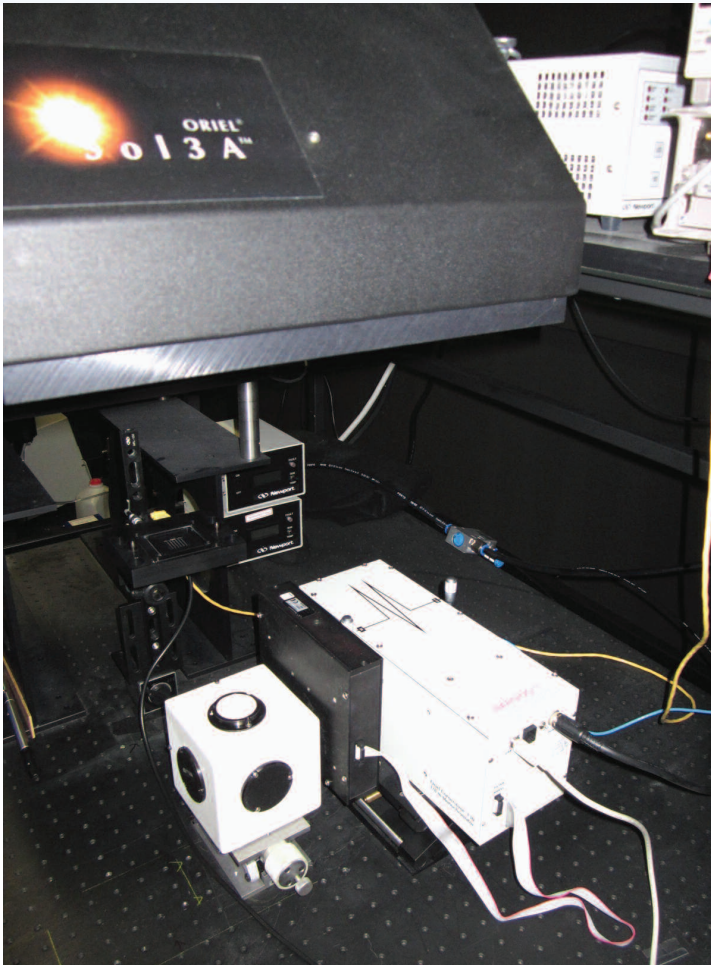


Spectroradiometric Measurements



Spectroradiometric Systems, or Spectroradiometers, measure spectral irradiance as a function of wavelength. They are typically used to measure the spectral output of an unknown or to calibrate measurement systems. In photovoltaics testing, spectral irradiance is needed in order to calculate the spectral mismatch between the test light source (typically a xenon lamp), and a reference spectrum (typically AM1.5G). The set-up shown on the left is used in Newport's Technology and Applications Center Photovoltaics Lab to calibrate Silicon Reference Cells and calculate their spectral mismatch.

Most spectroscopic systems include Monochromators with single point detectors, others, spectrographs with array detectors. The modular design of the Oriel product line allows the Researcher to custom design and build his system to meet his need; for example, the Oriel line offers various gratings, order sorting filters and detectors for scanning in UV-VIS and/or in the IR.

A TYPICAL SPECTRORADIOMETER SET-UP

As shown in the photo, the system used by Newport's PV Lab is based on an open 4 inch integrating sphere which is attached to the entrance of a 1/8 m Monochromator. The Spectroradiometer is calibrated against a spectral irradiance standard according to the ASTM standard G138 ("Standard Test Method for Calibration of a Spectroradiometer Using a Standard Source or Irradiance"). During calibration, the integrating sphere is turned on its side so that the open port faces the 1 kW Quartz Tungsten Halogen Standard Lamp, located 50 cm away. During normal operation, the open port of the sphere is turned upwards to face an Oriel Solar Simulator, and positioned at the center of the beam from the Solar Simulator. A calibrated Silicon photodiode detector, which has a spectral response that covers the UV-VIS wavelength range of interest, is mounted to the output port of the monochromator. A power meter reads the detector signal.

The TRACQ Data Acquisition Application commands the system's instruments (monochromator, filter wheel, optical power meter), and acquires and displays the data in real time. The data can be saved for later retrieval or post-processing.

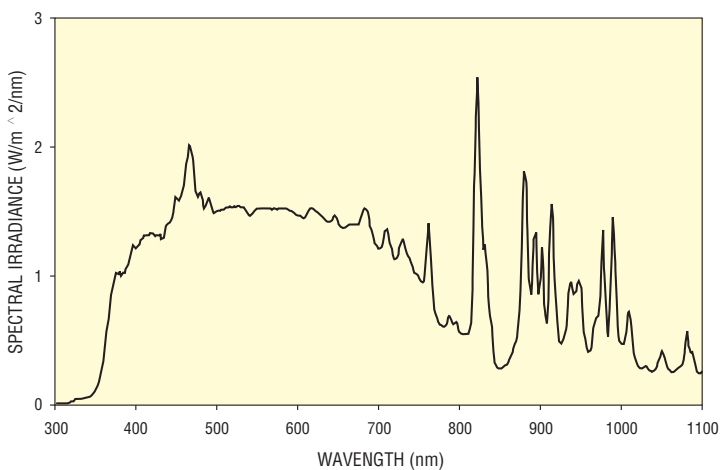


Fig. 1 Spectral irradiance of Oriel Class AAA Solar Simulator. The spectral irradiance data is used to calculate the spectral mismatch of Silicon Reference Cells.

Spectroradiometric Measurements

COMPONENT LIST

This component list represents the set-up used in Newport's PV Lab. For other configurations, contact an Oriel Technical Sales Engineer for assistance.

Model	Quantity	Description
74004	1	1/8 m Cornerstone Monochromator
74024	1	350 nm Blaze Grating
74025	1	750 nm Blaze Grating
74001	2	Micrometer Driven Slit Assemblies
74010	1	Motorized Filter Wheel
51250	1	Order Sorting Filter
51310	1	Order Sorting Filter
70672	1	Integrating Sphere
70655	2	Sphere Port Plugs
71580	1	Calibrated Silicon Detector
71683	1	Detector Interface Adapter
1936-R	1	Optical Power Meter
77890	1	TRACQ Data Acquisition Application
63978	1	1000 W QTH Calibration Source



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