

Measuring Laser Diode Output Flux

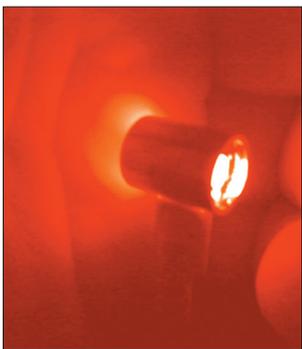
Laser diodes typically have wide output divergence in one direction, making it difficult to capture all the flux with a simple detector. An integrating sphere solves this problem by measuring all of the flux introduced into the sphere, regardless of direction.

Design

The sphere is designed to measure flux introduced onto a wide area of the sphere surface (in this case, about half of the sphere) and to respond equally to flux introduced anywhere onto this region.

Calibration

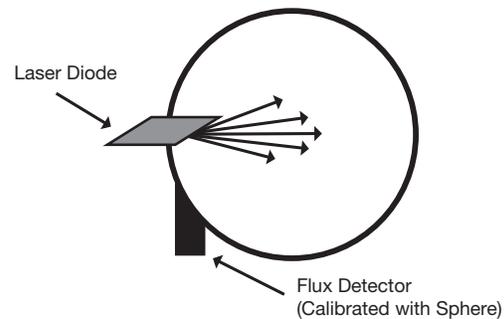
The detector and sphere are calibrated as a unit, using a source of known flux. This is usually achieved by a lamp standard of spectral irradiance at a precisely measured distance, through a precision aperture of known area. This provides a known quantity of flux into the sphere. The detector signal is scaled to this calibrating flux. For a sphere used to measure a narrowband source, such as a laser diode, the calibration source is generally filtered to provide flux over a similar narrow band, in order to account for the spectral dependence of the sphere-detector combination. In the case of a sphere used to measure the flux from laser diodes of very different spectral ranges, more than one calibration may be required.



Integrating sphere-based laser diode power meters offer accurate measurement while eliminating sensitivity to alignment.

Measurement

The figure below shows an integrating sphere measuring the output of a laser diode.



Positioning and Alignment

In addition to responding to the divergent flux from a laser diode, the integrating sphere is reasonably insensitive to positioning and alignment, making it an ideal solution for automated or even handheld measurements.

Simultaneous Spectral Measurement

In addition to measuring flux, a second detector can be added to the sphere to simultaneously view the spectrum. Since this spectral detector need not be calibrated for flux, it can be positioned nearly anywhere in the sphere, as shown in the figure below.

