



# SOC-210

## BIDIRECTIONAL REFLECTOMETER

The SOC-210 BDR is a full-featured goniometric measurement system for characterizing the angular scattering of light from surfaces. This data is useful in a variety of applications to assess surface finish, contamination, visualization of appearance and quality of optical components.



## KEY FEATURES

### TURNKEY SYSTEM

Delivered as a complete turnkey system, including installation and training, for mapping bidirectional reflectance distribution functions (BRDF) of surfaces, paints, coatings, liquids, and particles. The SOC-210 BDR provides full hemispherical bidirectional reflectance (BRDF) and Bi-directional transmittance distribution function (BTDF).

### FULL AUTOMATION

The manual setting of individual measurement angles and parameters for full BRDF is a time-consuming, cost-prohibitive process. The SOC-210 BDR's PC data acquisition system controls data collection, processing and archiving, including: complete automation for all four goniometric coordinates ( $\theta$  and  $\phi$ , incident and reflected angles), switching between the calibration reference and the sample, and configuration of source aperture, neutral density (ND) filter wheel, and polarization stages.

### VISIBLE TO INFRARED SPECTRAL RANGE

BRDF provides a method of describing reflectance as a function of incident (source) and reflected (observed) angles and wavelength. Consequently, a truly complete BRDF representation of the reflective behavior of a surface requires comprehensive angular coverage in both the visible and infrared wavelength range. The SOC-210 BDR is the only commercially available goniometer that extends to the LWIR region. Pre-aligned source and detector modules can be interchanged without need for alignment to accommodate a wavelength range of 0.35 to 14 $\mu$ m.

### CUSTOMIZABLE FILTER WHEEL

Individual interference spectral filters are provided for use in the receiver subsystem that allow continuous coverage over the entire operating spectral band. Several wide band interference filters are provided for broad spectral band measurements. A wide range of discrete thin film interference filters are provided. Uses standard commercial off-the-shelf (COTS) thin film 1 inch diameter bandpass filters. This opens the way for a complete library of filters, since they can be obtained from a number of third-party vendors.

## APPLICATIONS

- Photorealistic rendering
- Reflector material characterization
- Aerospace & black materials
- Cosmetics
- LCD backlighting
- Optical sensors
- Roughness control
- Semiconductor quality control
- Illumination design

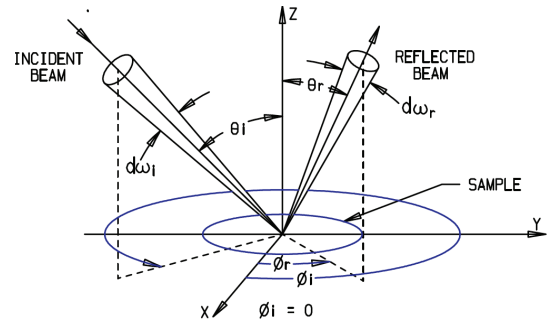
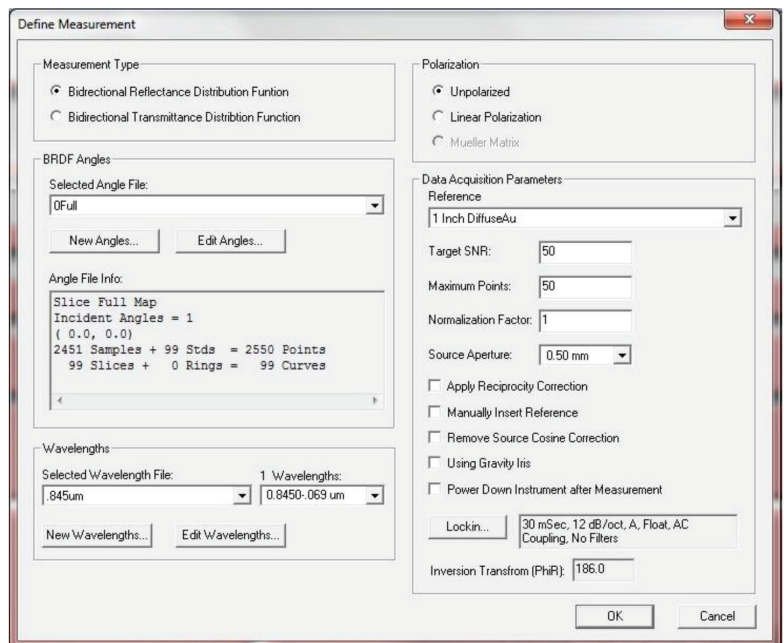


DIAGRAM ILLUSTRATING CONCEPT OF BIDIRECTIONAL REFLECTANCE

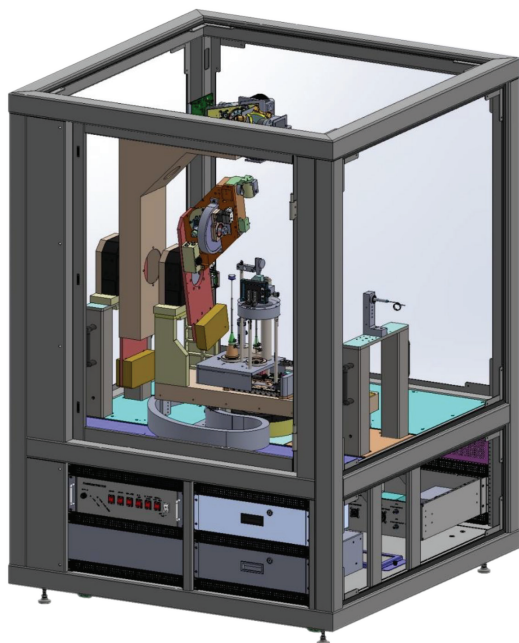
## SOFTWARE

A windows-based graphical user interface (GUI) controls operation of the SOC-210. All operating parameters and data collection and storage settings are accessible through a series of control buttons and selection boxes on the main interface panel.

The main window, displayed when the software is first invoked, contains several controls and displays. The standard software provided includes: instrument control and project and database management.



MAIN WINDOW SHOWING BRDF PLOT WHILE RUNNING A MEASUREMENT



SPECIFICATIONS

|                       |   |
|-----------------------|---|
| Measurements          | <ul style="list-style-type: none"> <li>• Full hemispherical bi-directional reflectance distribution function (brdf) measurement</li> <li>• Bi-directional Transmittance Distribution Function (BTDF)</li> <li>• Optional polarization measurement capability</li> </ul>   |
| Spectral Range        | .35 to 14 micrometer wavelength. Customized via interchangeable detector modules.   |
| Angular Coverage      | <p>Accuracy 0.1° for each. Complete flexibility with regard to the angles measured. Any combination of source and detector angles can be specified.</p> <p>Incident polar: Theta I     <math>\theta_i</math>     = 0° to 85°<br/>                     Incident azimuthal: Phi I     <math>\varphi_i</math>     = 0° to 360°<br/>                     Reflected polar: Theta R     <math>\theta_r</math>     = 0° to 85°<br/>                     Reflected azimuthal: Phi R     <math>\varphi_r</math>     = 0° to 360°</p> |
| Spectral Filtering    | Standard commercial off-the-shelf thin film 1 inch diameter bandpass filters.   |
| Automation            | $\theta_i$ $\varphi_i$ $\theta_r$ $\varphi_r$ source aperture, neutral density (ND) filter wheel, and sample/reference X-stage. All listed variables are programmable and controllable from PC.   |
| Sources               | Quartz halogen lamp, and/or silicon carbide glower. Optional laser sources. Laser diodes or small laser customization available upon request.   |
| Detectors             | Si (.35-1.1 $\mu\text{m}$ ), InGaAs (1.0-1.7 $\mu\text{m}$ ), InSb (1.5-5.0 $\mu\text{m}$ ), MCT (5.0-14.0 $\mu\text{m}$ )  |
| Noise Floor           | Less than $10^{-3}$ ster <sup>-1</sup> or better (bandpass filter dependent). Low noise detectors and electronics assure superior performance.  |
| Sample Size and Shape | Normal sample size is one inch diameter circular. Ability to measure powders and liquids. Optional sample mount. A container for powders and liquids is provided.   |
| Dimensions            | 50" x 50" x 75"   |
| Power                 | 120VAC 10 Amp power connection  |