Thermo-Optical Measurements and Advanced Coatings for Space Applications

Solar absorptance and thermal emittance are essential factors for maintaining temperature control of spacecraft materials. Variables such as thickness, surface preparation, coating formulations, manufacturing techniques, and application processes can significantly influence these properties, making it crucial to measure and characterize these values during material development and quality assurance.

Surface Optics is accelerating new space technology development by providing our customers with measurement instrumentation, lab services, and thin-film space coatings. Serving the needs of the aerospace community for over 45 years, Surface Optics is a trusted partner to the world's leading space innovators.

Measurement Lab
Optical property characterization, ensuring reliable thermal parameters of space materials through advanced laboratory testing.

Coating Services
Specializing in vacuum deposition coatings for spaceflight hardware, over 30 years of expertise in handling space qualified components.

Portable Reflectometers
Handheld reflectometers provide in-situ testing of material reflectance, aiding in performance validation from R&D to pre-flight quality control.

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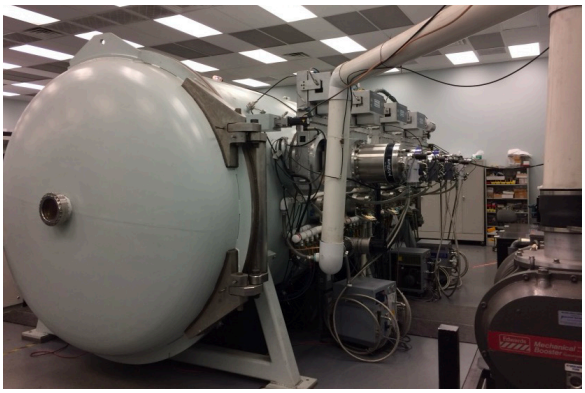
Portable Reflectometers for Rapid Absorptance & Emittance Measurements

Thermal engineers use coatings, films, and other materials designed for specific thermal properties. In situ measurements in laboratories, clean rooms, or directly on spacecraft during assembly and testing phases allow engineers to verify the solar absorptance and thermal emittance of materials under realistic conditions, ensuring the accuracy of their thermal control systems.

SOC410 Series reflectometers and emissometers are portable measurement devices allowing for quick validation of A/E to ensure specifications are met.

Thin-Film Coatings Services for the Space Industry

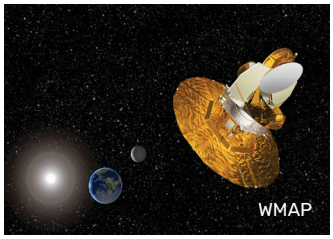


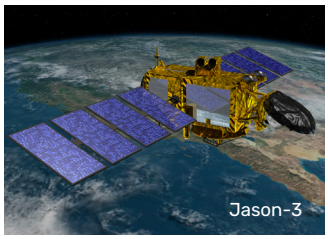
Surface Optics 5-meter web coating line, 1.5 meters width x 1000 meters roll capacity

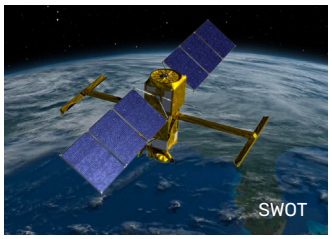
The Surface Optics coatings lab is a preferred supplier to the space industry and is ready to assist your mission with:

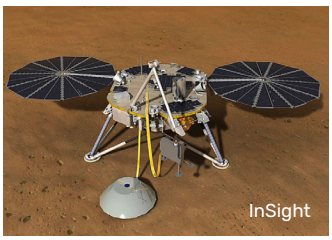
- Ability to take projects from R&D to production
- Multilayer, roll-to-roll and large area coatings
- Batch-to-batch adjustment and verification with our in-house measurement lab
- AS9100 Quality Management System certified

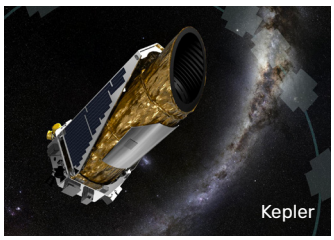
After more than 30 years of designing and delivering high-precision coatings, Surface Optics has enjoyed collaborating on numerous space flight programs and contributing to the success of our customer's missions.











Optical Properties Measurement Lab

SOC-100 Hemispherical Directional Reflectometer (HDR). The SOC-100 HDR provides a full range of measurement capabilities enabling improved design and fabrication of space materials.

Space-based construction materials must meet a range of requirements: mechanical robustness, lightweight characteristics, and tolerance to heat due to extreme exposure to solar radiation.

There are three optical requirements for heat management: the solar reflectance must be sufficiently high, the thermal emissivity must be sufficiently high, and the surface must be diffuse. These properties ensure that the spacecraft will remain cool, and the thermal control material will perform over a wide range of exposure angles.

- **Hemispheric directional reflectance**

  Measurements of HDR from 0.3 µm to 50 µm. Typical HDR measurements are made out to 25 µm. Measures the fraction of the light incident on a sample at a given angle that is reflected back into the hemisphere. We measure HDR as a function of incident elevation, polarization, wavelength, temperature, and provide both the specular and diffuse components.

- **Emissivity**

  From reflectance measurements (and transmittance where necessary), we generate emittance data as a function of polarization, wavelength, angle, and temperature. Directional, near-normal emittance, when reflectance has been measured at near normal incidence. Directional angular emittance, when reflectance has been measured at any incidence angle other than near-normal. Total hemispherical and spectral hemispherical emittance, when reflectance has been measured over a sufficiently wide range of incidence angles to permit integration over the hemisphere.

- **Bidirectional Reflectance Distribution Function**

  The bidirectional reflectance (BRDF) of a surface is defined as the ratio of the luminous radiance reflected into a unit solid angle to the total incident radiance. Bidirectional reflectance measurement capabilities span from 0.35 µm to 14 µm with a full four degrees of angular freedom (incident elevation and azimuth, and reflected elevation and azimuth).

Surface Optics Corp.
11555 Rancho Bernardo Rd.
San Diego, CA 92127, USA
P: 1 (858) 675-7404
www.surfaceoptics.com

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