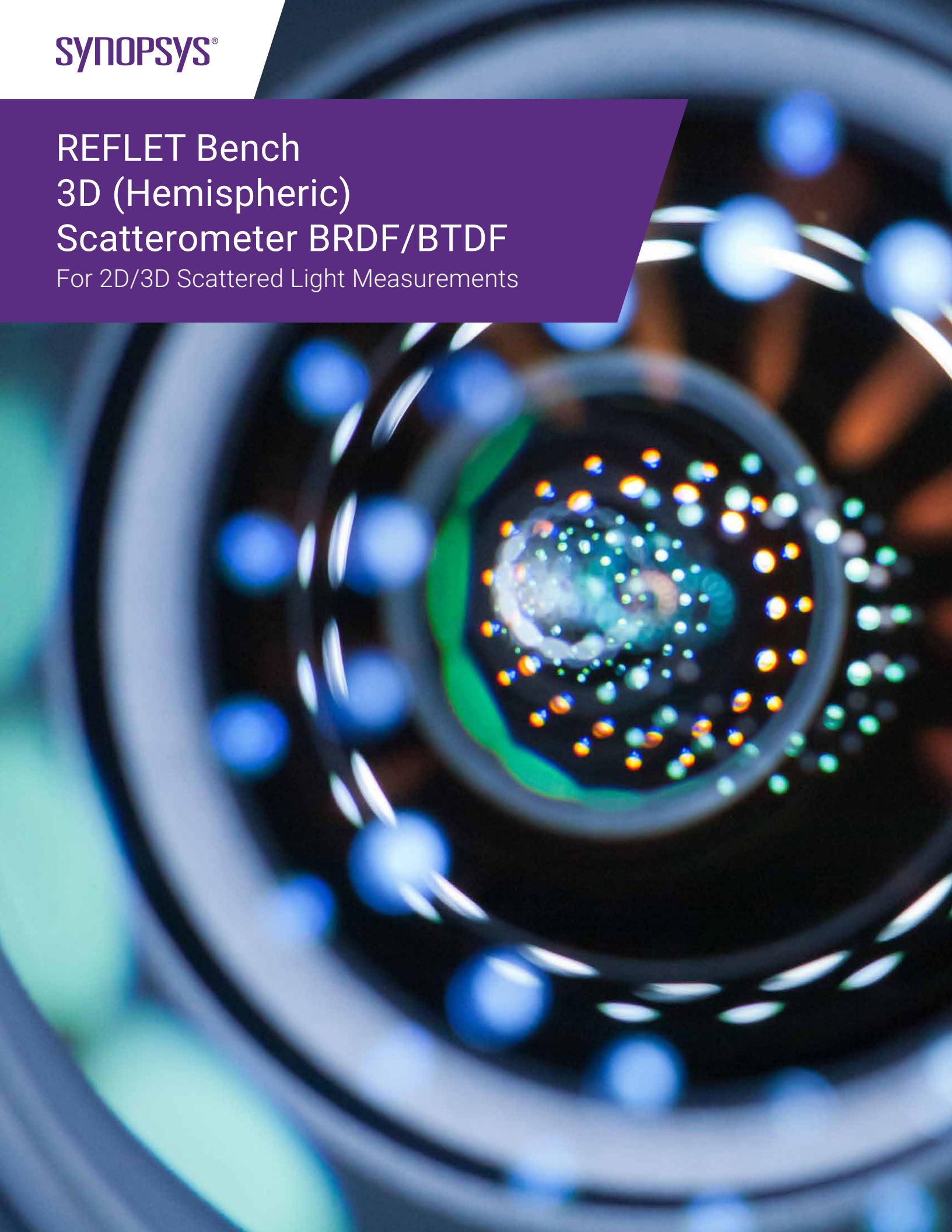
SYNOPSYS®

REFLET Bench 3D (Hemispheric) Scatterometer BRDF/BTDF

For 2D/3D Scattered Light Measurements



Applications

- Photorealistic rendering: accurate measurement of spectral behavior
- Optical sensors: medical, industrial, quality control, automotive
- Reflector material characterization for luminaire design
- Reflector material characterization for automotive headlamps design
- Cosmetics characteristics: spectral and specular behavior
- Roughness controls in production
- Quality control of dust/ particulates in semiconductors
- LCD backlighting
- Scattering of transmitting glasses
- Aerospace applications, measurements of black paints, BRDF of mirrors

REFLET 180S

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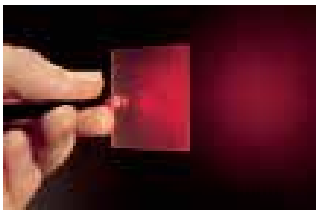
Complete system (Non-contractural photography)

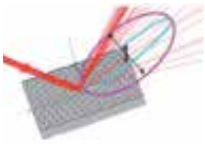
REFLET

A compact, motorized optical system for scattering characterization of any type of material. Get fast, accurate, and easy measurements of luminous energy distribution or spectral composition contained in the scattering lobes. The REFLET characterizes surfaces of your examined regions such as roughness, defects,and coatings or paints. Moreover, the system measures BRDF/BTDF, which perfectly represents the way any surface scatters incoming light in 3D space.



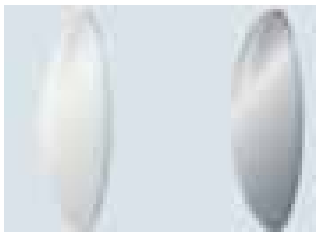
Diffuser

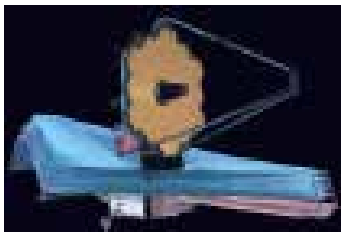
The measurements are done in reflection and in transmission. Understanding the way light is reflected and transmitted through a diffuser is essential to the use of materials in optical systems.



Aluminum

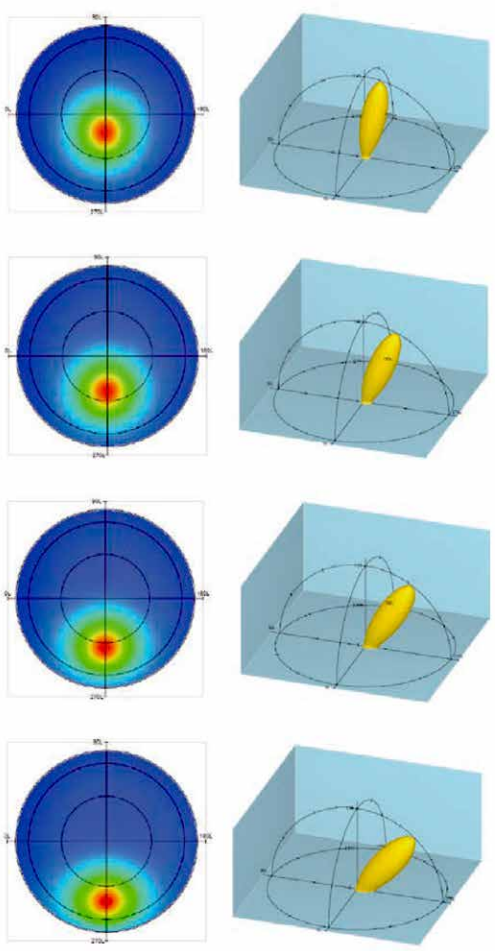
Reflector materials can have quite complex behaviors depending on the plane of incidence. REFLET provides accurate measurements in different planes of incidence (examples include anisotropic materials and polarization dependence).



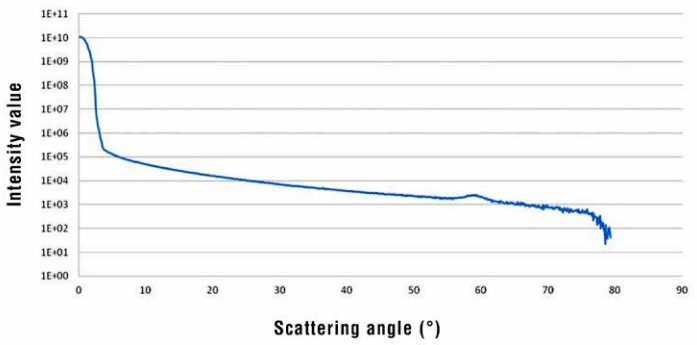


Polished Optics

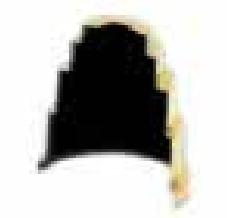
Specular surfaces (mirrors) and transparent surfaces (glasses, lenses, crystals) sometimes have a very low scattering such as 10-9 sr -1. Those surfaces are difficult to measure without a high dynamic detection system. REFLET supports measuring BRDF of 10-5 sr -1.

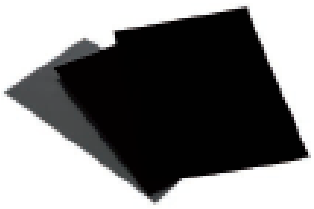


3D Scans



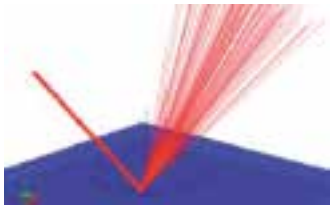
Dynamic Range

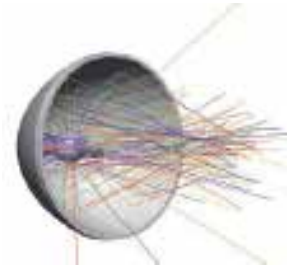




Black Materials

Mainly used in aerospace applications, black materials and coatings are difficult to measure without a powerful instrument. Those materials need to have a very low BRDF because they absorb a large amount of light: less than 1% of reflection. REFLET supports such BSDF levels with its high-dynamic detection.





Illumination Design Software

Illumination design software requires accurate data to provide accurate simulations. REFLET provides 2D/3D BRDF or BTDF files which can be imported in TRACEPRO, ASAP, LightTools, LucidShape, Photopia or SPEOS.

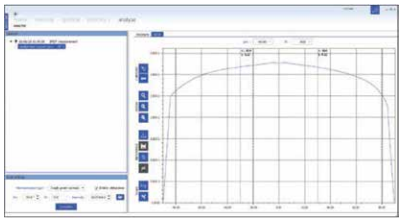
Realistic Rendering Software

In many industries such as automotive, optical designers need simulations to be as physically accurate as possible in order to provide realistic renderings. REFLET allows you to perform light characterization of headlamps, tail lamps,and dashboards. It also provides you with scattering measurement data to import into your optical design software.

Cosmetics

Cosmetic manufacturers need to compare different chemical mixtures to produce lipsticks or creams. REFLET allows the characterization of these types of products on skin and under different lighting (different spectra).

Technical Specifications	
Illumination	
Light Box	• Halogen 100W light box • Option: 6-position filter wheel (including R/G/B filters)
Spot size on the sample surface	• Scattering configuration: Manually adjustable from Ø1 mm to Ø13 mm
Beam aperture angle	• Scattering configuration: Manually adjustable from ±0.15° to ±2.26°
Goniometer	Standard version: • 0°-180° motorized (REFLECTION & TRANSMISSION) • Angular resolution: selectable (0.01°/0.1°/1°/10°) • Positioning precision: 0.01°
Detection	
Integrated-flux detector	• Visible channel: 400 - 1000 nm, dynamic 109 • Infra Red channel: 900 -1700 nm, dynamic 106 (option)
Spectrograph (option)	• Useful range: 420 - 900 nm • Spectral resolution: selectable (0.6 nm/1 nm/5 nm/10 nm)
Optical system	• Scattering configuration: 3 manually interchangeable optical blocs (2 to be chosen) Optical bloc 1 2 3 Angular acceptance ± 2° ± 1.1° ± 0.04° Observed area size Ø14mm Ø8mm Ø6mm
Goniometer	• θ: - 90° to 90° motorized • φ: - 90° to 90° motorized • Angular resolution: selectable (0.01°/0.1°/1°/10°) • Positioning precision: 0.01°
Polarizer/ Analyzer set (option)	• Rapid insertion • 0°- 90° manual rotation
Measuring Time	
180°—profile (option)	• "Integrated flux" mode: 45 s • "Spectrograph" mode: 45 s
Software	
Data Exchange	• Text file (ASTM) • BSDF format (imported in commercial software)



REFLET Software

References

ADC, Alanod, Alcan, Almeco, Automotive-Lighting, AUO, Arcelor, Bourget, Ball Aerospace, BARCO, Chanel, Dupont, Entire, Essilor, Helbling, Hewlett Packard, Loepfe, STMicroelectronics, Procter & Gamble, PSA, University of Darmstadt, University of Madrid, Volkswagen,...Synopsys' DesignWare® Foundation IP, Interface IP, Security IP, and Processor IP are optimized for high performance, low latency, and low power, while supporting advanced process technologies from 16-nm to 5-nm FinFET and future process nodes.

SYNOPSYS®
Silicon to Software™

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