**APPLICATIONS**

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

**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,…
**REFLET** is a compact, motorized optical system for scattering characterization of any kind of material and objects. It allows, in a fast and easy way, to measure luminous energy distribution, or spectral composition contained in the scattering lobes, and consequently characterizes surfaces of your examined regions such as roughness, defects, as well as types of coatings or paintings... 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. The knowledge of the way light is reflected and transmitted through a diffuser is very important for the use of this material in optical systems.

**Aluminum**

Reflector material can have quite complex behaviour depending on the plane of incidence. Reflet allows incidence parallel and perpendicular to stripes accurate measurements (anisotropic material, polarization dependence).

**Ophthalmic glasses**

The knowledge of the scattering of specular surfaces (mirrors), transparent surfaces (glasses, lenses, crystals) with sometimes a very low scattering of $10^{-9}$, is very difficult to measure without a high dynamic detection system, like the Reflet bench, which allows to measure BRDF of $10^{-9}$. 
Cosmetics

Cosmetic manufacturers need to compare different chemical mixture to produce lipsticks or creams. REFLET allows to characterize this product on different skin and under different lighting (different spectra).

Illumination design software

Illumination design software require accurate data to provide accurate simulations. REFLET provides 2D/3D BRDF or BTDF files to ready to be export to TRACEPRO, ASAP, LIGHTTOOLS or import in, LucidShape, PhotoPia or SPEOS.

Realistic rendering software

In many industries including Automotive industry, interaction of light with materials is very important, in headlamps, tail lamps, dashboards, and the optical simulations made by designers, developers with their illumination design software, their realistic rendering software need scattering data to perform simulations and get results. Unfortunately, only theoretical data are available right now, and simulation results are not relevant of reality.

It is why we have developed the REFLET Bench to answer all these problems.
### ILLUMINATION

| Light Box | • Halogen 100W light box  
|          | • Option: 6-position filter wheel (color and ND filters) |
| Spot size on the sample surface | • Scattering configuration: Manually adjustable from Ø1 mm to Ø13 mm  
|                                            | • Quasi-Specular configuration: Manually selectable Ø0.5 mm Ø1 mm Ø1.9 mm |
| Beam aperture angle | • Scattering configuration: Manually adjustable from ±0.15° to ±2.26°  
|                                    | • Quasi-Specular configuration: Manually selectable ±0.009° ±0.035° ±0.5° |

### DETECTION

| Integrated-flux Detector | • Visible channel: 400 - 1000 nm, dynamic 10⁴ or 10⁵  
|                          | • Infra Red channel: 900 - 1700 nm, dynamic 10⁵ |
| Spectrograph (option) | • Useful range: 420 - 900 nm or 900 - 1700 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 | Ø14 mm | Ø8 mm | Ø6 mm  
| Quasi-Specular configuration:  
| Observed area size | Manually selectable Ø0.5 mm Ø1 mm Ø1.9 mm  
| Beam angle | Manually selectable ±0.009° ±0.035° ±0.5° |

### Goniometer

Standard Version: REFLECTION MODE  
• 0°-90° motorized  
• Angular resolution: selectable (0.1°/1°/10°)  
• Positioning precision: 0.5°  

TRANSMISSION MODE  
• Fixed, =180°  

Optional upgraded version:  
• 0°-180° motorized (REFLECTION & TRANSMISSION)  
• Angular resolution: selectable (0.1°/1°/10°)  
• Positioning precision: 0.3°

### Optical system

| 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 | Ø14 mm | Ø8 mm | Ø6 mm  
| Quasi-Specular configuration:  
| Observed area size | Manually selectable Ø0.5 mm Ø1 mm Ø1.9 mm  
| Beam angle | Manually selectable ±0.009° ±0.035° ±0.5° |

### Polarizer/Analyzer set (option)

- Rapid insertion  
- 0°- 90° manual rotation

### MEASURING TIME

- 180° - profile (option)  
  - “Integrated flux” mode: 45 s  
  - “Spectrograph” mode: 10 s