



Surface materials engineering

Strengthening a common european photonics dual use industrial capability: a personal vision

Jorge SANCHEZ

 **HEF**[®] GROUPE

3 areas of surface materials engineering expertise



TRIBOLOGY

Studying phenomena related to dynamically interacting solids. Understanding and managing the mechanics of friction and wear.



PHOTONICS

Studying phenomena related to the interaction between light and matter.

Understanding and managing surfaces and optical interfaces.



HYDROGEN TECHNOLOGIES

Manufacturing, transporting, storing and using hydrogen: electrolysis / compression / fuel cells and hydrogen engines.

HEF Photonics in figures

8 facilities

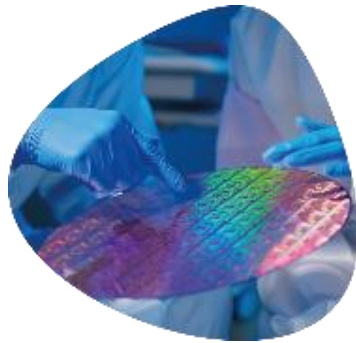
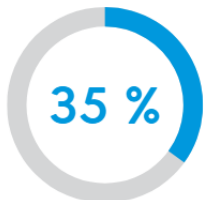
237 employees

CA 2023 :
30M€

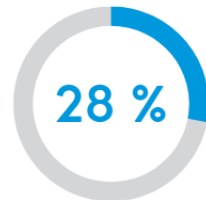
President :
Chantal GERMAIN



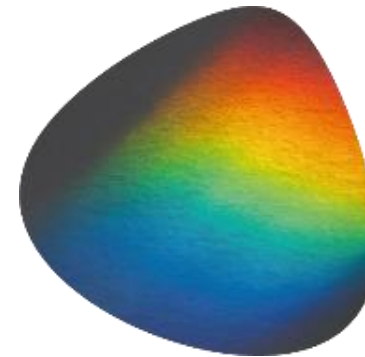
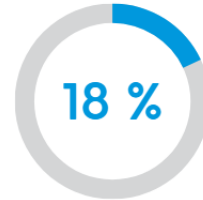
DEFENCE



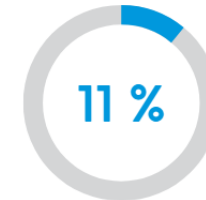
INDUSTRY



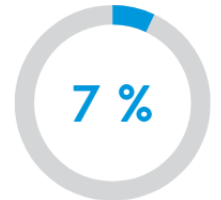
MEDICAL



INSTRUMENTATION



RESEARCH



HEF Photonics



Focus on Optical Components

Optical Components

Substrate

Window
Prism
Mirror
Lens
Filter...

Abrisa
Fichou
HEF Photonics

Engraving

Encoder
Reticle
Mire & Calibration
Phase & Amplitude modulator
EMI shielding grid

Kerdry
Optimask

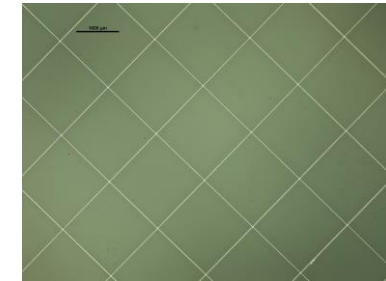
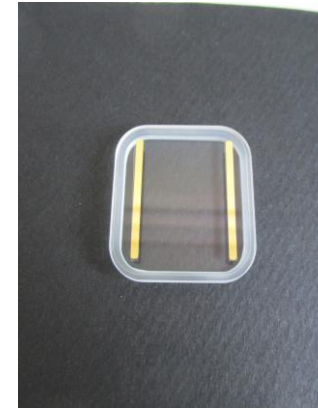
Coating

Antireflective (AR)
Metallic
Dielectric
ITO
Black coating

Abrisa
Fichou
HEF Photonics
Kerdry
Optimask

ITO. Concept and applicabilities

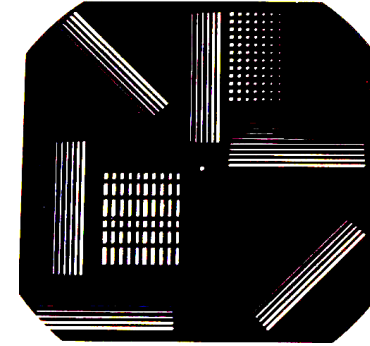
- ❖ **ITO (Indium Tin Oxide) coatings** can be applied on a variety of substrates, including glass (and even plastics)
- ❖ Mainly applications are:
 - EMI/RFI shielding**
 - ESD** (protection against electro static discharge)
 - heated optical filters for displays**
 - Active components for touch-screens
 - High performance electrodes for photovoltaic cells
- ❖ **Light transmission, absorption and reflection** are determined by the properties of the coated layer (PVD-based). Standard coatings are chosen for optimum light transmission (>80%). Generally they lie in VIS up to 1,5 micr. Range.
- ❖ **High conductive busbar** to create a contact area from the coating to the surface of the substrate as an option.



Optical thin films (continued)

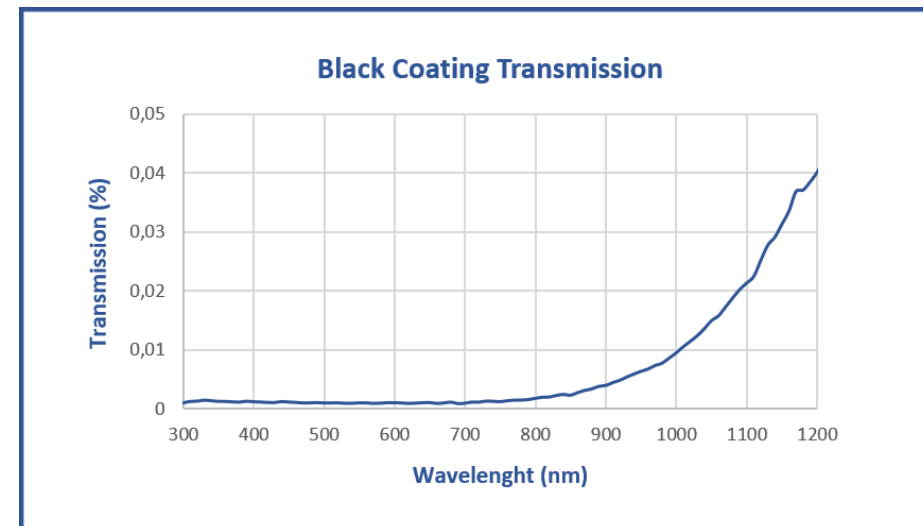
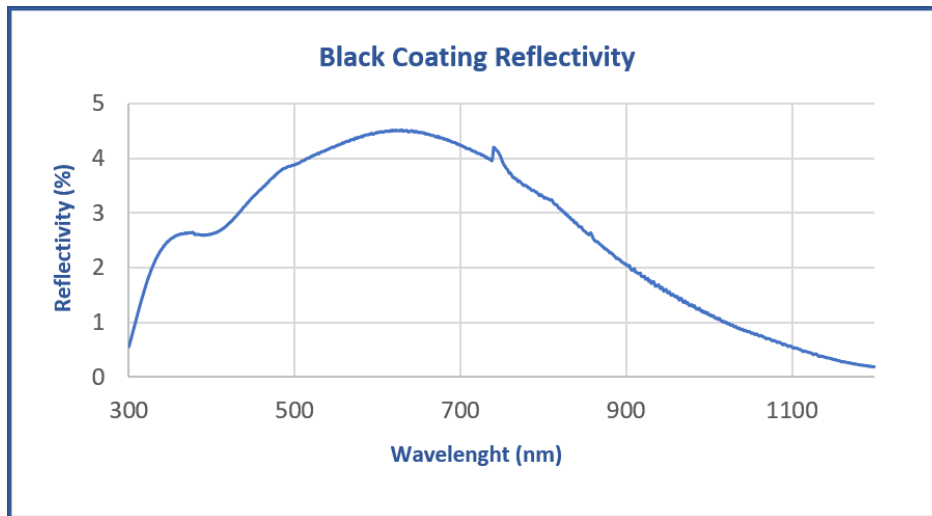
- Black Coating:

- Low Transmittance ($T < 0.01\%$)
- Low Reflectance
- Spectral band adapted to customer specifications from $0.3 \mu\text{m}$ to $3 \mu\text{m}$



Sentinel-5 Component

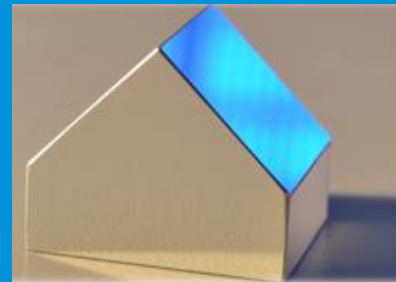
- On flat surfaces (200 mm diameter)



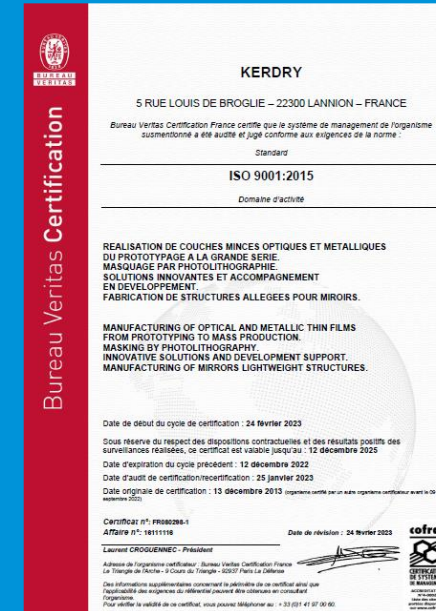
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ISO 9001:2015 & ISO 14001



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