



# LE VERRE FLUORÉ GLASSES AND FIBER OPTICS KEY TECHNOLOGIES OF THE 21<sup>ST</sup> CENTURY

## Our company

Since its foundation in 1977, after the discovery of fluoride glasses by Poulain Brothers at Rennes University in 1974, Le Verre Fluoré (LVF) has been thriving in the world of fluoride glass technology as an expert and main innovator in this field.

Among LVF outstanding pioneering achievements, we can cite the first commercial fluorozirconate glass fibers (1983), the first single mode fluoride fibers (1988), the first ZBLAN fiber lasers (1989) and the first fluoroindate glass fibers (1992).

Over the years, LVF has developed unique manufacturing processes of glasses and fibers and recently industrial capacity has been increased, with batches now produced on a daily basis.

LVF is today the world leading fluoride and germanate glass manufacturer, offering the world the best fluoride and germanate glasses and optical fibers on the market.

## Why LVF fluoride glass fibers are so interesting ?

They offer :

- A high transparency from UV to mid-IR (300 nm – 5500 nm), with best transparency among all fiber technologies in the 2 – 5 μm range.
- Thanks to their high rare earth solubility and low phonon energy, they offer more than 50 rare-earth transitions in the visible, infrared and mid-infrared bands, allowing the manufacturing of visible and mid-IR fiber lasers, and near-IR fiber amplifiers

## LVF technology addresses today a multitude of domains

LVF fluoride glass and optical fiber mature technology enables today the realization of innovative solutions that respond to challenges of the 21st century like improving the human health, better monitoring air and water pollution, monitoring our food quality while improving animal welfare, improving telecommunication infrastructures and monitoring quality in industrial processes.

Let cite few examples where LVF products are key enabling technologies.

### INDUSTRY & ECOLOGY

- Oil and gas spectroscopy, Urban pollution monitoring, Aircraft exhaust gas monitoring,
- Semiconductors process monitoring (mid-IR OCT (Optical coherence tomography))
- Wet paint thickness measurements, Pyrometry

- Water quality and wastewater monitoring
- Waste recycling
- Smart agriculture (boar taint monitoring, online milk monitoring)

### LVF Key components for NIR and MIR spectroscopy

Fiber patch cables, hermetic feedthroughs and flow cells

Fiber combiners for mid-IR laser diodes (ICL/QCL)

Fiber modules for mid IR supercontinuum lasers (up to 5μm and up to 9.5μm)

Targazh industrial sensor

### MEDICAL

- Surgery, Ophtalmology, Osteotomy, Dentistry, Dermatology
- 3D living cells bio printing (skin, breast)
- Super-resolution microscopy, Cytometry, Ophtalmology
- DNA sequencing
- Cancer detection

### LVF Key components

CW and pulsed 2.9μm laser (using Er doped fiber)

Multiwatts visible lasers and amplifiers

Passive fibers for mid-IR transmission

Er-YAG/Er-YSGG laser delivery (up to 1.5J/pulse)

Rare earth-doped fluoride glass fluorescent dyes

### GROUND and SPACE COMMUNICATIONS

- Telescopes coupling
- Ground-to-ground and ground-to-space communication, O-Band and S-band telecom amplifiers
- High bit rate LIFI communications

### LVF Key components

Passive ZBLAN fiber sub-systems

Rare earth doped fiber modules

3.9 μm pulsed laser

R G B pulsed fiber lasers

These examples highlight the diversity of our applications and new solutions powered by our fluoride glass technology. All of them are useful to human kind. Create a better future is our leitmotiv! ●

### CONTACT

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