MULTI-FUN

ENABLING MULTI-FUNCTIONAL PERFORMANCE THROUGH MULTI-MATERIAL ADDITIVE MANUFACTURING

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862617 – MULTI-FUN*

# SPEEDTECH-FORUMS

InPhoTECH® INNOVATION PHOTONICS TECHNOLOGY

*InPhoTech*

*Janusz Popławski*

***5th October 2022***

www.multi-fun.eu

# *Table of Contents*




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# InPhoTech

We deliver **INNOVATIVE PHOTONIC SOLUTIONS** to the industry

**12**
Years on the market

**40+**
International patent procedures

**70+**
Granted patents



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# Our Mission, Vision, Goal

## MISSION

In close cooperation with the client, we create technologically advanced solutions ensuring a competitive advantage

## VISION

We create solutions that meet the most difficult requirements of the industry, unattainable for traditional technologies

## GOAL

Thanks to optical fiber, we co-create the industry of the 21st century, just like electronics contributed to the industry of the 20th century


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# *Expertise & Strengths*

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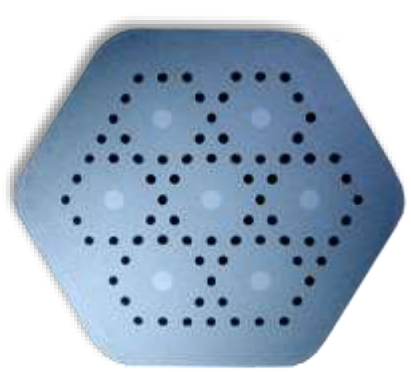
## Optical Fiber design & manufacturing

We design and manufacture innovative specialty optical fibers for telecommunications (5G networks, modern data centers) and sensor applications (precise monitoring for industry).





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# *Expertise & Strengths*

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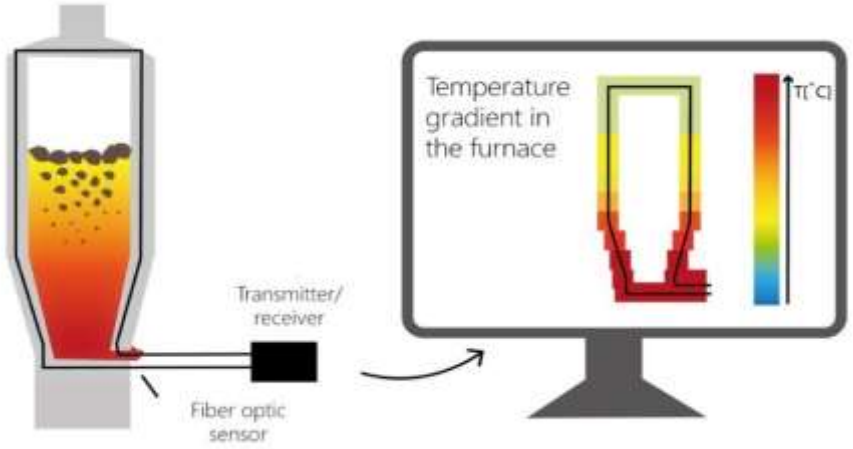
## Optical Fiber metallic coating



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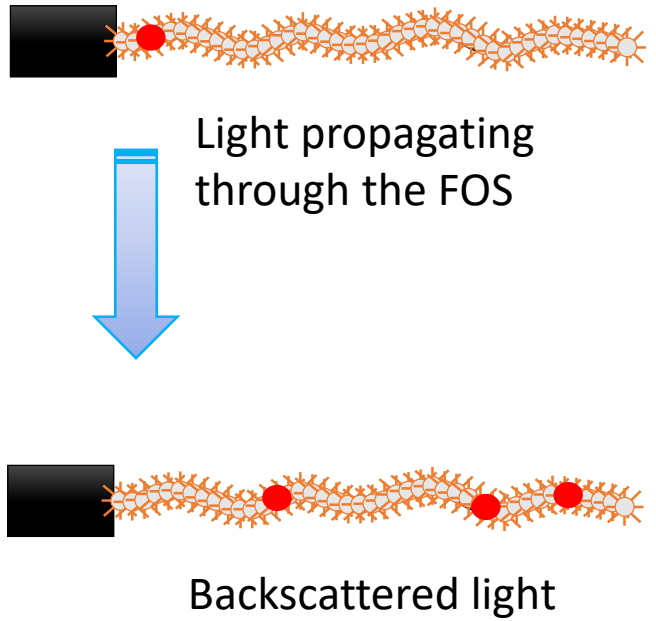
# Expertise & Strengths

## Distributed Fiber Optic Sensors (FOS)

- Distributed FOS allow the measurement of hundreds or thousands of measuring points within the same optical fiber.

- No previous treatment is required to the fiber (unlike point or quasi-distributed sensors); pulsed light is introduced within "transforming" each section into a temperature, strain, vibration, … sensor.





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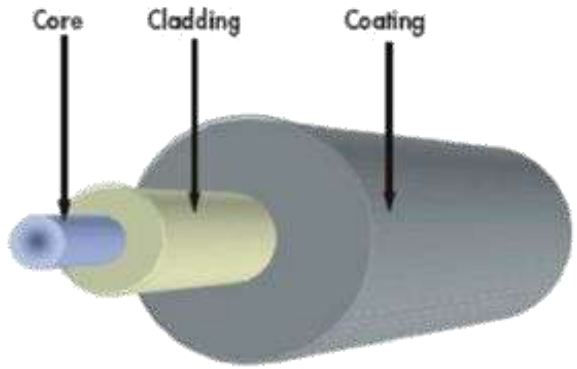
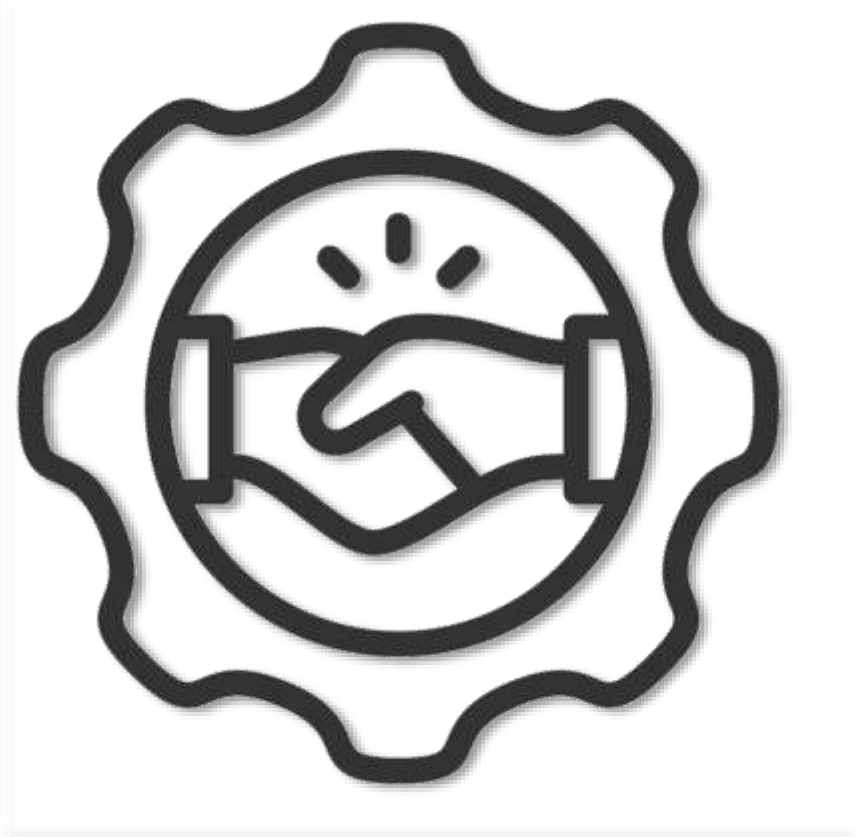
# Main Contributions to MULTI-FUN

## Development of metallic coatings

InPhoTech coated single mode (8.2 µm core diameter and 125 µm cladding diameter) optical fibres with different metallic coatings including:

- Nickel
- Copper
- Gold
- Nickel on copper

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# Development of metallic coatings

Challenges related to fiber development:

- Definition of metallic coating (type and thickness) in order to make them resistant to handling, WAAM process and HT induced thermal and mechanical stresses
- Optimization of coating process to obtain constant thickness
- Characterization of optical characteristics (attenuation)
- Feasibility of bending → coiled FOS for automated feeding
- Connection of fibers (pigtails)


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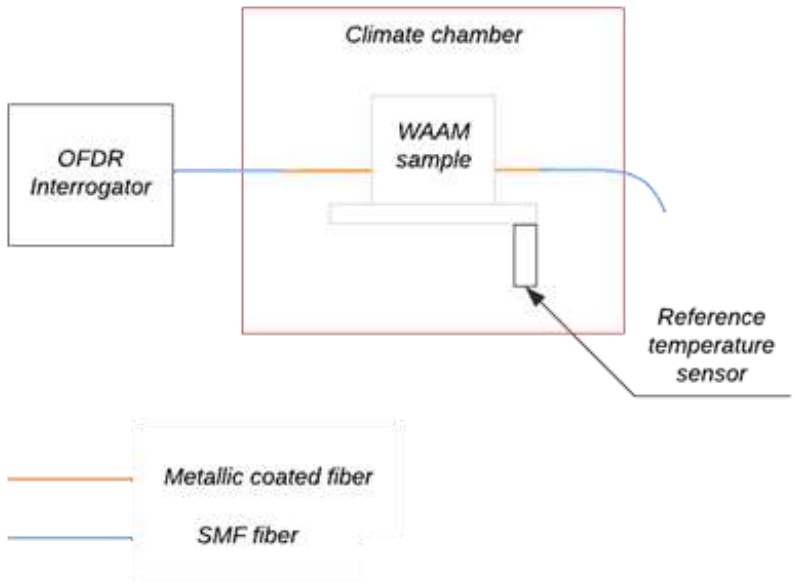
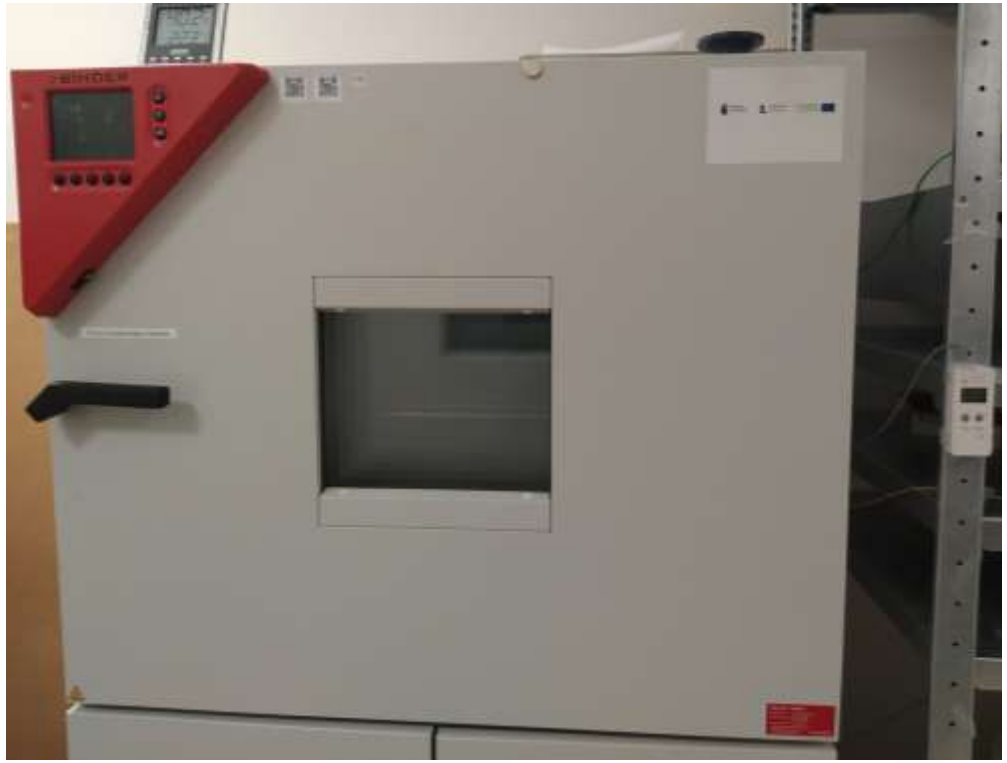
## Evaluation of distributed sensing suistanability - *temperature*

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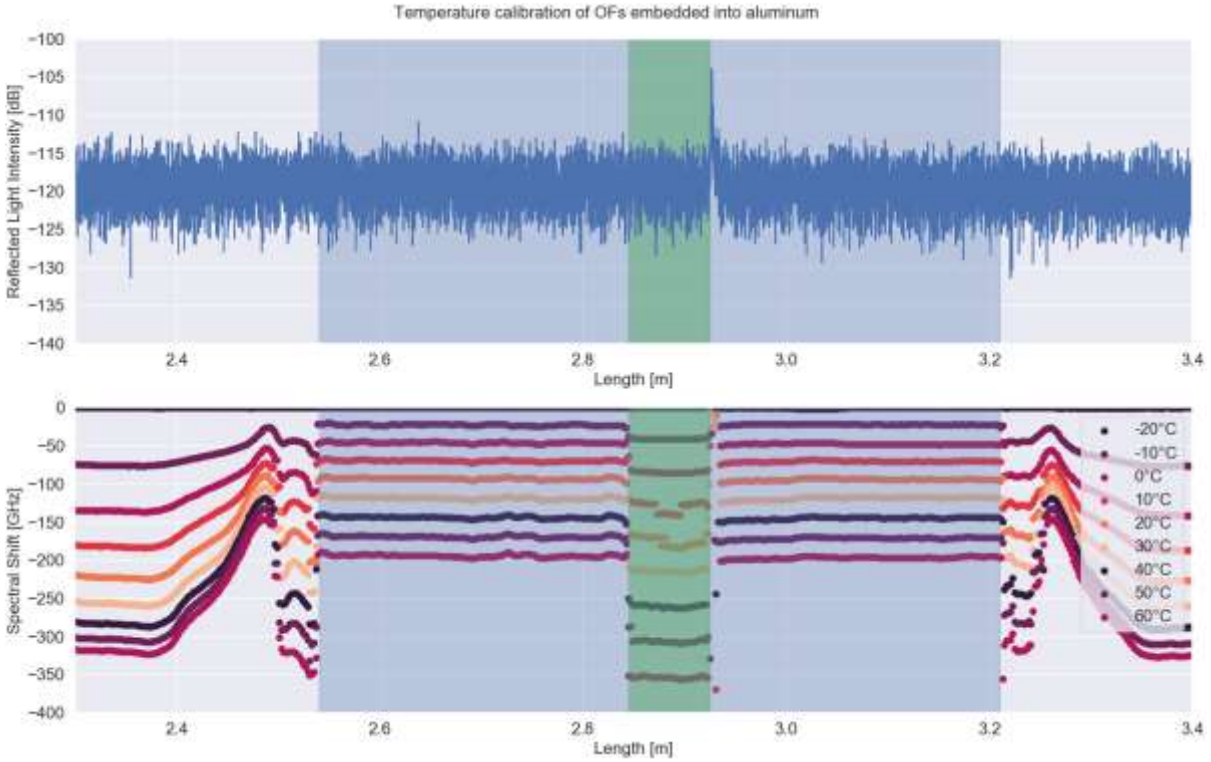


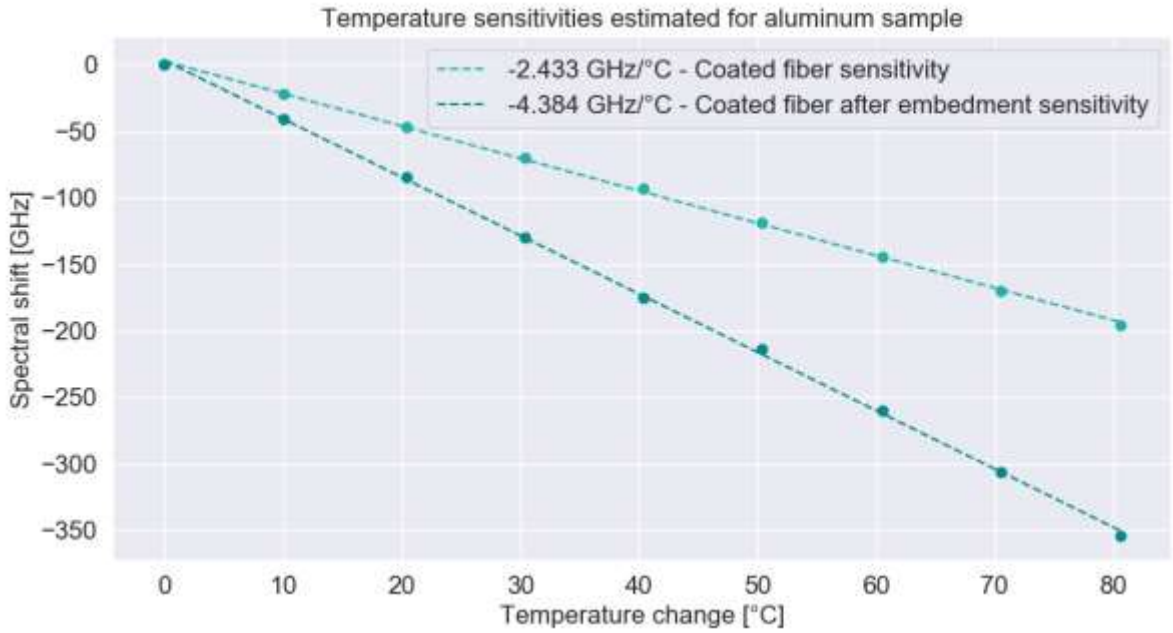



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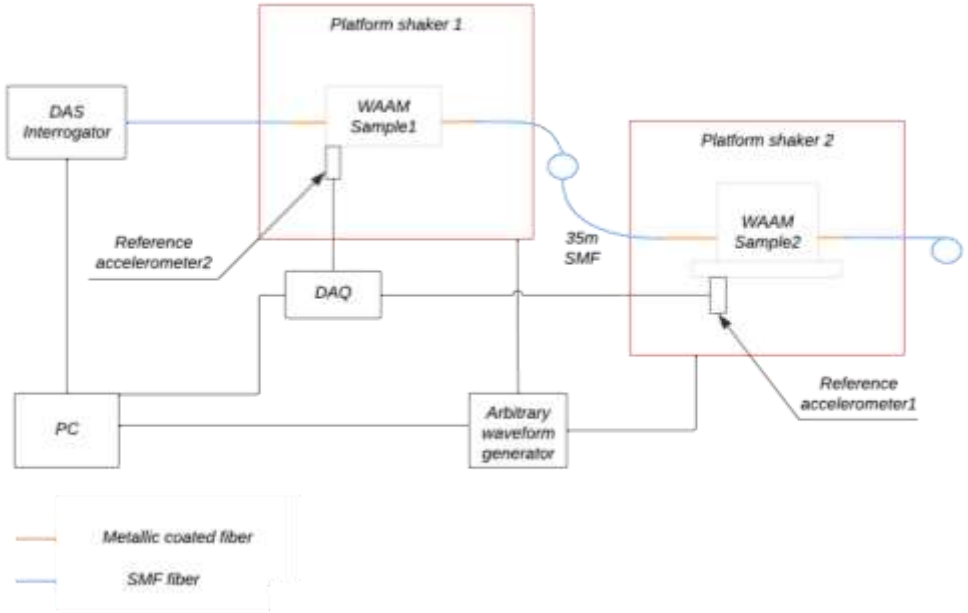



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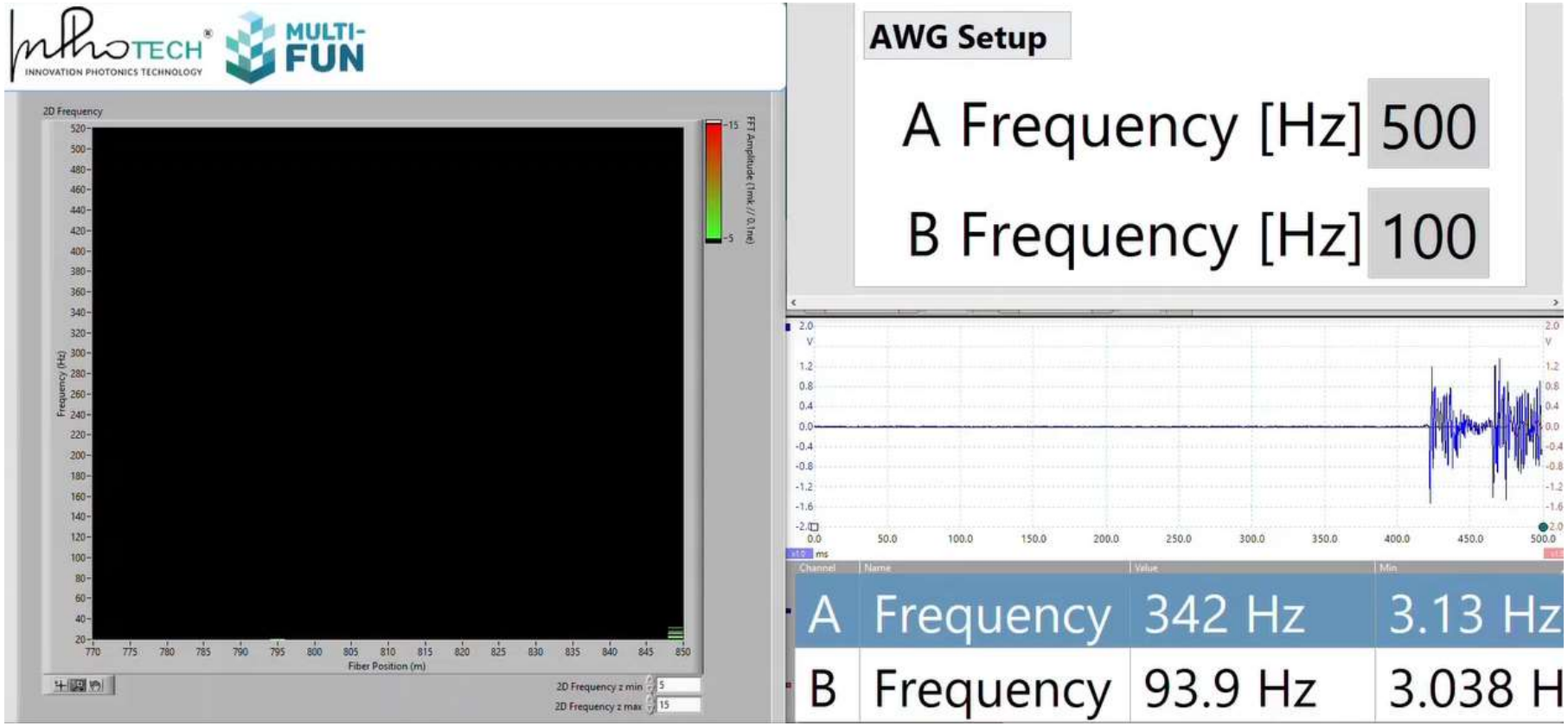



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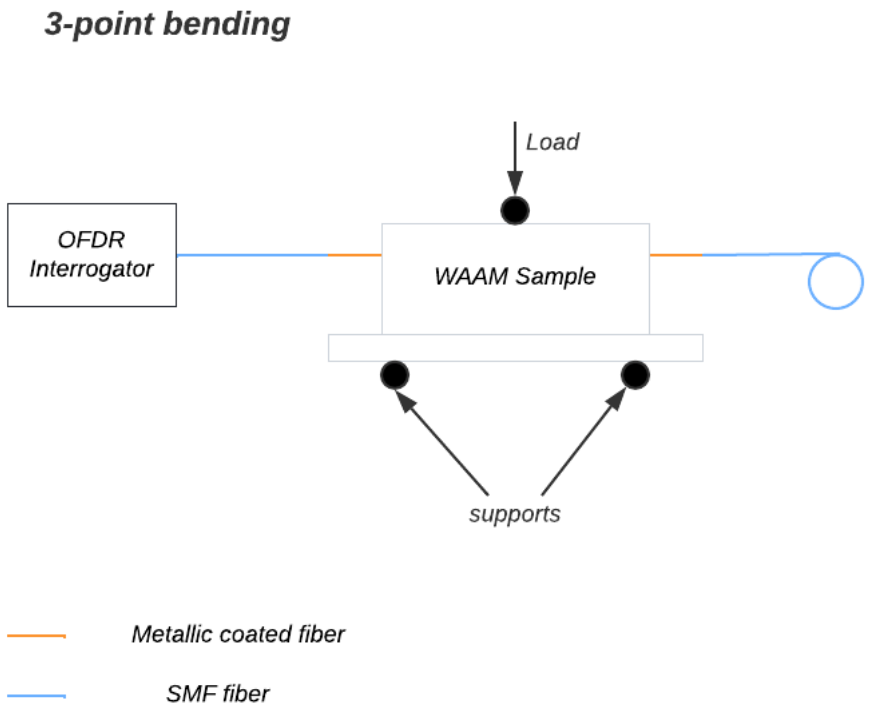



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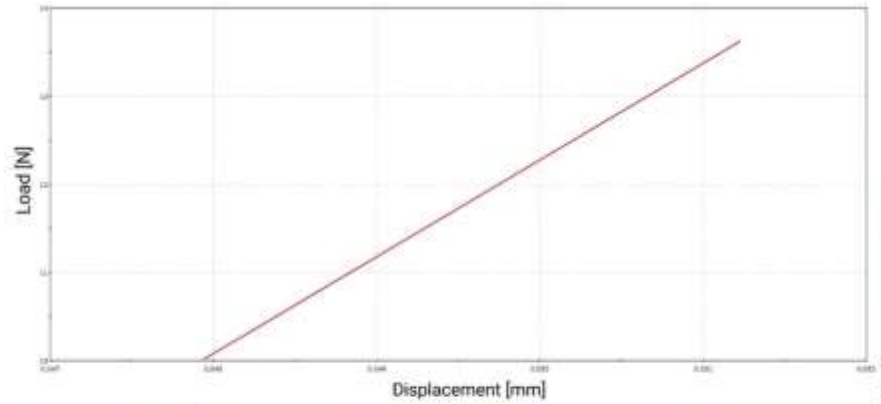


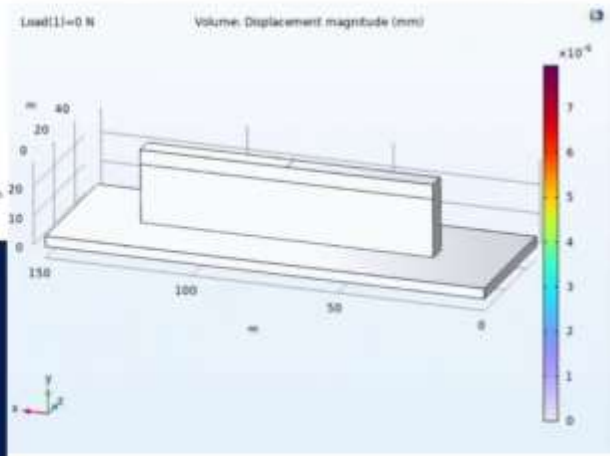


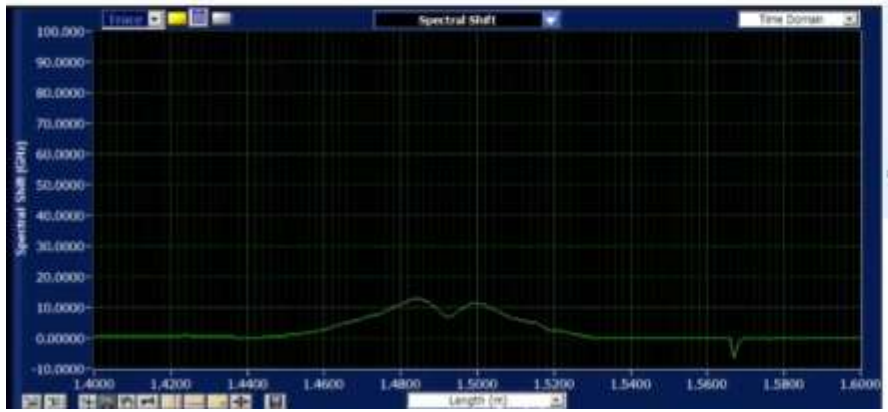



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# *Innovation Potential*

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## Bimetallic coated optical fibers for WAAM applications

- The innovative composition of the layers ensures, on the one hand, excellent adhesion of the coating to the optical fiber, and, on the other hand, good integration with the surrounding metal.
- An important feature of the developed product is the preservation of optical properties allowing for the implementation of optical distributed measurements after the integration of the optical fiber in the structure.



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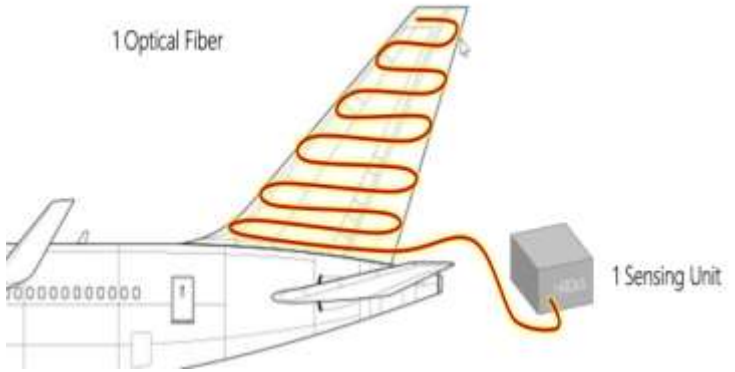
# Structural health monitoring

- Optical fibre integrated within the structure
- Negligible effect on the structural integrity of the structure
- Real-time full mapping of strain / shape / temperature distribution
- Great freedom in designing the shape of the element





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# thank You!

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