

SHM with fiber optic sensors at AIMEN technology center

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Research group

Members:

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Multidisciplinary team with members coming from ICTs, optics, materials science and structural engineering

Objectives:

- Development of fiber optic sensing systems (distributed and punctual)
- Development of monitoring system based in fiber optic sensors
- SHM with fiber optic sensors

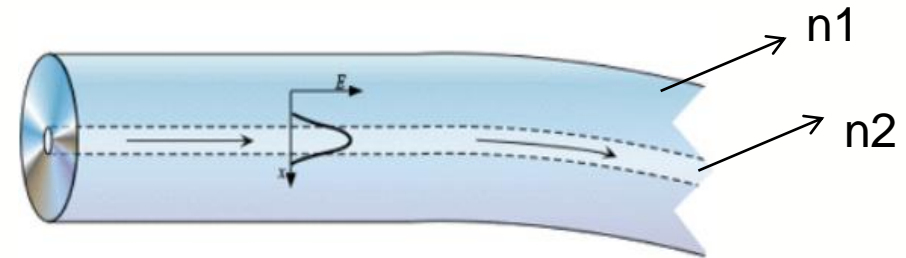
Introduction

Advantages

- Small and light
- Passive
- Remote sensing possibilities (>300km)
- Immune to corrosion
- Immune to electric and magnetic fields
- High/low temperature resistant (-250°C a >1200°C)
- Ease for multiplexation

Disadvantages

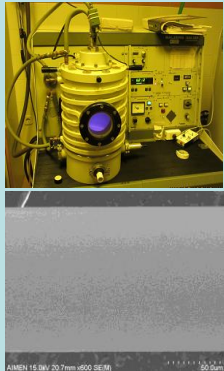
- The technology is still not mature \Rightarrow R&D opportunities
- Fragile \Rightarrow Find adequate protection
- Need to understand the technology to get maximum performance \Rightarrow More R&D opportunities



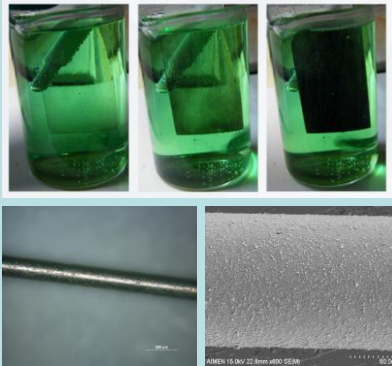
- Core diameter: 1-10 μm
- Cladding diameter: 80-250 μm
- Cost: 0.03€/m
- Revolution in ICT

Embedded fiber optic sensors and metallic coatings

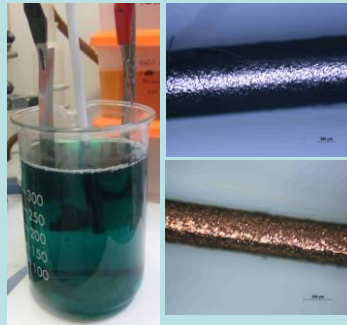
PVD of Ag



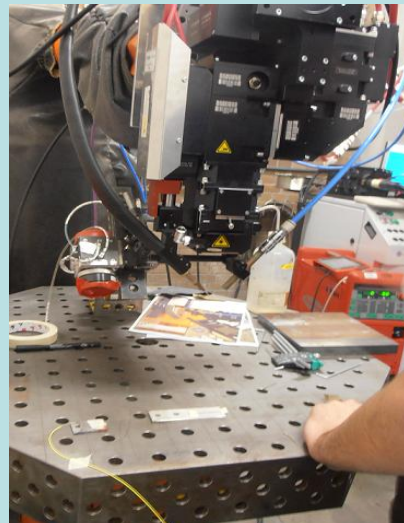
Electroless Ni Deposition



Electroplating Ni/Cu Deposition



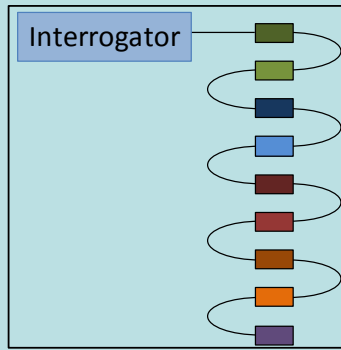
- increase the thermal sensitivity of the sensor
- Add robustness to the sensor
 - welding processes
 - detect and measure corrosion



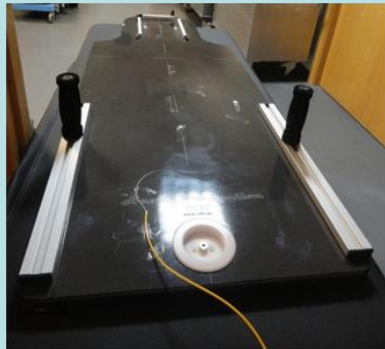
Embedding in metallic structures

- Smart metal structures
- It is an ongoing research taking advantage from our laser welding tools and expertise

Fiber optic sensors for strong electromagnetic field environments



(a)



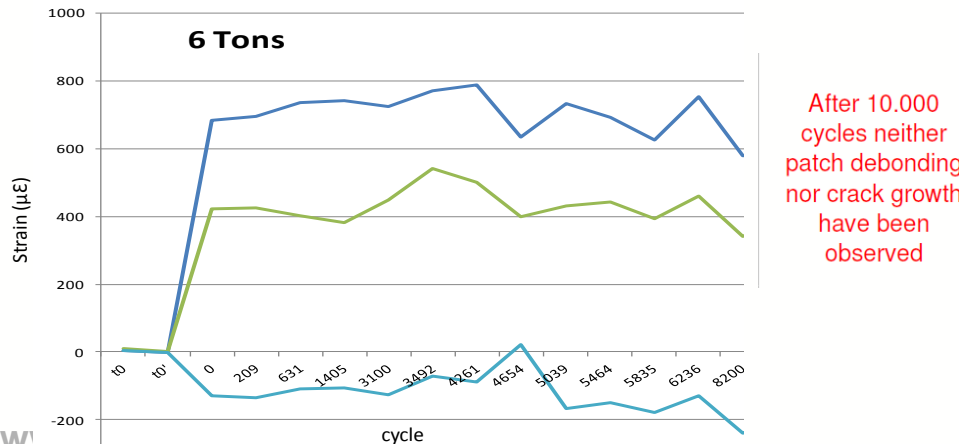
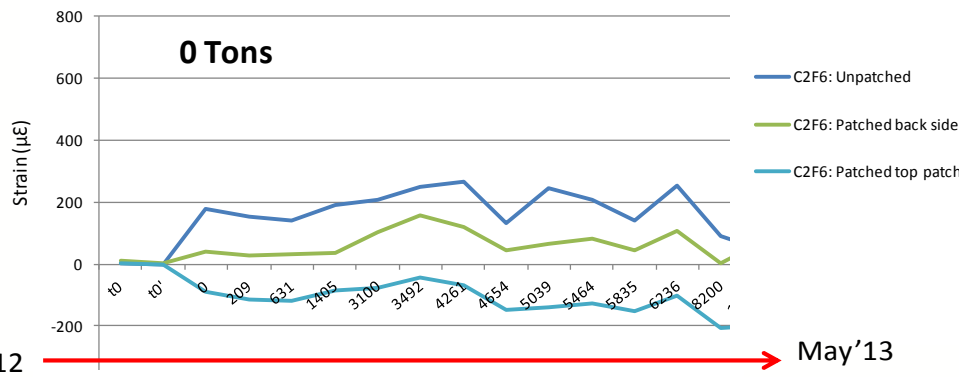
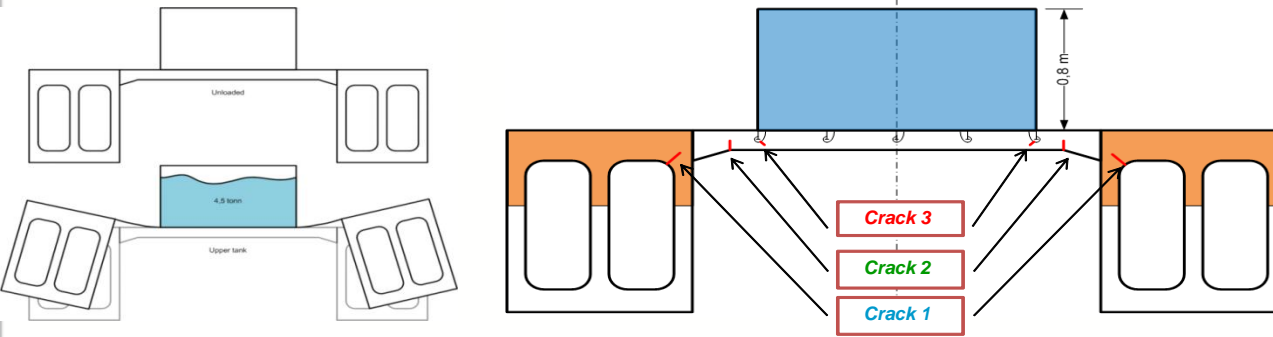
(b)



(c)

- Fiber optic (FBG type) sensors to detect heating in carbon fiber samples subjected to MRI

FBG sensors embedded into composites



Co-Patch European project from FP7 (GA 233969)

- Novel and effective repair and reinforcement method for large steel structures with composite materials ships and bridges
- patches were placed in a catamaran to repair and monitor 3 types of cracks
- FBG fiber optic sensors to monitor crack growth and composite patch behavior (1year)

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Thank you

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