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Coordinator contact

El-Peacetolero - System Block Diagram





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El-Peacetolero Project

Context & challeges

- Polymers play a crucial role in NPP security
 - Pipes, Cables, Paintings, Seals, ...
 - Ageing monitoring is therefor fundamental
- Current monitoring methods :
 - Invasive, time consuming, High cost
 - Can't afford early detection of embrittlement
- Non-invasive real-time monitoring is needed

Key results

El-Peacetolero Ageing threshold



Stage I: No absorption bands at 1630 cm-1. Shore A hardness increases from 72 to 86 (0 - 21 days at 120°C; 0 - 368 days at 80°C)

Stage II: Rapid growth of absorption bands at 1630 cm-1. Shore A hardness exceeds 86.

- 120°C_28 days: normalized absorbance at 1630 cm-1 = 0.56. Shore A hardness = 89 ShA
- 80°C_552 days: normalized absorbance at 1630 cm-1 = 0.59. Shore A hardness = 91 ShA.

Compact multi-lambda QCL IR source



Autonomous device handling multiple laser source 4 QCL Lasers :

Objectives & methodology

Design a hand-held, embedded optoelectronic system deploying AI for in-situ real-time polymer identification and diagnosis using ATR technique.

- Accelerated ageing of 2 use case polymers to build a dataset of aged samples & FTIR ATR database
- Data augmentation & Al Algorithms development
- Design and fabricate an embedded optoelectronic system : 2 measurements heads
 - \circ LED based Head : 2 μ m < Wavelength < 5 μ m
 - QC Laser Head : 5 µm < Wavelength < 11 µm
- Radiation hardened prototype
- Mobile Robotic platform development: intervention holding El-Peacetolero prototype

Budget: 3 652 170 € EU Funding : 2 999 236 €

• 1730cm-1; 1647 cm-1; 1086 cm-1; 1002 cm-1 Size reduction :

The volume of the device is **divided** by a **factor 50**.

El-Peacetolero Edge computing and Tiny ML platform

Tiny ML platform design is based on a System In Package module (SIP) :

- Compactness, high performance, low power consumption, ...
- Robustness against radiations.
- Can handle and accelerate matrix computing and display.



El-Peacetolero compact prototype on a robot



Partners







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