PHOSFOS
Photonic Skins For Optical Sensing

2007 - 2013 SEVENTH FRAMEWORK PROGRAMME

PHOSFOS Fact Sheet – Micro-structured fibres

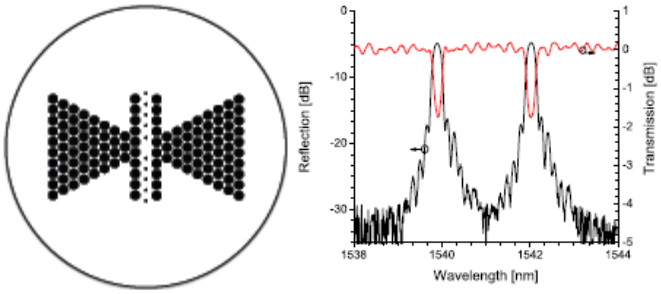
Introduction

Since its start in 2008, PHOSFOS has created a new paradigm for flexible optical sensors integrated with electronic modules and control circuitry. It aimed at developing a generic technology that offers an integrated solution to this increasingly important problem. The project is now reaching its end and has achieved several major breakthroughs in the field of optical sensing, flexible materials, embedding technologies and integration concepts which may be used in a wide range of applications.

Breakthrough

The PHOSFOS project consortium developed a new pressure sensitive and temperature insensitive optical fibre sensor. The pressure sensitivity exceeds the state-of-the-art with a factor of 20, whilst the sensor is truly temperature insensitive.

Technology



The sensor is based on a novel design of a highly birefringent (10^{-3}) microstructured optical fibre sensor that features a high pressure sensitivity (3.3 pm/bar), a negligible temperature sensitivity (10^{-2} pm/K) and is compatible with conventional ultraviolet grating inscription setups. The temperature insensitivity was achieved by careful tailoring of the doped region in the core of the microstructure. The repeatable and reproducible fabrication of the MOF was demonstrated in an extensive series of fibres. The sensor elements are fibre Bragg gratings manufactured with a commercially available technique using an ultraviolet laser in an interferometric writing set-up.

Application

The technology allows fabricating sensors for accurate pressure measurements in the presence of temperature gradients as required in the field of oil and gas exploration. When embedded in composite materials the sensors exceeded previously demonstrated transverse strain sensitivities by an order of magnitude (-0.16 pm/µstrain). The sensor can therefore contribute vital information about the structural health of composite materials by following the mechanical strain in its most vulnerable direction as required in the field of aeronautics.

Contacts

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