

PHOSFOS Fact Sheet – Polymer Fibre Gratings

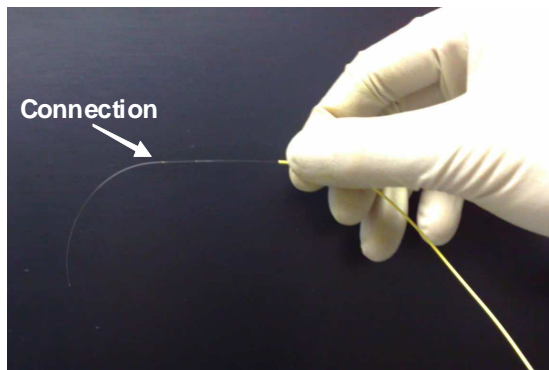
Introduction

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

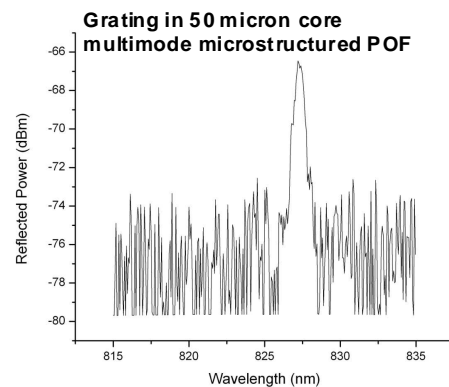
Prior to the commencement of PHOSFOS, gratings in polymer optical fibre (POF) only existed in the 1550nm spectral region where the large fibre loss (1dB/cm) only permitted very short (<10cm) fibre lengths to be used and the device had to be butt coupled to a silica fibre lead on the optical bench. The PHOSFOS consortium has developed a means for reliably splicing POF to silica fibre and produced the first gratings in the 800nm spectral region where losses are almost 2 orders of magnitude less than at 1550nm. These developments have allowed POF grating sensors to be used outside the laboratory for the first time.

Technology



Careful control of the phase mask position relative to the fibre and a stable inscription arrangement permitting exposure times of up to 1 hour (depending on fibre material) has allowed gratings to be fabricated for the first time in the 800 nm spectral region.

The connection between silica fibre and POF is formed using a UV curable glue to directly splice the two fibre together. The gluing process itself introduces less than 1 dB of attenuation between the two fibres and results in a joint less than 1mm in diameter.



Applications

Fibre Bragg grating sensors in POF have potential advantages over their silica counterparts in applications that require very large strains (>5%) to be monitored or where the structure to be monitored is itself compliant and silica fibre would simply reinforce the structure.

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