PHOSFOS Fact Sheet – Multiplexed Gratings in POF

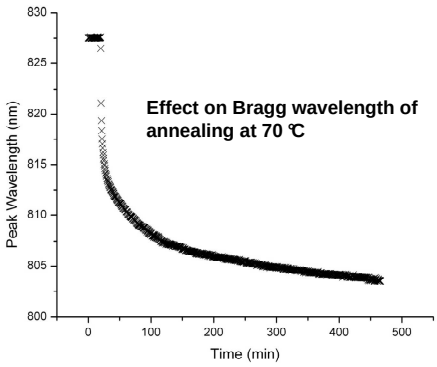
Introduction

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

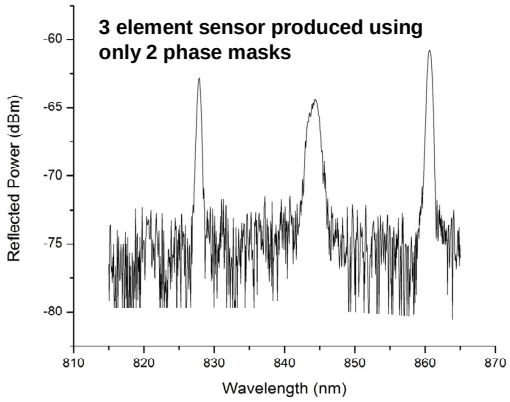
Within PHSOS we have created the first ever wavelength division multiplexed (WDM) Bragg grating sensors in polymer optical fibre (POF). Moreover we have characterised and exploited the thermal annealing properties of the fibre to enable us to shift the reflecting wavelength of a grating by over 20nm, to enable multiple WDM sensors to be recorded with a single phase mask.

Technology



During the manufacture of POF, tension in the softened fibre on the drawing tower results in a partial molecular alignment along the fibre axis. Annealing the drawn fibre at an elevated temperature allows this alignment to relax, with a slight contraction along the fibre length.

When the annealing is carried out after grating inscritption, it can be used to instill a permanent – and controllable – shift in the Bragg wavelength.



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. Multiplexed sensors are required in numerous applications and this approach may also be used to precisely tune the Bragg wavelength for a specific requirement – e.g. matching to a laser line.

Contacts

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