

PHOSFOS Fact Sheet – Integration concepts

Introduction

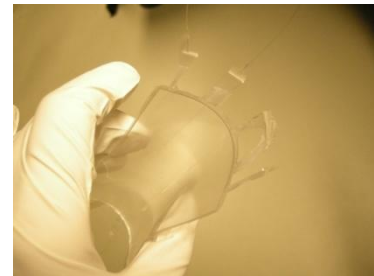
Since its start in 2008, PHOSFOS has created a new paradigm for flexible optical sensors integrated with electronic modules and control circuitry. It aimed at developing a generic technology that offers an integrated solution to this increasingly important problem. The project is now reaching its end 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

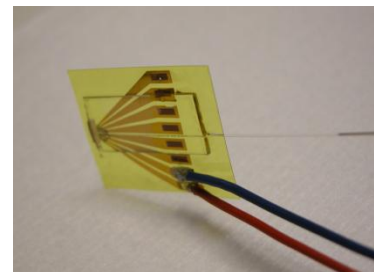
The PHOSFOS-project consortium developed a generic technology for embedding (opto-) electronic chips into flexible substrates.

Technology

The PHOSFOS-project consortium developed different approaches for embedding optical fibre sensors in a flexible and stretchable host material, including injection molding, laser structuring, and soft lithography. The influence of the embedding process has been studied for silica and polymer fibre Bragg gratings. Temperature, humidity, strain, curvature and pressure sensitivities were fully characterized for different flexible host materials.



We have proposed an approach in which the embedded optoelectronic chips can be efficiently coupled towards the optical fibre sensors, using dedicated coupling structures, incorporating a 45° micromirror, as well as a fibre alignment groove. Using low cost components in combination with well-established fabrication technologies, we were able to demonstrate a truly low cost fully integrated sensing foil for biomedical applications.



Application

The fully integrated photonic skins developed in PHOSFOS may find applications in continuously monitoring the integrity and the behavior of different kinds of structures in e.g. civil engineering (buildings, dams, bridges, roads, tunnels and mines), in aerospace (aircraft wings, helicopter blades) or in energy production (windmill blades) and therefore provide the necessary means for remote early failure, anomaly or danger warning. The field of healthcare will also benefit from the development of a highly flexible/stretchable membrane for such applications as the long term monitoring of respiration and cardiac activity, as well as the detection of pressure points under bed-ridden patients. PHOSFOS therefore also contributes to better healthcare.

Contacts

Scientific: Dr. Geert Van Steenberge, imec/CMST, Technologiepark 914A, 9052 Zwijnaarde,
geert.vansteenberge@imec.be