

WG4: **New challenges in fibre sensors**

Report

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I. Overview

WG4 part in the “Les Houches” meeting comprised several presentations, describing the state of the art in some of the activities of WG4, as well as a proposal for a new activity.

II. Technical presentation of WG4

Fibre Optic Sensors – Have they come of age? (B. Culshaw (USTR))

Abstract: The first fibre sensor patents were reported in the 1960's. One – the fonic™ sensor precise distance monitor, used in the precision machine tool industry, continues to be available. The fibre optic gyroscope initially reported in the 1970's became a commercial reality in the mid 1990's and is now arguably the most successful fibre sensor, selling in very significant numbers and addressing a wide range of performance parameters, including the highest precision market. Others, the fibre Bragg grating being the prime example, find themselves in ever-increasing numbers of trials and proof of principle exercises but as yet very modest routine application though that would undoubtedly expand. Meanwhile distributed sensing, the art of measuring external variables along the fibre length, gains acceptance especially for temperature and strain assessment and is likely to become the dominant fibre sensor concept within the next decade. So yes, some sensors are most definitely of age but others maturing still more are just emerging. The field will continue to consolidate over the coming years (SG1)

III. Technical session of WG4

1) The potential of slow light for sensing – Luc Thevenaz (EPFL)

Abstract: Slow light is a very active research field, world-wide. Besides the pure basic scientific interest in these phenomena of slow and fast light, researchers are trying hard to use it for data storage, data synchronization and the delay of analog signals. The talk proposed to use the tremendously increased group velocity for sensing. A few options were proposed, calling for contributions from other COST members.

2) Fiber optic sensing – The path from Laboratory To Product – Brian Culshaw (USTR)

Abstract: The steps from the lab experiment to the realisation of a real product are many and diverse. This talk explores the essential features of the technology transfer process, whether through licensing and interaction with established companies or through a new venture. The importance of communication throughout the interested parties - final user and purchaser, maintenance providers, regulatory bodies and standards associations, certification authorities and – for new ventures – sources of capital and personnel cannot be overstated. An essential aspect of this is the need to appreciate the different roles of the various members of an exploitation team – the academic, often the initiator – is rarely equipped to contribute beyond the source of science and technology. Marketing, legal, regulatory and financial administration are critical and often dominant. With patience, persistence and recognition of the necessary contributions to the technology transfer activity, the whole exercise can be, intellectually and – hopefully – financially, immensely rewarding.

3) New Projects in Fibre Optic Sensing (including application-related aspects) – W. Habel (BAM)

Abstract: Presenting experience from different fibre sensor applications on-site, the need of guidelines for developers, manufacturers, suppliers as well as users is obvious. Presented examples revealed that a lack of technical instructions can lead to unreliable measurement results or even damage of sensing components. Because FBG sensors are the most popular sensing techniques in very different fields, development of guidelines for FBG use in experimental stress analysis, for structure monitoring and temperature measurement was recommended.

Following the meeting in Les Houches, a European core group is being formed that is to deal with a proposal to support the development of FBG guidelines. First contacts are made, next steps will be done shortly. (SG3)

III. Short Term scientific mission

An STSM was proposed to investigate Self-Referenced Fibre Optic Intensity Configurations for Single and Multi-Sensors (University Carlos III of Madrid and INESC Porto) (SG2)

IV. Suggestion

It has been suggested that the activity dealing with ‘Resolution length definition for distributed optical fiber (Chair: L. Thevenaz) could be moved to WG4.