OFSETH Consortium

OFSETH consortium is composed of 10 partners from 5 EU countries with cross competencies in the fields of health, textile and optics.

n°	Participant name	Short name	Country
1	Multitel	MUL	Belgium
2	Centre Scientifique et Technique de l'Industrie Textile Belge	CEN	Belgium
3	Shishoo Consulting AB	SHI	Sweden
4	TAM Télésanté	TAM	France
5	Centre Hospitalier Régional Universi-taire de Lille	ITM	France
6	Bundesanstalt für Materialforshung und Prüfung	BAM	Germany
7	Advanced Optics Solutions Gmbh	AOS	Germany
8	Fiberware Gener-alunternehmen für Nachrichtentechnik GmbH	FIB	Germany
9	Technische Univer-sität München	TUM	Germany
10	ELASTA Ind	ELA	Belgium

Project & contact details

Project details :

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- Commission funding : 2.3 M€

Information Society Technologies

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OFSETH

Optical **F**ibre **S**ensors **E**mbedded *into technical* **T**extile for **H**ealthcare

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General Context

Healthcare monitoring is a general concern for patients requiring a continuous medical assistance and treatment. In order to increase mobility of such patients, a huge effort is pursued worldwide for the development of wearable monitoring systems able to measure vital physiological parameters such as respiration movements, cardiac activity, pulse oxymetry, temperature of the body. Technical or smart textiles that incorporate many different sensors play a growing role in these developments as they are well suited for wearability and can ensure comfort to the user.

While most developments up to now have been focused on the use of electrical sensors, the aim of OFSETH is to take advantage of pure optical sensing technologies for extending the capabilities of medical technical textiles for wearable health monitoring.

Technical approach & objectives

OFSETH research will focus on how silica and polymer optical fibres can be used for sensing vital parameters while being compatible with a textile manufacturing process.

Optical fibre sensors have already demonstrated great capabilities for many applications where distance, electromagnetic compatibility (EMC), risk of explosion, need for distributed measurement,… limit the use of standard competing technologies. Up to now however, their use as embedded sensors in technical textiles for medical applications has not been fully explored, despite their expected positive impact.

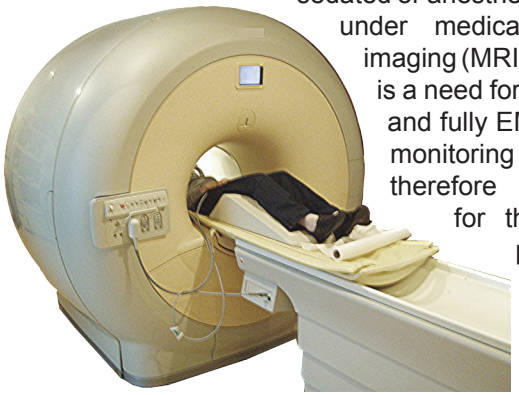
In this context, OFSETH will notably investigate how measurements of various vital parameters such as cardiac, respiratory rates and pulse oxymetry can be performed through pure optical devices and techniques, such as fibre Bragg gratings (FBG) sensors and near infrared spectroscopy (NIRS), among others, and which could also, in a longer term, suit for non-invasive pH or glucometry measurements. The feasibility of such sensors using polymer optical fibre (POF) instead of standard glass (silica) fibre for an easier integration into the textile will be investigated, with a special focus on POF FBGs.

In parallel, OFSETH will explore all suitable techniques for processing optical fibres together with textile yarns, for the realisation of medical textiles with embedded optical sensors. Specific developments of weaving and knitting techniques as well as custom design of optical fibres shall be necessary in order to obtain a textile manufacturing compatible process that does not damage the optical fibres nor degrade their sensing properties.

In the frame of OFSETH, prototypes of fibre based sensors integrated into textiles will be developed and compared with standard sensors when tested onto simulators. A complete monitoring textile with embedded monitor shall then be produced and used for clinical evaluation with patients and healthy volunteers.

Expected Impact

OFSETH expects to achieve a breakthrough in healthcare monitoring applications where standard (non-optical) monitoring techniques show significant limits. In particular and as short and mid-term results, OFSETH developments will be assessed for monitoring the vital parameters of sedated or anesthetised patients under medical resonance imaging (MRI), where there is a need for safe, reliable and fully EMC compliant monitoring systems and therefore an interest for the promising properties of pure optical sensing solutions.



The wearability and comfort of the system will then be assessed as it is an additional goal of OFSETH to enlarge the capabilities of the technique to ambulatory healthcare monitoring and SIDS (Sudden Infant Death Syndrom).

OFSETH will develop optical fibre based sensors to continuously assess the vital parameters of a patient. The objective is to demonstrate the validity of optical sensing solutions for healthcare and develop this technology taking into account the issues linked with textiles and wearability for a future efficient and continuous care of patients