

**Project:**

LighTPatch - Led Technology in Photo Haemostasis

Technological key words:

Photocoagulation, wound healing, diabetes, dermabrasion

Industrial sectors addressed:

Biomedical, Health, Medicine

Total project costs: 1.503.000 Euros

Partners' descriptions:

- **Light4tech Firenze S.r.L., L4T, Italy**

L4T is a high-tech company specialized in developing prototypes and products in the fields of photonics, optics and spectroscopy for application in Biophysics and Biomedicine. L4T has managerial and research supervision responsibilities, closely follows and personally participates in all the activities of the project. During the project will be performed activities regarding the devices and subparts design, taking into account all the mechanical, optical, electronic and legislative problems.

Web: www.light4tech.com



- **Italian National Research Council, CNR-IFAC, Italy**

CNR-IFAC is specialized in theoretical and experimental studies of light-tissue interactions, development of minimally invasive photonic-based systems for therapy and diagnosis. The staff of the CNR-IFAC will plan and design the experiments on animal models and on human subjects. The experimental results will be evaluated during treatment and in a follow up study, and will be focused on evidencing eventual collateral effects and on studying the healing process of a wound treated with the light.

Web: www.ifac.cnr.it



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- **Biochemical Systems International, BSI, Italy**

BSI is a biochemical research company, involved in the development, production and trading of Rapid Diagnostics Products in humans and animals, portable laboratory photometers and systems for the fast determination of multi-parameters. In this project BSI will indicate the end-users of the photohaemostasis devices, involving skilled surgeons and physicians in the use of the device on animals and human and their feedback will be used to design the optimized prototypes for different surgical areas.

Web: www.biosys.it



- **Optocap Ltd, OPTOCAP, United Kingdom**

OPTOCAP provides contract package design and assembly services for microelectronic and optoelectronic devices, from design through prototyping. During the project thermo-mechanical finite element and optical modeling will be used for design, realize and test of the optimized LED source for the different devices layout, taking into account thermal, optical, material and packaging aspects. Optocap will assemble the LED source package with appropriate interconnections and fiber/optic coupling.

Web: www.optocap.com



- **Laboratory for Non-linear Spectroscopy, LENS, Italy**

The Biophotonics group at LENS has been active in the areas of single molecule biophysics, nonlinear microscopy, tissue imaging and development of novel technologies for in vivo diagnostics. They will use combined two-photon fluorescence (TPF), to image fibroblasts and other, and second-harmonic generation (SHG) microscopy, to image collagen, in order to studying photo-induced modifications in the surrounding skin tissue for comparing treated skin against untreated and healthy skin.

Web: www.lens.unifi.it



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Project abstract:

The LightTPatch project aims to develop a quasi-commercial prototype of a photohaemostatic device. This photohaemostatic device provides selective photo-thermal effect in the superficial blood layer, in order to induce coagulation of a superficial abrasion avoiding thermal damage in the surrounding skin tissue. The LightTPatch devices will emit a wavelength that is mainly absorbed by the haemoglobin and deoxyhaemoglobin (i.e. in the UV-BLUE region of the light spectrum), thus inducing a selective thermal effect. The light source of the prototypes is based on LED technology, so that the final device will be easy to use, cheap and with low maintenance needs. During the project, we will provide one or more prototypes of a photohaemostasis device for applications in dermatology, dentistry, minimally invasive surgery and first aid patient care. In order to achieve these goals two different kind of prototype will be optimized: a fiber coupled device and a handheld device. The end users of the fibre-coupled device are surgeons and physicians, interested in a cheap, easy to use, and selective photohaemostatic device, as an alternative tool to currently used products or devices. The end user of the handheld device will be the patient himself, as it is intended as a sort of first aid medical device providing a shorter healing time of a skin superficial wound. The demonstrators will be designed with the collaborations of surgeons and physicians, i.e. the skilled personnel having know-how in microsurgery, dentistry and dermatology, haematology and clotting disorders, in order to optimize the final configuration for a particular application. In order to do this, differences in irradiation conditions and in the settings of the irradiation parameters will be optimized for the specific application, considering that there can be some variations in the thermo-physical properties of the target tissue. This study will be supported by the collaboration of the Research Institutes partners of the project and local clinical partners acting as subcontractors. The healing process due to the LED photohaemostasis will be exploited in animal models in order to evidence differences between the photo-induced coagulation and a natural coagulation and healing process. At the end of the project the prototypes will be eventually tested in selected and informed patient. The results of the experimental tests will define one or more devices close to the commercialization phase.

Expected results and exploitation plan:

The LightTPatch exploitation activities include market analyses and Business scenarios, Cost Benefit and Cost Effectiveness analyses. This activities will help to determine and quantify the exact impact of the LightTPatch outcomes on the current market context. These activities will also prove the economic viability of the project solutions. The main goal is to ensure that the exploitation plan is in actual fact a real tangible outcome that can help the consortium partners to

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have a new potential revenue stream within a few years after the project. The economic impact for the SMEs representing the value chain for the final production of the LightTPatch devices. A previous market analysis, conducted in 2011, has indicated that the market for the only portable photohaemostasis device can be foreseen to be 24.5 million €, and can be even larger considering the sales of all LightTPatch devices, therefore the SMEs involved will increase their markets and business through the launch of new products.