MEDILIGHT

Miniaturized smart system for light stimulation and monitoring of wound healing

Project Overview

Basic Facts

MEDILIGHT: Miniaturized smart system for light stimulation and monitoring of wound healing	
Project number:	644267
Starting date:	1 February 2015
Duration:	36 months
Call identifier:	H2020-ICT-2014-1
Topic:	ICT 2 – 2014: Smart System Integration
Number of participants:	7 from 6 countries
Project cost: Project EU funding:	€ 2.98 M € 2.48 M
Keywords:	Light therapy; Chronic wound; Wound healing; Bio-medical; Disposable patch; Soft encasement; Smart electronics; Micro- and nano-structuring; Light-management; Printed electronics; Smart sensors

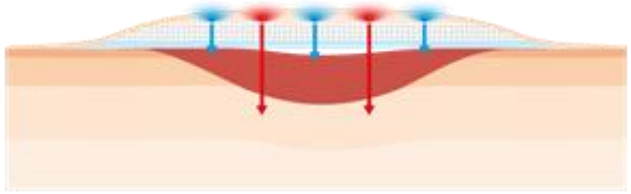
Scope & Concept of MEDILIGHT

Advanced wound healing by

- **fully integrated intelligent phototherapy band aid with**
  - embedded light delivery and
  - sensor structures in the wound dressing and
  - an attached electronic control module
- **temporal delivery schemes in accordance with the therapeutic policy**
  - exploitation of scientifically proven phenomena **(biological impact of light on skin tissues)**
- **highly integrated components - modularization** (wound dressing, electronic module)
- system will be backed by **in-vitro and in-vivo studies**

MEDILIGHT translates technologies already scientifically proven as a concept (biological impact of light on skin issues, **TRL 4**) or demonstrated for different applications (back pain/large lamp, **TRL 5**) to higher integrated components (wound dressing, electronic module).

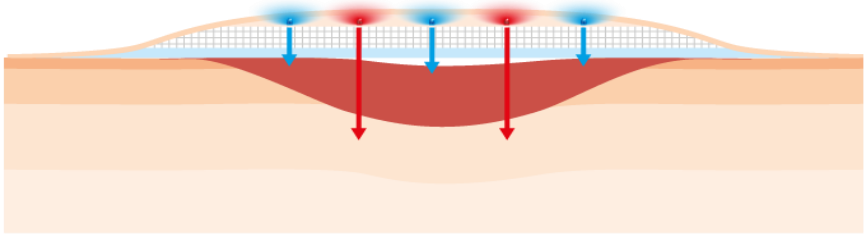




Project Goals

Main technical goals

- Develop a disposable wound dressing with integrated light structures and electronic sensors (13cmx13cm)
- Develop a highly integrated electronic module (5cmx3cmx0.7cm) (data acquisition, light sources & detectors, etc.)
- Develop various light schemes, optimisation of the light therapy
- A wireless device and software, recording the history of wound healing and provision of an individualised therapy
- Testing prototypes animal in-vivo models (pre-clinical studies) and perform first human tests



Technical Objectives & Partners' roles

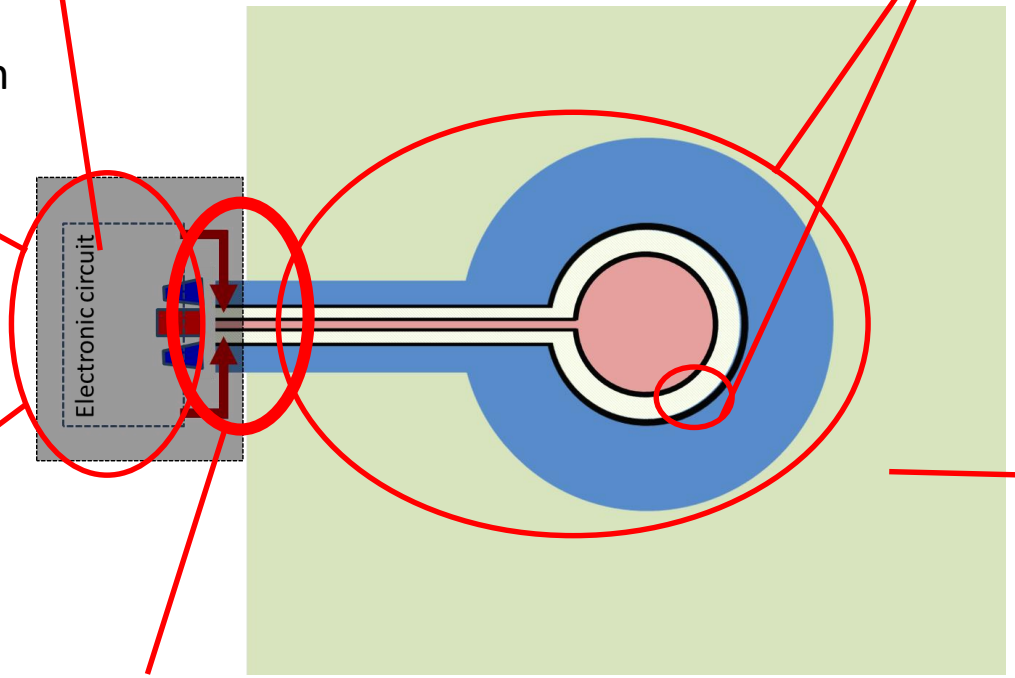
Electronic System Development
SignalGeneriX

Medical concept development
Application cases
Field testing
U Heidelberg

Photonic structures
- Transmission
- Sensor Structures
- Distribution of light

CSEM

Project Coordination
Module miniaturization
Robustness
Energy supply
TU Berlin



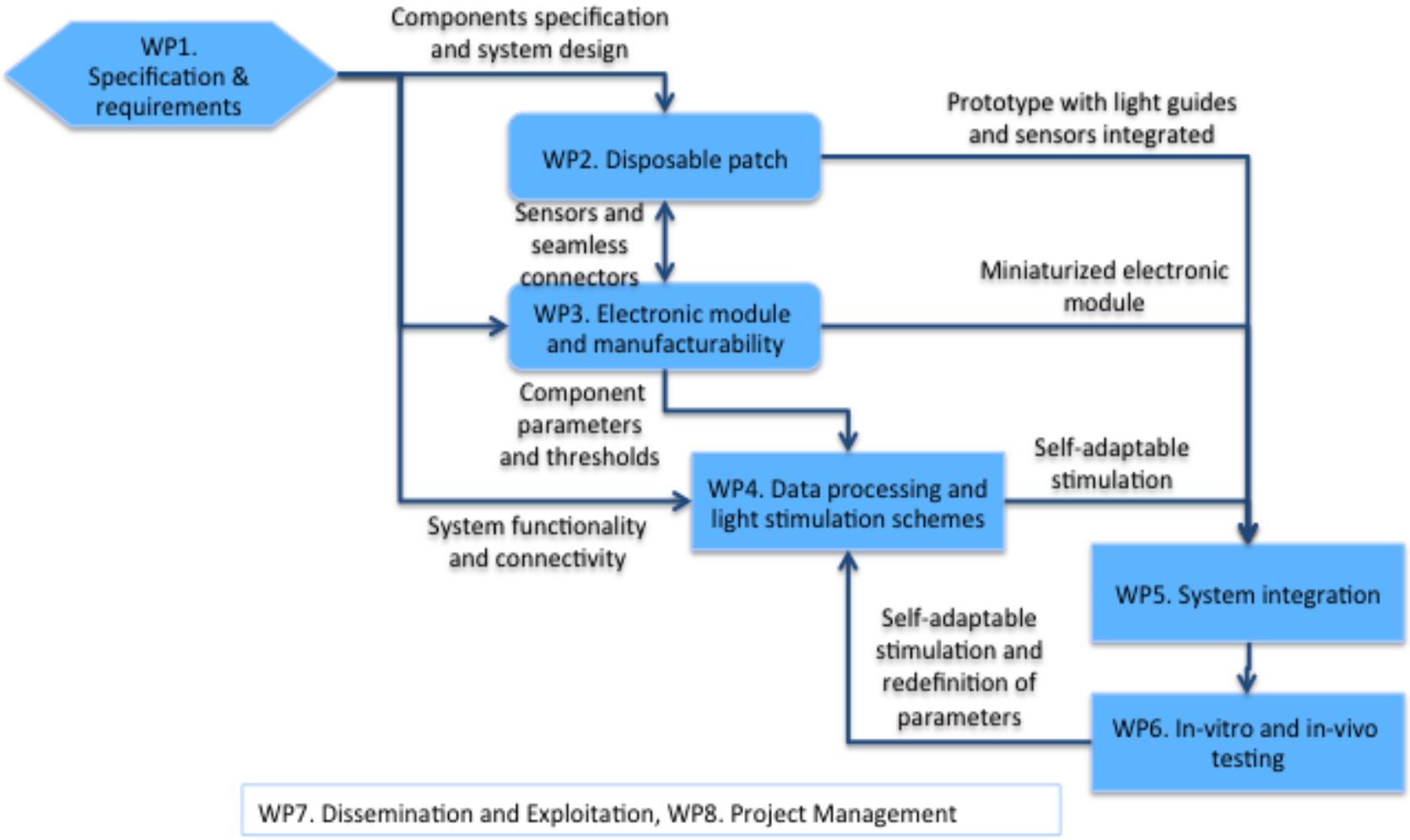
Integration into the band aid structure, non-woven build up
End User
Fabrication and roadmap for products
URGO

Industrial manufacturing of modules
Microsemi

Optical and Electronic coupling
Detachable/multiple connect cycles
TU Berlin + CSEM

Project Management & Dissemination
AMIRES

Interaction of Work Packages



SOTA with LED system on skin



*Ambulight/Ambicare
for melanoma



**Bluetouch/back pain
Bluecontrol/psoriasis

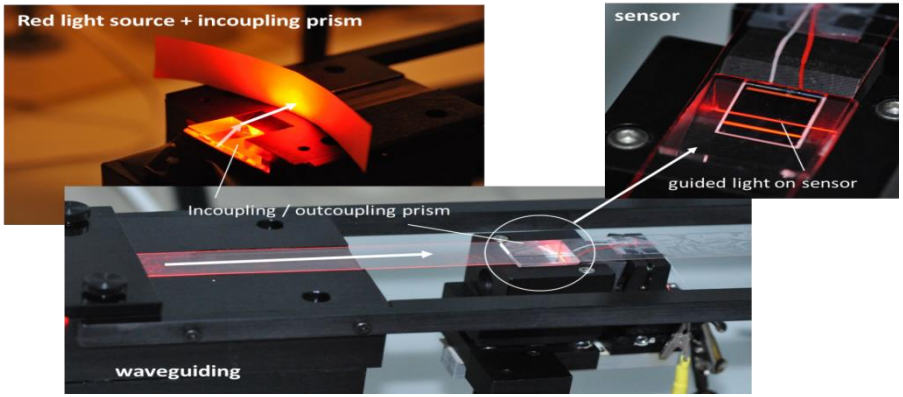


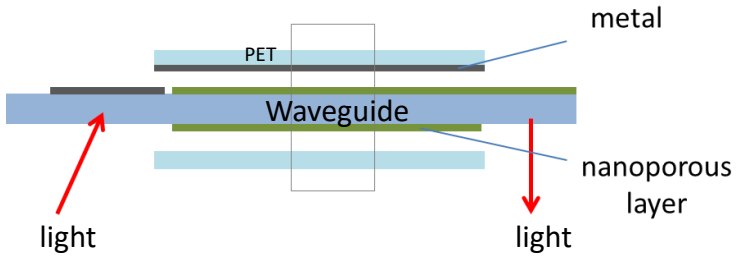
*LUMI-HEAL/KLOX
Photoconvertor gel & LED
(chronic wounds)

** Photodynamic methodology*
*** Photobiomodulation methodology (as in MEDILIGHT)*

WP2 Highlights

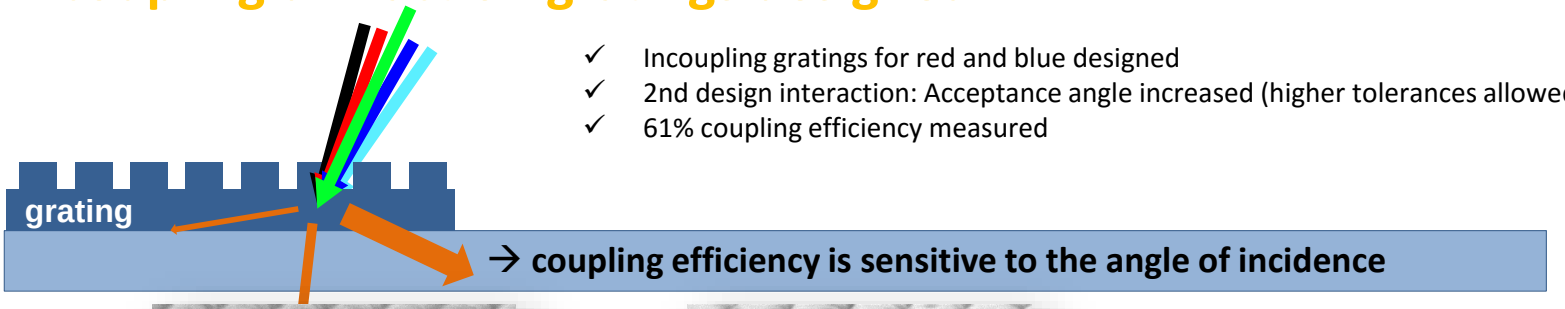
- ## Waveguide materials tested





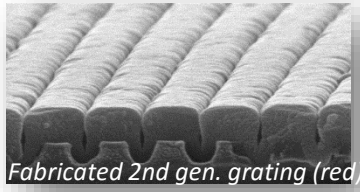
- ✓ Optical setup for waveguide efficiency built
- ✓ Different waveguide materials tested (COP - Cyclic olefin polymer)

- ## Incoupling diffraction gratings designed



- ✓ Incoupling gratings for red and blue designed
- ✓ 2nd design interaction: Acceptance angle increased (higher tolerances allowed)
- ✓ 61% coupling efficiency measured

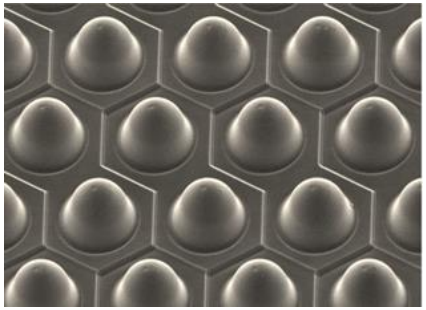

Fabricated 2nd gen. grating (blue)

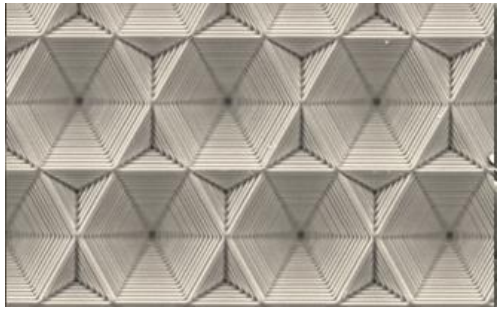

Fabricated 2nd gen. grating (red)

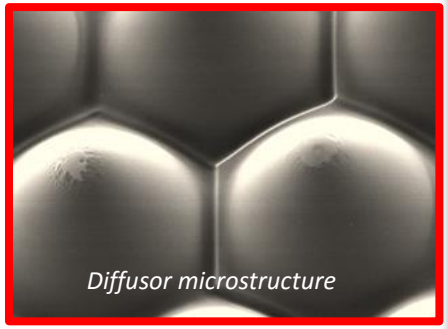
- ✓ **60% efficiency was measured with a highly collimated laser light**

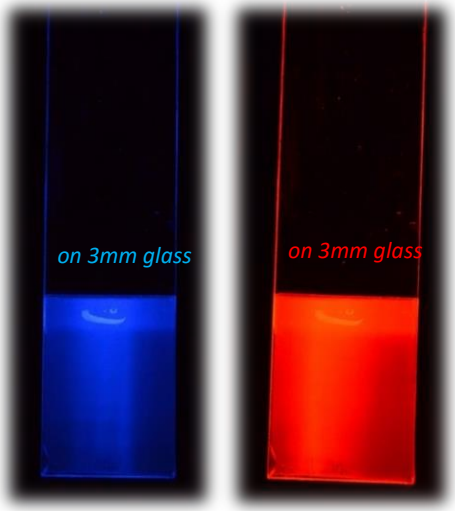
WP2 Highlights (Cont.)

- **Diffraction gratings and diffusor fabricated**









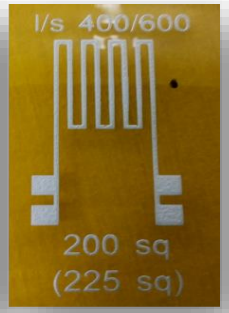
- **Temperature Sensor fabricated**

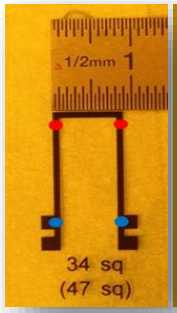
✓ Different patterns fabricated (ink jet, screen printing)

✓ First sensor printed and encapsulated

✓ First demo built (USB, graphical user interface)





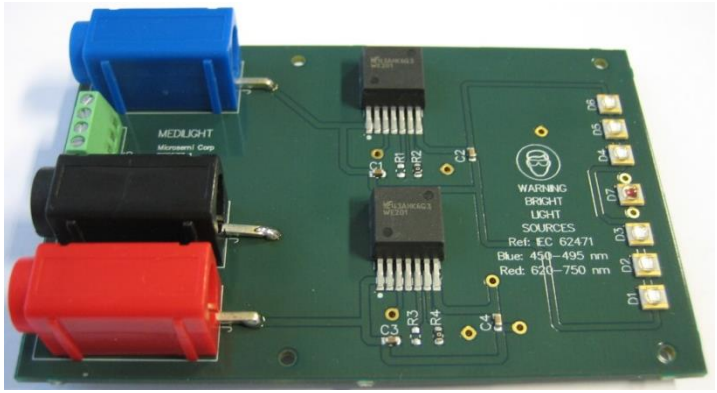




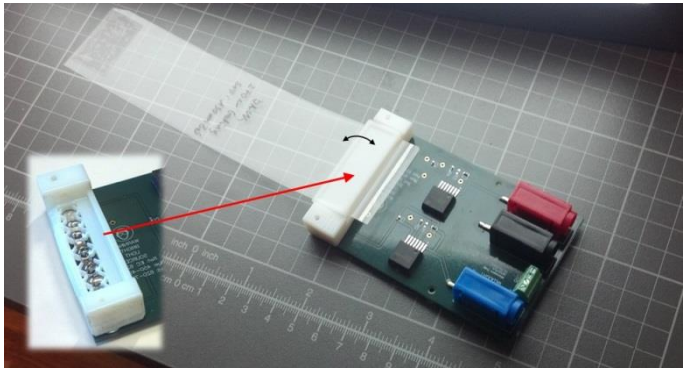
- **Concepts for oxygenation sensor ready/under discussions**

WP3 Highlights

- **LED Driver unit**
  - to evaluate the concept and functionality of the electronic module
  - to test and realize the collimating and in-coupling of the waveguide structure



- **Test structure for the in-coupling concept**
  - Adjustable LEDs (PCB) to achieve an optimal in-coupling
  - Detachable waveguide structure



WP7: Roadmap to technology translation and distance to the market

IN VITRO proof of concept (UHEI)

Product Design

In-vivo, Clinical Studies / Medico-economical study

Regulatory / Health authority issues

Industrial scale up

T0 YEAR 3 YEAR 5 YEAR 6 YEAR 8



- *About 4.5-5 years after MEDILIGHT*
- *First roadmap (to be updated)*
- *Value chain partners also identified*

Consortium

Participant	Short name	Country
Technische Universität Berlin (COORD)	TUB	DE
Laboratoires URGO	URGO	FR
Ruprecht-Karls-Universität Heidelberg	UHEI	DE
Centre Suisse d'Electronique et de Microtechnique S.A.	CSEM	CH
SignalGeneriX Ltd	SG	CY
Microsemi Semiconductor Limited	MSL	UK
AMIRES s.r.o.	AMI	CZ

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