



SC1-BHC-07-2019

*Regenerative medicine: from new insights to new applications*

# ORGANTRANS

**Controlled Organoids transplantation as enabler for regenerative medicine translation**

Starting date of the project: 01/01/2020

Duration: 36 months

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## = Deliverable D7.4 =

**Sensor for the monitoring of dissolved oxygen**

*Performances of the sensor for the monitoring of dissolved oxygen (report)*

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| Dissemination level |   |   |
|---------------------|---|---|
| PU                  | Public  | X |
| PP                  | Restricted to other programme participants (including the Commission Services)        |   |
| RE                  | Restricted to a group specified by the consortium (including the Commission Services) |   |
| CO                  | Confidential, only for members of the consortium (including the Commission Services)  |   |



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## DOCUMENT DATA

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## DISTRIBUTION LIST

| Date       | Version | Recipients                           |
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## Executive Summary

Deliverable 7.3 provided detailed information on the fabrication, characterization, tests and performances of the sensor for the monitoring of dissolved oxygen. Deliverable 7.4 describes the performances of the oxygen sensing system composed of sensor and reader in a public flyer.

## Table of Contents

|                                |   |
|--------------------------------|---|
| 1. Introduction.....           | 5 |
| 2. Results and Discussion..... | 6 |
| 3. Conclusions.....            | 7 |
| 4. Degree of Progress .....    | 7 |
| 5. Dissemination Level.....    | 8 |

## 1. Introduction

Deliverable D7.4 is closely related to Deliverable D7.3, and part of Task 7.2: Oxygen monitoring, whose goal is to develop the sensors for optical monitoring of dissolved oxygen in the bioreactor.

The oxygen sensor technology consists of a luminescent-reactive dye embedded in a hierarchical porous matrix. The oxygen sensors are disposable and compatible with industrial manufacturing processes. The sensors are coupled with a portable reading device that provides a light source (LED), a detector (photodiode) and all the optoelectronic components for oxygen measurement.

CSEM produced 100 disposable oxygen sensors and a dedicated reader system to optically measure the concentration of oxygen in cell culture medium.

## 2. Results and Discussion

All details are provided in D7.3 (confidential report). Public information on the sensing device and performances is provided a flyer for dissemination.



### DEMOX X—CONTACTLESS OXYGEN SENSING IN GAS AND LIQUID

Oxygen sensors allow for rapid, non-invasive measurements of oxygen concentration in a wide range of gaseous and liquid environments. They are suitable for long-term use applications, sterilizable, biocompatible and show zero oxygen consumption.

CSEM's new generation of optical sensors are based on a dual hierarchical porosity, which allows for better response and stability.

DEMOX X is a miniaturized mobile reading system for smartphones. Printed on-sensor QR codes provide identification and traceability.

#### Technology performances

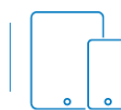
- Working range: 0.1% - 21% O<sub>2</sub>
- Accuracy: 0.1% at 2% O<sub>2</sub>
- Precision: ±0.3% at 2% O<sub>2</sub>
- Shelf life: > 12 months

#### Applications

- Organ-on-Chip systems
- Physiological microenvironments
- Bioreactors & incubators
- Controlled atmosphere packaging
- Food & beverages
- Environment & water



[www.csem.ch/demox](http://www.csem.ch/demox)



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The O<sub>2</sub> sensor technology performances meet the requirements provided in the DoA for oxygen monitoring:

|                                      | <b>DoA requirements</b> | <b>Measured performances</b> |
|--------------------------------------|-------------------------|------------------------------|
| <b>Oxygen concentration (in air)</b> | 1% - 21% O <sub>2</sub> | 1% - 21% O <sub>2</sub>      |
| <b>Accuracy</b>                      | 0.5% O <sub>2</sub>     | 0.1% at 2% O <sub>2</sub>    |
| <b>Precision</b>                     | ±0.5% O <sub>2</sub>    | ±0.3% at 2% O <sub>2</sub>   |

### 3. Conclusions

Oxygen sensing patches were fabricated and tested with a dedicated reader. The sensor was functional in cell culture medium, and enabled to detect oxygen consumption by cells over a few days. The sensor sensitivity needed to provide physiologically relevant information from the sensor was however not defined.

### 4. Degree of Progress

The objectives reported in the DoA were achieved, with the present report, describing the performances of the oxygen sensing system.

## 5. Dissemination Level

Public