

Optical Readers for Monitoring Response of Fluorescent Sensors in SWIR Region

V. Zubkovs¹, M. Markocic¹, V. Basoli², S. Grad², S. H. Sajjadi³, A. A. Boghossian³, S. Cattaneo¹

¹ CSEM, Landquart, Switzerland

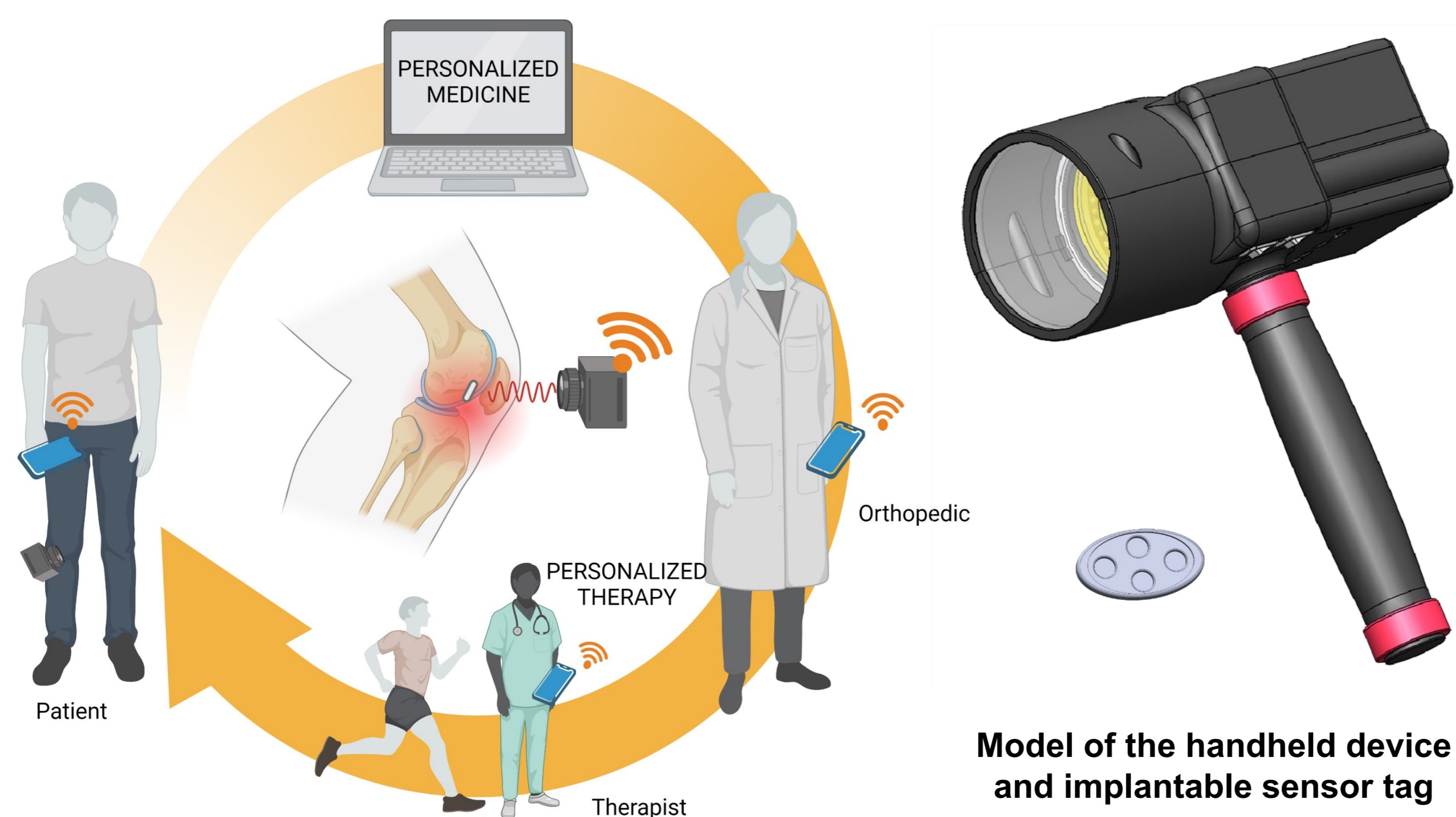
² AO Research Institute (ARI), Davos, Switzerland

³ École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

In this project, a handheld SWIR prototype reader for monitoring SWCNT-based sensors was developed. The target application of the project is a real-time, long-term monitoring of inflammation based on NO (nitric oxide) levels, a biological biomarker for osteoarthritis, a chronic joint disease. The study presents the feasibility and functionality of the prototype device for *in vivo* inflammation measurement in tissues.

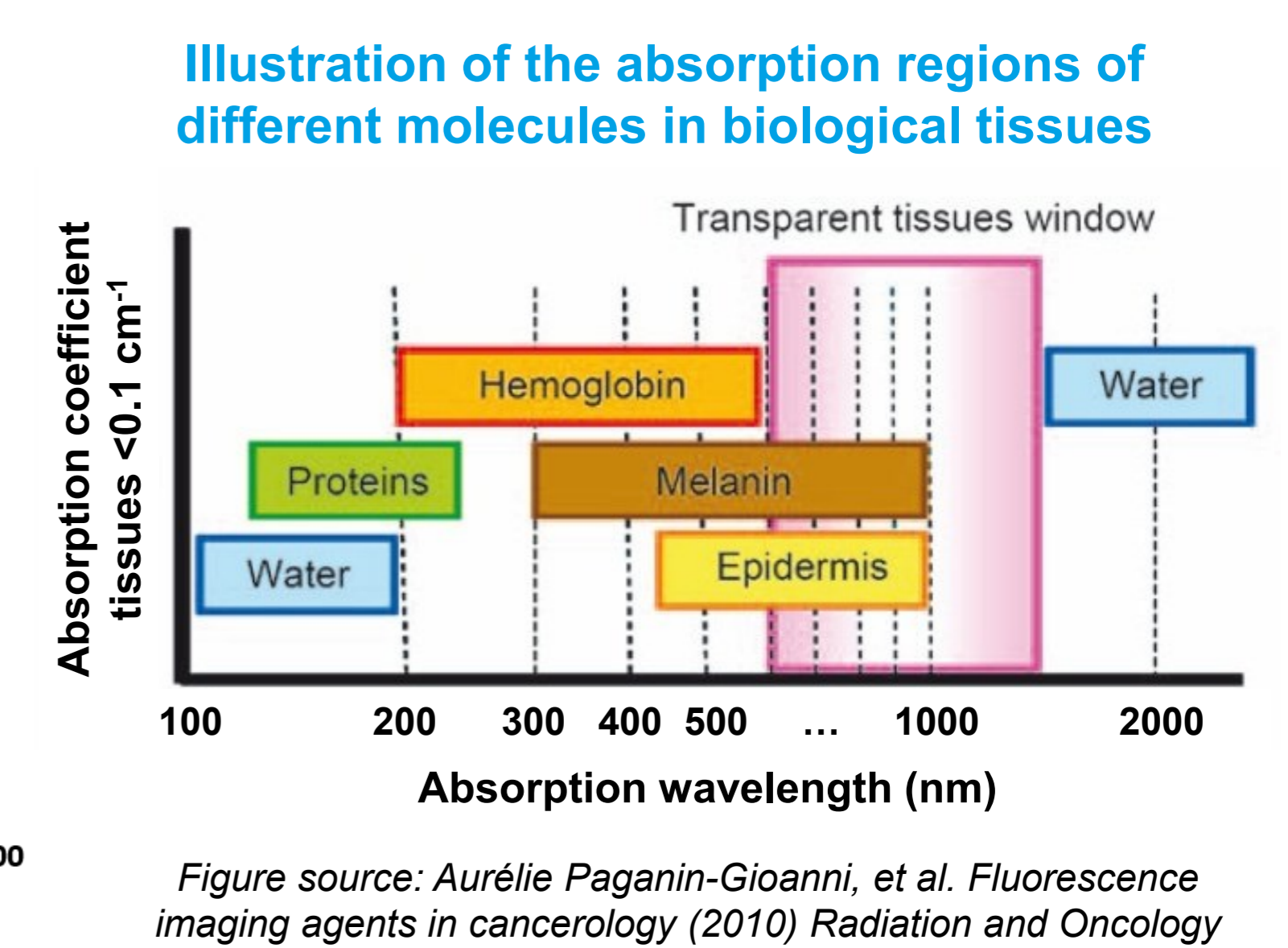
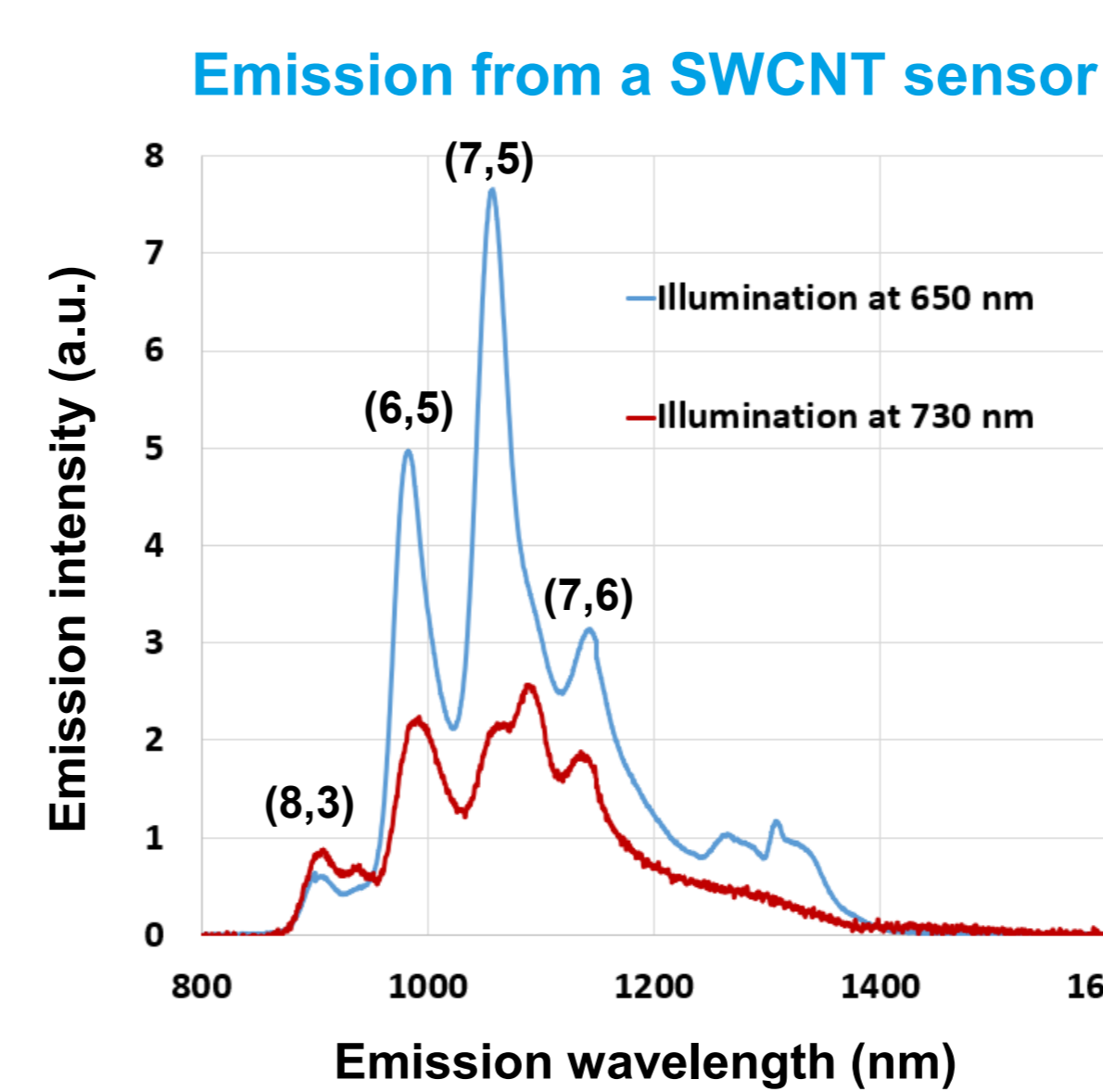
Introduction

Concept of a compact, proof-of-concept device for real-time monitoring of inflammation using an optical nano-sensor technology. This device is designed for point-of-care continuous monitoring of nitric oxide, an inflammatory biomarker found in joints that is associated with chronic pathologies.

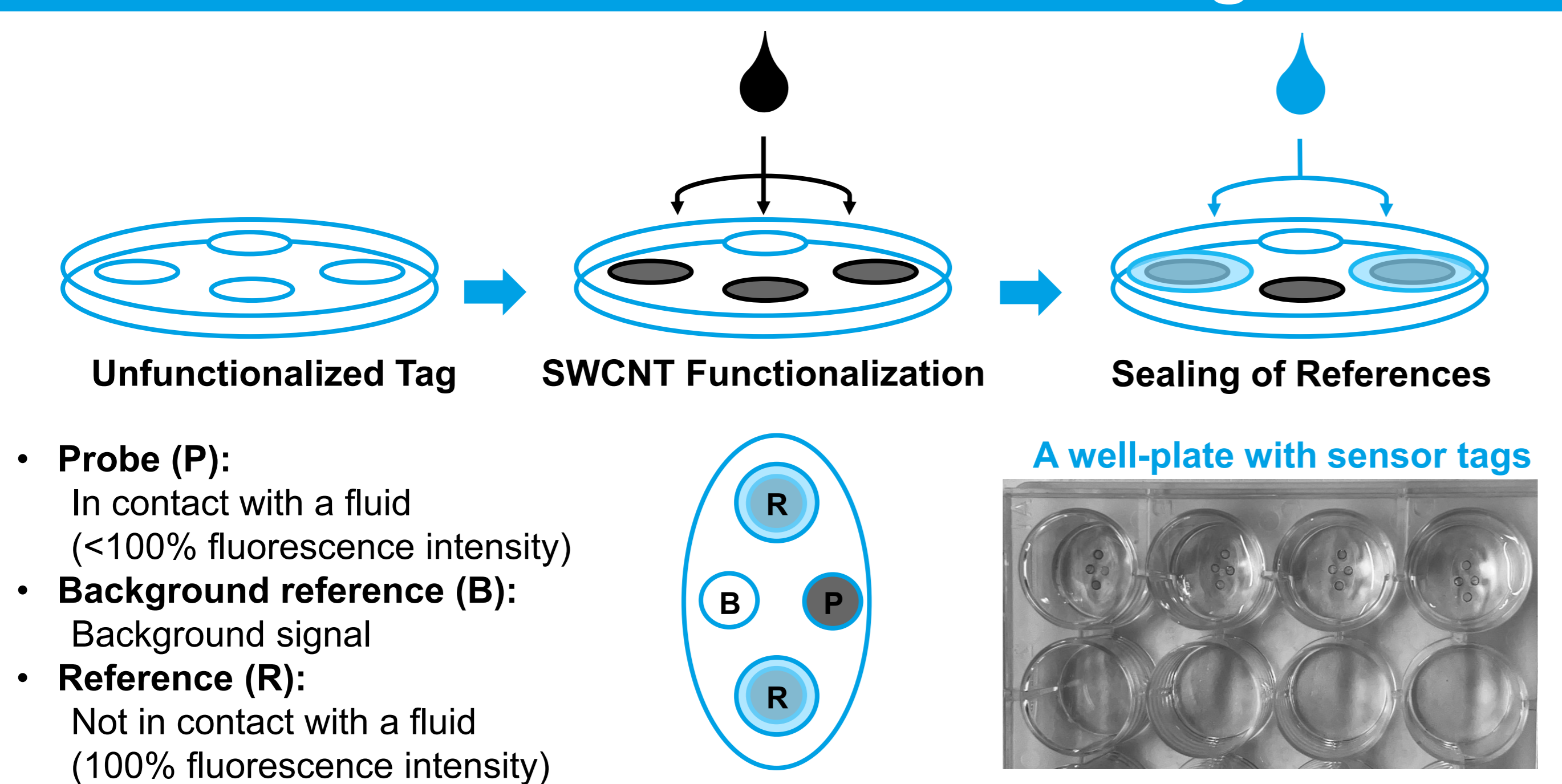


Optical Properties of SWCNTs

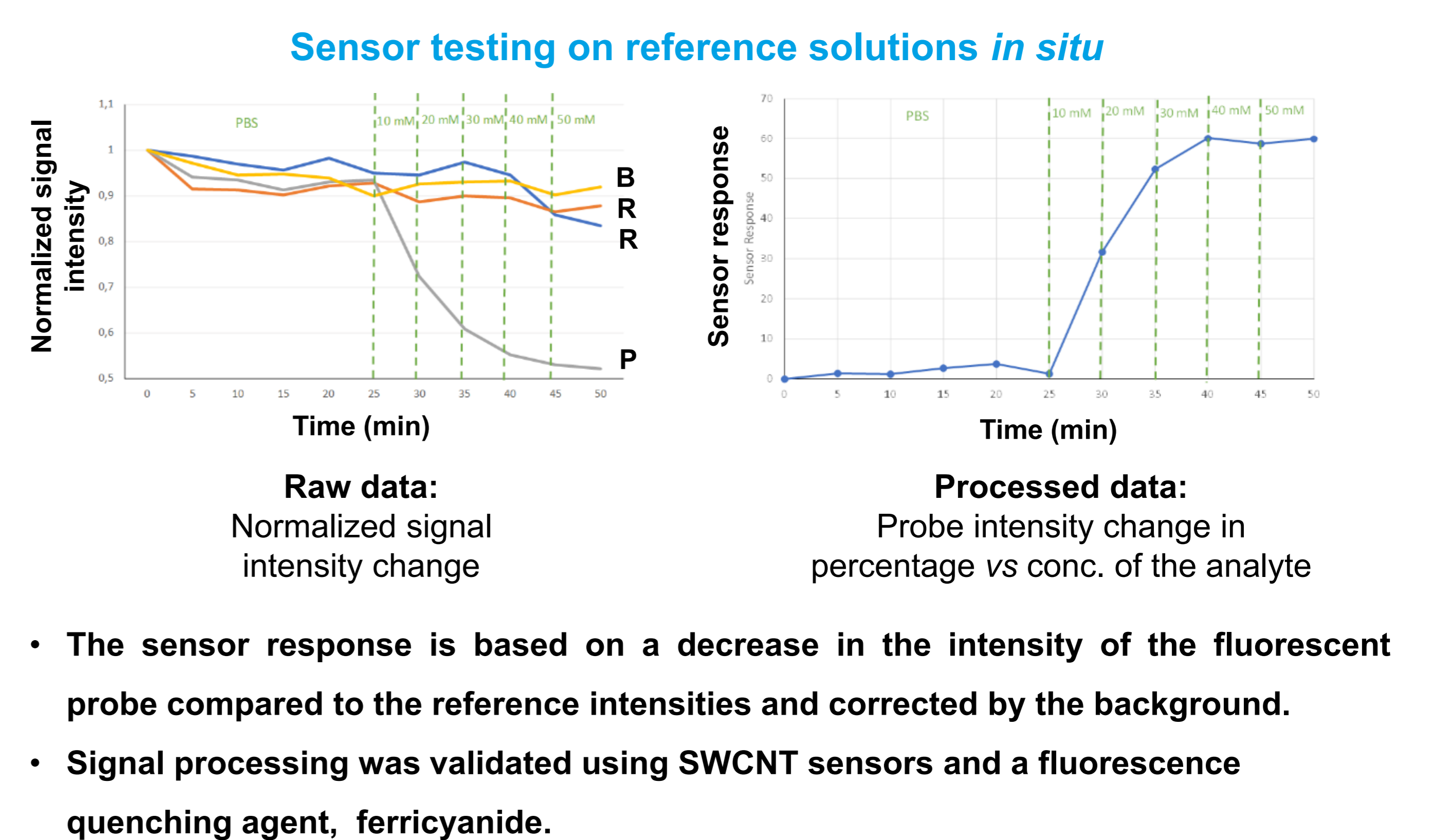
- **Photostable** – do not photo-bleach and demonstrate long-term signal stability.
- **Sensitive** – enable single-molecule binding selectivity towards the target analyte.
- **Bio-compatible** – tested *in vitro* and *in vivo* in various research studies.
- **Bio-transparent** – fluoresce in the short wavelength near-infrared (SWIR) region where adsorption of biological tissues is low.
- **Multimodality in sensing** – surface functionalization can tailor response and selectivity of SWCNTs a wide range of bio-analytes.



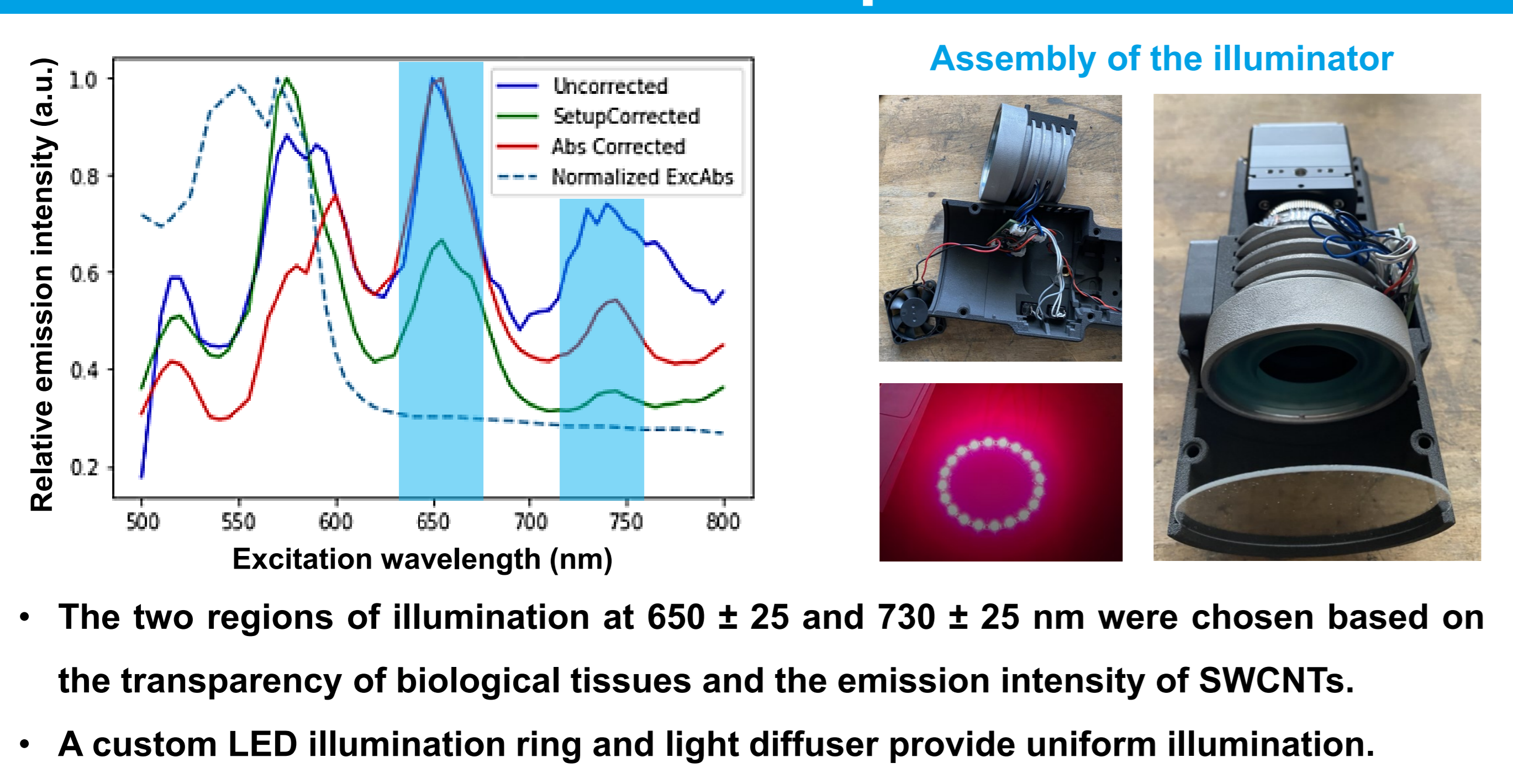
Fabrication of Sensor Tag



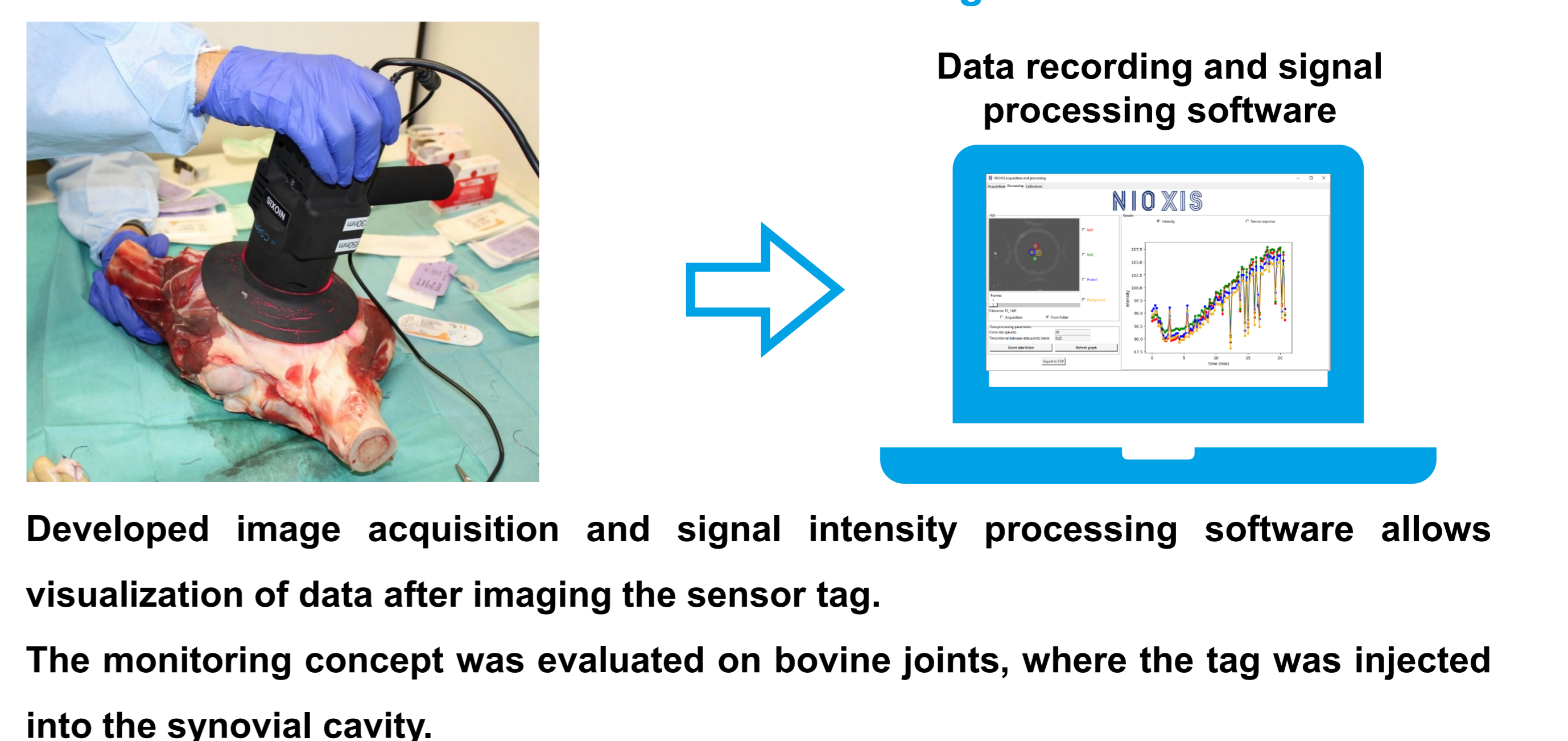
Device and Software Validation



Handheld SWIR Optical Reader



Device and software testing *ex vivo*



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