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PHOTONICS - EUROPHOTONICS MASTER COURSE

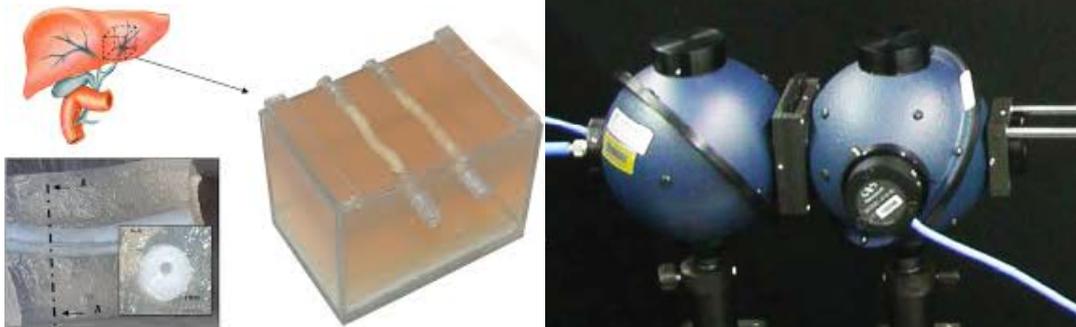
PROPOSAL FOR A MASTER THESIS

Dates : April 1st, 2016 – September 31st, 2016

Laboratory : Centre for Sensors, Instrumentation and systems Development (UPC-CD6)
City, Country : Terrassa, Spain

Title of the master thesis :

Construction and characterization of tissue phantoms



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Summary of the subject (maximum 1 page):

Tissue phantoms are a relevant part of biomedical photonics research. They are non-biological systems designed to mimic, to the best possible value, the optical (and mechanical, electrical..) properties of living tissue so they may serve as standards for calibration of instruments, or at least for testing samples along the development of an instrument. Typically they are composed of a bulk matrix, combined with a variable density of absorbers or scatterers, which define their optical behaviour.

As samples to be used as reference, the characterization of their optical performance is extremely relevant, in special regarding their scattering and absorption coefficients. Within this project we intend to implement the different algorithmic approaches (Kubelka-Munk, Inverse adding-doubling, Monte Carlo...) which enable to recover the obtained optical properties out of the experimental measurements obtained from a double integrating sphere.

The student working in this project will propose, fabricate and characterize different types of basic tissue phantoms, and propose and implement the best method to deliver their optical properties. The project involves experimental work both for tissue phantom elaboration and for its optical characterization in the lab, together with numerical/programming skills for the implementation of the different reconstruction methods which extract the optical features of the samples.

Keywords : Tissue phantom, optical characterization, Kubelka-Munk, inverse adding-doubling, Monte Carlo, biomedical photonics

Additional information :

* Amount of the monthly allowance (if it is the case):

To be discussed depending on the value of candidate

* Required skills :

Interest in application-driven experimental work for solving real-world innovation needs, and in hands-on laboratory work.

Basic concepts in optical metrology and optical engineering .

Basic programming skills (C++, MatLab, Zemax, Labview) .

Search of resources and components, both scientific and technical.

Self-motivated, objective-driven, capable of autonomous working within a multidisciplinary team.

* Miscellaneous :

International team with several years of experience in the topic proposed.

Multidisciplinary environment with electronics and mechanics workshops, and specialists and technicians in metrology, optics, mechatronics, and electronics.

Possibility of joining the Centre for a PhD/Technician/ Project Manager career in case of common interest.

Early start welcome.