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Master in Photonics – “PHOTONICS BCN” ERASMUS+ “EUROPHOTONICS”

MASTER THESIS PROPOSAL

Dates: April - September 2020

Laboratory: Laboratory of Integrated Photonics (Chemical Transducers Group)

Institution: Microelectronics Institute of Barcelona (IMB-CNM, CSIC)

City, Country: Bellaterra (Barcelona), Spain

Title of the master thesis: *Nanophotonic Paper for the Next Generation of Point-of-Care Devices*

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Keywords: bacterial nanocellulose, silk-fibroin, photonic components, microfluidics, lab on a chip, point-of-care.

Summary of the subject (maximum 1 page):

Point of care (POC) devices are conceived to transfer medical test from central laboratories to the place of patients' care like the bedside or home. The flagship of POC devices is paper-based lateral flow assay (LFA), where the paper pumps the liquid through the system by capillarity and the device provides the result after few minutes and without user's intervention. Albeit simple and low cost, most of LFAs are restricted to either yes/no or subjective and interpretable results. The reasons for that are: the opacity of cellulose papers, which limits the optical path to few microns, too short to perform absorbance measurements; and the ageing of the paper matrix, which discolour over time and produces colour inhomogeneity at the readout zone. In this project, alternatives based on transparent nanocellulose papers and nano-patterned silk-fibroin layers will be explored with the aim to produce photonic paper for the new generation of point of care devices.

Additional information:

* Required skills: micro-nano-technologies; simulation; photonic characterization; photonic bio-sensing; microfluidics.

* Miscellaneous: teamwork capacity; multidisciplinary.