

MAP-fis Essay Proposal, 2016-2017

(please write in English)

Supervisor

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Title

Monolithic sensors fabricated by femtosecond laser micromachining for lab-on-a-chip applications

Area

(Materials, Optics, Condensed Theory, High Energy Theory,...);

Optics

Summary of Proposal

The main goal of this doctoral program is to explore the enabling capabilities of three-dimensional direct writing and wet-etching with fs laser, in the development of the next generation of compact and highly integrated devices for demanding sensing applications. This is an enabling technology suitable to produce devices that can combine low volume fluid handling capability with optical signal processing and detection, exhibiting a high degree of integration and functionality which fit perfectly in the demanding requirements of health applications.

In this context, the program addresses very specific scientific and technological challenges. (i) Develop new optofluidic configurations to address (localized) surface plasmon resonance biosensors with waveguides, enabling sensor arrays with improved self-referenced interrogation methods. (ii) Develop improved methodologies for coupling of high-Q hollow resonators in sensor array aiming advanced biosensing applications.

The case studies proposed here demand a high degree of control of the entire fabrication process and novel designs and concepts in what concerns device integration. The two case studies proposed as the main objectives all represent challenges at the edge of the state of the art and their demonstration will pave the way to many other applications in sensing and optical signal processing, beyond those here briefly explained.

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References

(to allow students first look at topic)

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