EUROPHOTONICS MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Course 2014 –2015

Laboratory : OPTOELECTRONICS group at ICFO
City, Country : Castelldefels (Barcelona), Spain

Title of the master thesis: Ultrasensitive metal nano-structures for plasmonic enhanced Raman scattering of small molecules and its biological and medical applications

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Summary of the subject (maximum 1 page) :
Raman spectroscopy it is a very powerful tool that is widespread in the biological and medical community. Among Raman techniques, surface-enhanced Raman spectroscopy (SERS) has demonstrated to be a very sensitive technique, enhancing Raman signal up to 10^{+8} times. Despite many efforts in the research a reliable low cost and industrially scalable substrate fabrication for SERS is still missing.
The synthesis of new materials and the advances in controlling fabrication processes at the nanoscale are the basis for the development of new designs and added functionalities in photonic sensing devices. In particular an essential feature for mass production of devices is to find reliable techniques, other than e-beam lithography and focused ion beam milling, that allow precise nanostructuring of large surfaces at low cost.

The research will focus on developing nanostructured surfaces and interfaces with unprecedented properties by using advanced concepts and nano-fabrication techniques scalable at industrial level. More specifically the fabrication of SERS substrates employing novel nano-assembly techniques will be addressed. Moreover, the substrates will be characterized and optimized for small bio-molecules detection.

The trainee will closely work with researchers and PhD students of the Optoelectronics group at ICFO:
http://www.icfo.es/index.php?section=people0&lang=english&op=show_card&people_id=168&nick=Valerio Pruneri

Keywords :
Surface-enhanced Raman spectroscopy (SERS), Nano-fabrication, Plasmonic structures

Additional information :
* Required skills : We are looking for a highly motivated student with basic laboratory skills and basic knowledge of data analysis. Team spirit and good knowledge of English.