MASTER IN PHOTONICS – PHOTONICS BCN
EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April - September 2017

Laboratory : Plasmon Nano-Optics group
Institution: ICFO
City, Country : Barcelona

Title of the master thesis: Study of plasmon-induced heat generation in a 3D heterogeneous medium

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Summary of the subject (maximum 1 page):

This multidisciplinary project will focus on further understanding and optimizing heat generation in vivo with illuminated gold nanoparticles. In particular, special emphasis will be put on studying the respective influence of scattering, absorption and heterogeneity of the medium as well as light penetration. The study will be carried out in close collaboration with experimentalists of the same groups and is expected to highly benefit laser ablation development for less invasive cancer treatment.

The student will be first in charge of developing a recipe to build jelly phantom mimicking a mouse. This phantom will be made of controlled mixtures of water, lipofundina, different inks and gold nanoparticles at specific concentrations. The optical characteristics of the phantoms will be based on the real values measured on living mice.

The second phase of the project will consist in characterizing both the optical penetration and heat generation through the phantom depth. Effect of heterogeneities

of the medium and nanoparticle distribution will be studied. If time allows it, the student will also be introduced to simulations and the experimental data directly compared to numerical data.

Keywords:

Nano-optics, hyperthermia, medical optics, diffused optics.

Additional information :
* Required skills:
* Miscellaneous: