Degree projects in Biophotonics 2013-14

LUND UNIVERSITY

DEGREE PROJECTS WITHIN THE INTERDISCIPLINARY FIELD OF OPTICS AND MEDICINE

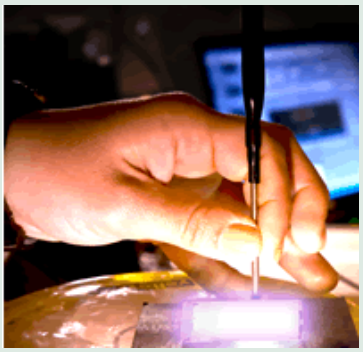
The Biophotonics group is offering the opportunities to carry out degree projects in a variety of interesting topics, closely linked to the research of the group

Tumor resection guidance in liver and brain

In collaboration with the Departments of Surgery and Neurosurgery.

Surgical resection of tumour and tumour metastases is a routinely used modality in the combat of malignant diseases. There is a current trend in developing optical techniques that can enable guidance for the surgeon so that healthy tissues are spared and malignant tissues are removed.

In this project we are developing instruments to be used in the clinic that can quantify the state of the tissue based on haemoglobin concentration, oxygen saturation, water and lipid content, as well the presence of a fluorescent tumour marker. By assessing this info we hypothesize that the surgical resection can be improved, rendering better outcome for the patients.



Photon time-of-flight spectroscopy of pharmaceuticals

In collaboration with AstraZeneca R&D, Mölndal.

Optical spectroscopy is an indispensable tool for analysis of diverse media in multiple branches of modern science and technology. By observing how light at different wavelength is absorbed and scattered in a sample one can get detailed information about sample chemical composition, its structural properties and physical conditions.

In this project we are developing photon time-of-flight spectroscopy that is employed to investigate highly common materials where light scattering dominates over light absorption. This technique is especially relevant for applications in biomedicine, applied analysis in the pharmaceutical-, food- and agrochemical-industry.

Monitoring radiation therapy with optical techniques

In collaboration with Medical Radiation Physics at the Faculty of Medicine.

Radiation therapy of tumours is the most common method to battle cancer. Oxygen saturation of the radiated tissue will largely determine the effect of the radiation and thus strongly influence the treatment outcome. It is known that solid tumours hold regions with low oxygen concentration. Hence it is important to monitor the tissue oxygenation in connection to the treatment.

In this project we are developing optical instrumentation that can quantify the oxygen saturation of tissues. The instrument will be used for assessment of new treatment schemes where it will provide a deeper understanding of how the radiation therapy induces its effect on the diseased tissue.

Up-converting nanoparticles for imaging of cancer

In collaboration with Genovis AB, Lund.

The pharmaceutical industry as well as medical research uses a large number of animal experiments. There is a strong incentive to restrict these experiments, and we are developing a technology that could dramatically contribute to this. The technique is based on the unique characteristics of so-called up-converting nanoparticles.

In this project we are developing this technology to allow imaging of live animals when screening drugs, thereby enabling a substantial reduction of the number of animals used in the screening candidate pharmaceutical drugs and in the development of medical research and technology.

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