NanoIn: Evaluation of anticancer nanodrugs with Brillouin light scattering

Laboratory : Institut Lumiere Matiere
In Cooperation With : LAGEPP
Level : M2
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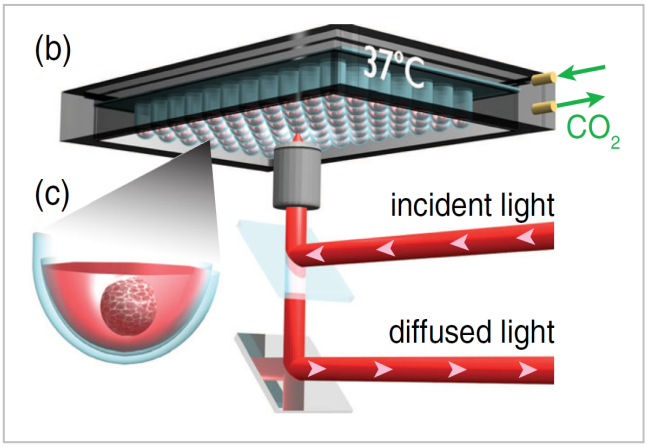
Keyword(s) :

Scientific Context :



BLS setup and zoom-in on a MCTS

Recently, advances in the field of nanomedicines have offered new opportunities to improve the effectiveness of cancer treatments. However, only few nanomedicine solutions reach clinical stage, mainly because of a poor knowledge of the biological barriers they have to cross in tumors. In order to simulate these barriers we propose to use an innovative model, the multicellular tumor spheroids (MCTS), resulting from the spontaneous 3D aggregation of cancer cells. This system allows recapitulating the characteristics of real tumours in the lab. The objective of this project is to quantify in vitro the penetration and diffusion of different nanomedecines in MCTS using an innovative microscopy technique. BLS setup and zoom-in on a MCTS The in-depth distribution of the efficacy of nanomedicines will be studied with a non-invasive quantitative microscopy based on the inelastic scattering of light (Brillouin scattering, BLS) developed at the ILM. BLS microscopy allows the production of label-free images, with a contrast based on tissue rigidity with micrometric resolution. Different types of nanoparticles will be studied to study the influence of their composition, size and surface charges on in-depth efficacy in MCTS. These nanosystems will be loaded with model active compounds such as 5-fluorouracil (5-FU) and oxaliplatin already used clinically for their activity in colon cancer.

Missions :

The objective of this internship will be to 1) adapt the existing BLS microscope to accommodate the MCTS samples, 2) take BLS images of the MCTS subjected to various nanodrug therapies designed in the laboratory by our collaborators and 3) analyse the data. The student will have to carry out the necessary optical assembly and implement the acquisition on biological tissues models. This work will be supported by the expertise in photonics of the host teams. Finally, she/he will have to interact with the other students involved in the project on the pharmacology side to interpret the results, with the guidance of the collaborative team. Local collaborative network : The student will work at ILM in the Biophysics and Luminescence teams. She/he will be supervised by Thomas Dehoux and Jérémie Margueritat. The pharmacology part (sample preparation and data interpretation) will be developed by the team of our collaborator, Giovanna Lollo from the team GePharm at LAGEPP.

Outlooks :

Possibility of a PhD: yes

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