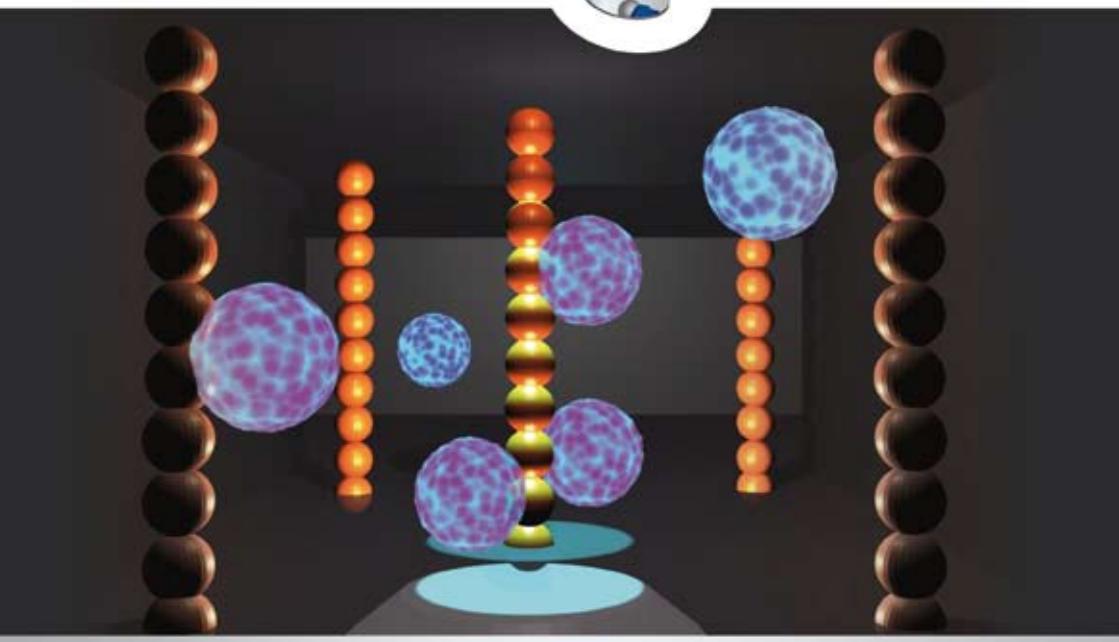
CAMINEMS



Integrated Micro-Nano-Opto Fluidic systems for high-content diagnosis and studies of rare cancer cells

A European Project supported through the Seventh Framework Programme for Research and Technological Development

Objectives

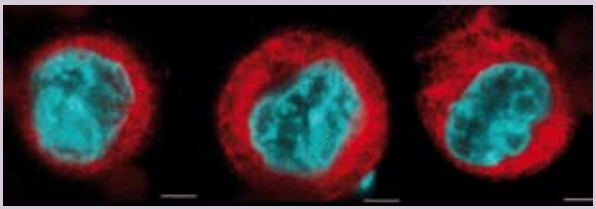
The CAMINEMS project aims at developing a new technology to sort, characterize and study rare cancer cells, mainly circulating tumour cells (CTC).

The instrument will combine:

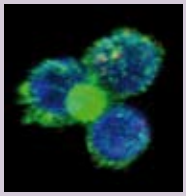
- a nanoparticles-based multiscale microfluidic system, able to capture rare tumour cells with a high yield, and
- optical nano-observation and cell culture tools allowing the application of elaborate multi-biomarkers typing of these cells, and their study by cell biology methods.

Due to its microfluidic nature, our system is ideally suited to the development of minimally invasive sampling methods reducing risk and discomfort for patients.
It will improve the power of CTC screening for treatment orientation and follow-up, in strong synergy with personalised medicine strategies. Finally, the CAMINEMS technology will also facilitate forefront research on the metastatic process and the development of new drugs.

High resolution images of tumour cells, with nucleus labelled in blue and cytokeratin cancer cell biomarker in red

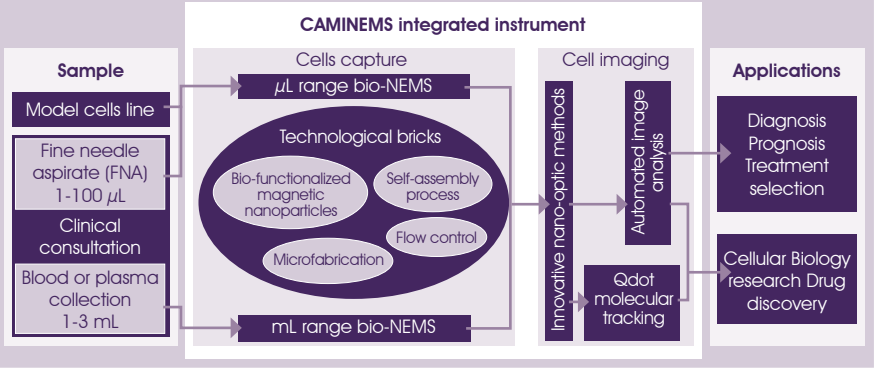


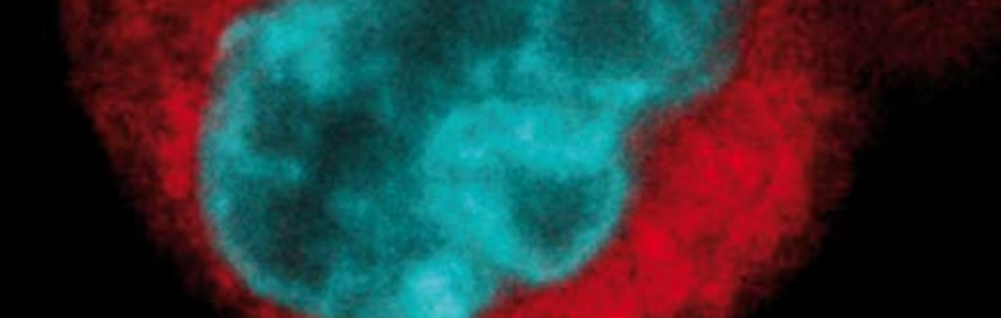
Multimarker 3D imaging for cancer diagnosis



Platform for magnetic field control

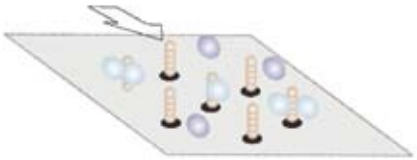
Interrelations of technologies/tasks





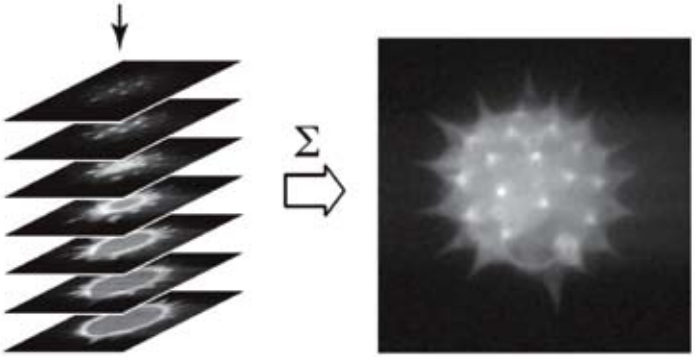
Context

About 90% of cancer mortality today is associated with metastases. These metastases are due to a small number of circulating tumour cells (CTC), which escape the primary tumour, travel in the blood, and contaminate distant organs in multiple locations. In the process, these CTC often undergo modifications that make them more resistant to treatment than the primary tumours. Being able to characterize and study them would thus be essential for treatment optimization, but so far their rarity (typically one per ml blood) has limited such studies.

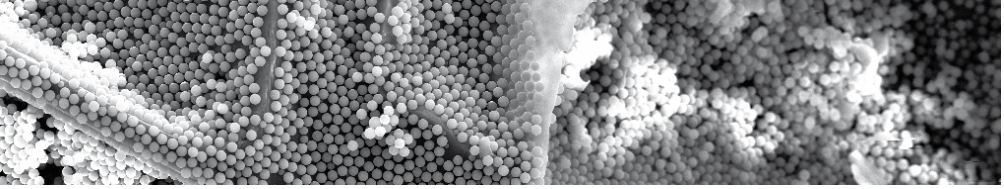


Scheme of the Cell capture technology.

- ***Orange:*** *magnetic particles organized in microcolumns and functionalised with antibodies.*
- ***Black:*** *regular array of magnetic dots.*
- ***Light blue:*** *cells of interest.*
- ***Purple:*** *negative cells.*



Principle of extended depth of focus imaging by optical sectioning (applied here to a fluorescent pollen grain)



Consortium

Acknowledgement

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CAMINEMS

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