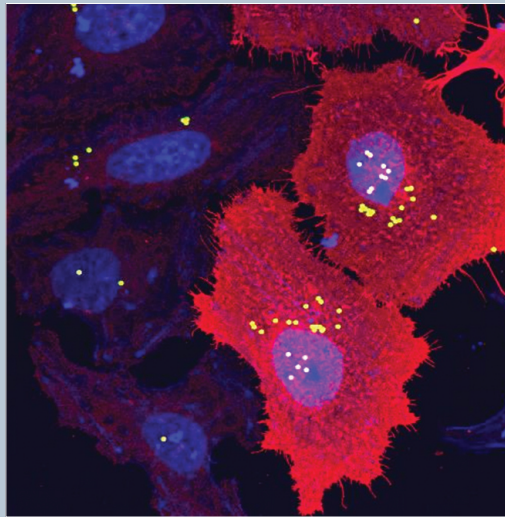


Molecular diagnostics and imaging

IMEC develops techniques for the in-vivo detection of for example cancer cells by new molecular imaging techniques (and combined therapy) and in-vitro detection of disease markers in for example blood samples by new biosensor concepts.

The main objectives of this research are:

- *Synthesis and functionalization of nanoparticles*
IMEC studies the use of nanoparticles (gold and magnetic) to be used as in-vivo labels that report on the presence of a tumor or on molecular pathways in cells. Functionalized nanoparticles can also be used to enhance the contrast of MRI scans and for targeted therapy (hyperthermia or optical-based hyperthermia). Advanced techniques (chemically from solution, chemical vapor deposition, ink-jet printing) are used for particle synthesis. Functionalization of the particle surface is necessary to create the right properties (e.g. water solubility) and the desired binding capacities. IMEC uses silanes and thiols for particle functionalization.
- *Develop lab-on-chip technologies*
Magnetic-particle based biosensors and plasmon-resonance based biosensors are developed to measure extremely low concentrations of disease markers in blood samples. Next to these detection devices, a technique for controlled manipulation of magnetic beads is worked out. These are the building blocks for true lab-on-chips with sample preparation, isolation and quantification of the disease markers on one single chip with microfluidics.
- *Develop intelligent pores for molecular diagnostics*
Structures based on nanotechnology are being combined with nanofluidics and being developed to analyze DNA and screen for proteomic biomarkers of Alzheimer's disease, heart disease, cancer...



Yellow spots indicate the site where functionalized particles (1 μm) have bound to cell membrane receptors. These particles allow studying cell processes at the molecular level. (research done in collaboration with Prof. Dr. W. Anaert (VIB/K.U. Leuven)).

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