SEMINAIRE ISMO

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Nanobiophotonics for multiplexed diagnostics

Applications based on Förster Resonance Energy Transfer (**FRET**) play an important role for the determination of concentrations and distances within nanometer-scale systems *in vitro* and *in vivo* in many fields of biotechnology. Using **time-resolved optical spectroscopy and microscopy** for the analysis of FRET systems offers several advantages concerning sensitivity and specificity. Two extraordinary materials concerning time-resolved FRET are **luminescent lanthanide complexes** (LLCs) and **semiconductor quantum dots** (QDs). Both are frequently used as FRET donors in combination with organic dyes, fluorescent proteins etc.

However, their combination as LLC-QD donor-acceptor pair gives access to unique optical properties, which makes this FRET-pair an incredible tool for **highly sensitive multiplexed diagnostics**. The presentation will start with a short introduction to FRET, lanthanide complexes and quantum dots and their possible applications and will then focus on recent research results concerning LLC and QD-based FRET in combination and with other FRET partners. Time- and spectrally-resolved simultaneous measurement of five FRET sensitized QDs using LLCs as FRET-donors within a biotin-streptavidin bioassay with sub-picomolar detection limits as well as multiplexed specific lung cancer immunoassays (for the distinction of small cell and non-small cell lung cancer) will be presented. Moreover, the suitability of the FRET nanoprobes for size and shape determination of quantum dots under physiological conditions and for high-resolution multiplexed conformational and functional studies in cell imaging will be demonstrated. The results also provide insight into energy transfer mechanisms from LLCs to QDs, which are assumed to be of Förster type (r^{-6} distance dependence) although the theory appears inauspicious for this system.

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Mardi 24 mai 2011 à 11 h 00
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