

Monolithic optofluidic chips: from optical manipulation of single cells to quantum sensing of fluids

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The frontier of optical measurements in microfluidic chips is striving to overcome the current resolution limits. In this talk two different aspects of ultrafine optical measurements will be discussed, targeting different biomedical applications. In cell analysis, ultrafine measurements means single cells resolution, which allows one to unravel the biological complexity hidden in nominally homogeneous populations. In concentration measurements of proteins in fluids, ultrafine measurements means extracting the maximum amount of information from each photon interacting with the fluid, by exploiting quantum states of light. Taking advantage of the versatility of femtosecond laser micromachining, monolithic optofluidic devices are produced, which combine optical waveguides and microfluidic channels. Biologically relevant examples of both single cell manipulation and quantum sensing of fluids will be presented and perspectives of further integration of functionalities discussed.