

EuroTechTalk #1

» Nanophotonic and single-molecule biosensing at EPFL and TU/e «

In this EuroTechTalk we will present nanophotonic and single-molecule biosensors that are being investigated at TU/e and EPFL, including research in the CONSENSE program, a European network that focusses on continuous biosensing technologies for personal health.

Prof. Prins will present biosensors for the continuous monitoring of biomolecular targets, based on measuring Brownian motion of microparticles. The sensors employ particles on a surface, where the particles as well as the surface are provided with specific binder molecules. Motion traces are recorded of hundreds of particles, each revealing digital binding and unbinding events. The events are statistically analyzed and related to the biomarker concentration in solution. Large molecules (proteins, nucleic acids) and small molecules (oligonucleotides, metabolites) are being measured across a wide range of concentrations (picomolar to millimolar). Applications in industry and healthcare will be discussed, for early warning and closed-loop control based on real-time biochemical data.

Prof. Altug will present nanophotonic technologies for optical biosensors, bioimaging and spectroscopy, based on nanofabrication, microfluidics, surface chemistry and data science. Nanoplasmonic and dielectric metasurfaces are developed for increased light-matter interaction in targeted spectral ranges including visible, near-infrared and mid-infrared. Nanofabrication methods allow high-throughput and low-cost manufacturing of nanophotonic structures and integration with microfluidics for automated sample handling. Data science tools with hyperspectral imaging and spectroscopy enable high device performances. Recent progress will be presented as well as prospects for applications.

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