

Master thesis

Topic: Electrical and optical biosensors

The laboratory “[Transport at Nanoscale Interfaces](#)” at Empa Dübendorf and the laboratory “[Advanced Fibers](#)” at Empa St. Gallen are looking for strong candidates with a background in biomedical engineering, physics, electrical engineering, biochemistry or a related field for a master thesis research project.

Studying the interactions between biomolecules is crucial for the fundamental understanding of biochemical processes, drug development, and future medical diagnosis. Transducers which directly convert chemical interactions to electrical or optical signals are a promising tool, as they can be fabricated at low cost and integrated into multiplexed systems. To enable the specificity of such systems, understanding the processes at the liquid-solid interphase is of great interest.

In this project, you will develop a sensor based on hybrid transducing, i.e. combining optical sensing based on transmission interferometric adsorption sensors (TInAS)^[1] and electrical sensing based on Ion-sensitive field-effect transistors (ISFETs)^[2] to study the adsorption of molecules onto surfaces. Your work will include micro fabrication of the sensor devices in a cleanroom environment as well as adapting a measurement setup for the combined optical and electrical readout. Further, the project will involve planning and execution of first experiments to study the interaction of proteins with immobilized ligands on the sensor surface.

You should be highly motivated to work on a multidisciplinary research project in contact with different research groups. For applications (with motivation and CV) or any further questions please contact Mathias Wipf (mathias.wipf@empa.ch).

References

- [1] M. Heuberger and T. Balmer, *Journal of Physics D: Applied Physics* **2007**, *40*, 7245-7254.
- [2]. See e.g. M. Wipf et al., Label-Free FimH Protein Interaction Analysis using Silicon Nanoribbon BioFETs, *ACS Sensors* **2016**, *1* (6), 781–788.