

PhD thesis

Topic: Photonic sensing technologies and systems for biochemical / life sciences applications

The goal is to build a bio-sensor system platform prototype leveraging the researched technologies, proposed system/sensing principle and selected bio-chemistry.

In cooperation with: **ams AG**



Objectives/deliverables:

Year 1 (estimate)

- Research on optical sensing of biochemical reactions for life science / medical applications using a combination of microfluidic, photonic (e.g. MZI) waveguides, light sources / detectors, sensing principles, algorithms, etc technologies
- Comparison/benchmarking of plausible sensing system concepts, architectures and solutions
 - The intention is to use ams SiN photonic waveguide technology
 - Optical end-to-end signal path / system optimization and trade-offs
 - System modeling and architecture, solution costs

Year 2 (estimate)

- Research on photonic sensing elements/devices/materials and bio-material interfaces.
 - Optical design and characterization of photonic PIC sensing devices
- Research on Technology building blocks required for the system
 - Biocompatible microfluidic cavity materials and microfluidic cap adhesive materials on photonic integrated circuit wafer

Year 3 (estimate)

- Prototype of a sensor system platform capable to measure and identify bio-chemical substances (Year 3)
 - Implementation of the proposed system and selected biochemistries

Graz University of Technology
Institute of Electrical Measurement and Sensor Systems

Additional:

- ams PHON001 SiN waveguide technology
- Collaboration with possible biomarker research centers / companies

Organizational matters:

- Contractual partner: ams AG
- Duration: 3 years – fulltime employment contract

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