Universität Stuttgart

Institut für Nano- und Mikroelektronische Systeme

In Kooperation mit dem
Institut für Mikroelektronik Stuttgart
Stiftung des bürgerlichen Rechts

Arbeitsbereich:
Systeme

Ausrichtung:

☒Entwicklung & Simulation
☐Layout
☐Charakterisierung
☒Programmierung
☒Hardware-Entwicklung
☒Messtechnik
☐ Machbarkeitsstudie

Studiengang:

☒Elektro- und Informationstechnik
☒Software Engineering
☐Physik
☐Biologie
☐Maschinenbau
☐Medizintechnik

Einstieg:
ab 01.05.2024

Umfang:
Ca. 3 Monate

Vorkenntnisse
☐digitale Schaltungstechn
☐analoge Schaltungstechn.
☐SPICE Simulation
☐Layout-Erfahrung
☒ Programmierkenntnisse
☒elektr. Messtechnik
☐Mechanikkenntnisse

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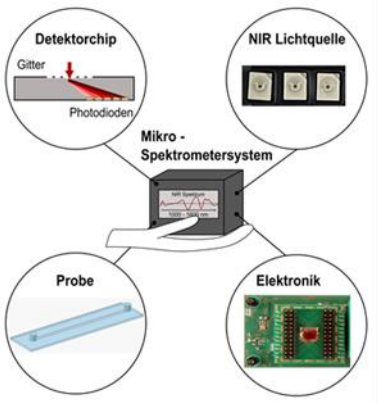
Student project or Master thesis

Micro-spectrometer system for near-infrared analysis

Motivation

Today many analytical procedures rely on highly expensive and inflexible spectroscopy solutions in the biomedical field. The miniaturization of such systems (lab-on-chip) would enable cost-efficient, real-time on-site sensing in for example the biomedical research and the food industry. This motivates the development of a novel micro-spectrometer system for the near-infrared (NIR) range. A spectrally sensitive photonic chip has already been developed at IMS, which is to be used in a micro-NIR spectrometer system. Based on previous work the scope of this topic, is to develop a miniaturized measuring system for analyzing a sample with NIR spectroscopy and the realization of the individual components.

Task



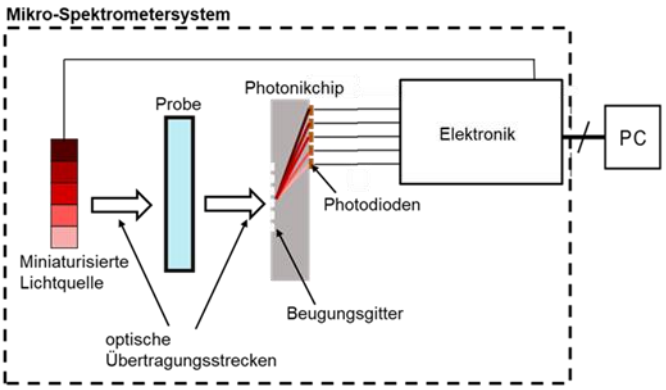


image: schematic system concept

1. Literature research on NIR spectroscopy and related data processing techniques and calibration procedures.
2. Optimization of the optical system design using the existing optical detector
   - Realization of a miniaturized light source and driver circuit
   - Realization of the optical interfaces
   - Adaptation of the sample
3. Adjustment of graphical user interface and control software
   - Implementation of different calibration procedures
   - Extension of the user interface for various analytical applications
4. Carrying out and evaluating measurements

Requirements

C/C++ programming, desirable would be first experiences in technical optics