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

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