Design and Development of an Optical Coherent Tomography System (OCT) for Depth Characterization

Background People with type 1 diabetes need to monitor their blood glucose levels frequently to adjust their insulin doses. Most current sensors use enzyme based sensing that has limitation when it comes to lifetime and the possibility of multiplexing. We aim to develop the first optical fiber based sensor that overcomes these difficulties, hence capable of real-time multiplexed multi-metabolite sensing.

Aim To design and develop an OCT system that can measure coating thickness with high axial resolution, including hardware, and software.

Materials and Methods: The project will focus on developing, calibrating and validating an OCT system. The student will integrate optical components (including SLD light source, detectors, fibers) into a bench-top setup. After the readiness of the physical setup and software development, system calibration shall take place with reference samples (krypton lamp, calibration target). The master student will be continuously supervised and supported by PhD students from the group.

Figure 1 OCT System (concept)

Nature of the Thesis:
Literature research: 10%
Experimental: 50%
Programming: 30%
Documentation: 10%

Requirements:
Motivation to work in a multidisciplinary team
Interest in experimental work
Familiarity with optics (lenses, filters, fibers), background in spectroscopy is an advantage
Familiarity with at least one of the following programming languages: Python, MATLAB, C++, R.
Familiarity with microcontrollers is an advantage

Don't meet every single requirement? We still encourage you to apply, we value diverse experiences and perspectives.

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