

Erasmus Placement Project 2022-2023

Multiplexed Fluorescence Lateral Flow Optical Detection of Protein Biomarkers to Monitor Heart Failure Diseases

Cardiovascular diseases are the leading causes of mortality worldwide. Among them, hypertension and its pathological complications pose a major risk for heart failure and stroke. Approximately 1.1 million people in Norway live with established cardiovascular disease or a high risk of developing the disease. Although significant progress has been made in detecting cardiovascular disease-specific biomarkers, it is still unable to predict candidates at risk efficiently. Since the physiological range of these biomarkers is very low, it is essential to detect these biomarkers at very low concentrations in blood.

Biosensors have a prominent role in developing point-of-care diagnostic instruments for a more effective solution to the early-stage detection of cardiovascular diseases. As a result, there is a high demand for portable, rapid, and low-cost biosensing devices to detect heart failure biomarkers. The integration of biosensors with a microfluidic platform with multiplexed capabilities is a preponderant approach for the simultaneous detection of biomarkers quickly and with accuracy for patient care.

This project aims to develop a lateral flow assay biosensor for multiple biomarkers to measure the biomarker concentration correlated with the worsening of heart failure. Whereas that sensitivity and specificity are crucial for detecting low biomarker concentration, the R&D challenges are related to the development of an optofluidic system for the detection of the biomarkers (see Fig. 1). The system involves the interaction of specific fluorophores to quantitative fluorescence detection by an optoelectronic system.

The task of the candidate to master is to optimize the design of an optofluidic system and develop an optoelectronic sensing approach to biomarkers passing a specific area in the microfluidic channel.

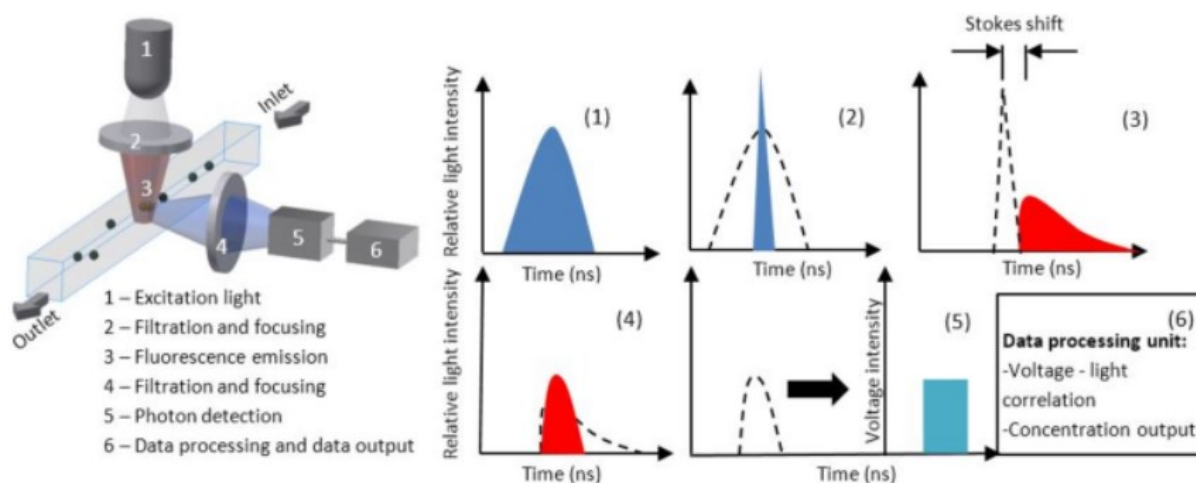


Figure 1: General fluorescence detection scheme (orthogonal configuration).

Useful information:

The project is financed by the company SensoVann AS, in Norway. The candidate joins the project via Erasmus+ Placement. The company gives the opportunity of financial compensation in addition to the Erasmus scholarship in a similar amount as given by the Erasmus program. For

more information regarding the company and conditions of application, do not hesitate to contact cco@sensovann.com and Professor Paulo André email.: paulo.andre@tecnico.ulisboa.pt