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Functionalization of Smartphone-assisted Surface Plasmon Resonance Sensors

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Abstract—*Point of care testing (POCT) enables rapid diagnostics and real-time monitoring of health-related parameters. POCT devices detect biomarkers associated with specific diseases. Within this context, lateral flow assays are most used POCT devices, however, their sensitivity is not sufficient to detect low abundant biomarkers.*

Currently, different techniques are being developed to increase the sensitivity of POCT devices. Surface Plasmon Resonance (SPR) is an optical technique allowing to measure biomolecules through refractive index changes in the proximity of a noble metal layer. Therefore, the surface of the sensor, which is in most cases composed of gold has to be functionalized with bioreceptors such as antibodies or aptamers. However, due to the size and costs of SPR devices, their application is currently limited to laboratory environments and can not be applied for POCT. In 2015,the first Fiber Optic SPR (FO-SPR)sensor that can be interrogated with a Smartphone was reported as a proof of concept. An optical fiber was connected to the flash light and the camera of the Smartphone to be used as incident light and detector respectively. This novel sensor system holds the potential to combine sensitivity of SPR with portability required for POCT. The aim of this research project is the modification of the FO-SPR sensor with antibodies for sensitive detection of biomarkers. As a first model, detection of C-reactive protein (CRP), which is a sensitive marker for inflammation, will be realized. Objective of this work is to modified the gold surface with self-assembled mono layers (SAM), Functionalization via coupling of antibodies to the SAM and Characterization of the resulting SPR sensor.