

Rapid point-of care readout system to quantify cytokines based on three-dimensional bottle microresonators

Swen Marke, IfU Diagnostic Systems GmbH

The PoC-BoSens project was conceived to exploit photonics to study label-free, protein-protein interactions. As outlined in the proposal, the chosen application is a rapid point of care readout system to quantify cytokines. Cytokine release is a characteristic in assays based on cell-mediated immunity (CMI), a method that has been used for the development of commercially available diagnostic tests for tuberculosis and Q-fever.

The diagnostic readout in these assays is the quantitative determination of released cytokine biomarkers in a fast (<15 minutes), reliable and label-free sensing microsystem. This approach will allow a rapid and early detection, thereby enabling the fast treatment and eliminating side effects and associated costs.

The technology behind the PoC sensing platform will be defined by the combination of an array of photonic transducing elements based on novel three-dimensional bottle microresonators (3D-BMRs) and a microfluidic system for transportation of test samples on the transducing elements. The BMR is a class of resonant structures with high sensitivity, a high grade of compactness, and multiplexing capabilities. The complete integration on a chip of a BMR array will allow the development of sensitive (pg/ml level), fast, portable and low-cost photonic platform for PoC testing which might easily be used by untrained personnel, and has the potential for implementation in field medical units, crisis centres and transit screening.

The focus of the presentation is the fast readout system with laser driver and temperature controller.