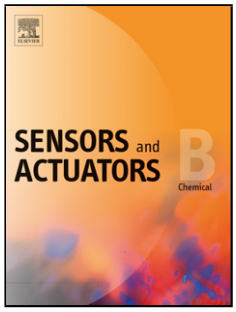

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Detection of tuberculosis in patients with the use of portable SPR device.

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Research highligths

- A possibility to detect whole Tuberculosis bacteria by SPR technique has been studied.
- POC SPR device has been designed and built.
- The SPR device was proven to work as it detected bacteria both in cultures and sputum samples.

Abstract

Tuberculosis (TB) is still one of the important causes of death worldwide. Its detection is challenging and new tools for TB diagnostics are highly needed. In this work, we investigated a possibility of using surface plasmon resonance (SPR) phenomenon in detection of TB bacteria in sputum. For this purpose we designed a portable SPR apparatus. We compared its performance with a standard desktop SPR platform designed to work in laboratory by measuring response to Ag85 - TB secretory protein. We examined samples of suspended *Mycobacterium tuberculosis* cultures and sputum samples of TB patients. The device was able to detect M. *tuberculosis* secretory protein (Ag85) in concentration of 10 ng/ml which was comparable to the desktop SPR equipment. It has been also able to detect TB bacteria cultures in concentration of $1*10^4$ cfu/ml with no significant interfering response from two other bacteria species. Finally, detection of bacteria in sputum of confirmed tuberculosis patients has been demonstrated.

Keywords: Surface Plasmon Resonance, Point-of-care detection, Tuberculosis

1. Introduction

Tuberculosis (TB) is an airborne infectious disease caused by bacilli *Mycobacterium tuberculosis* (MTB) [1]. It killed millions of humans over the past centuries and is still among the leading causes of