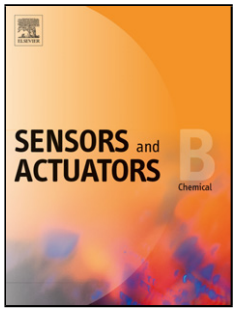

Title: Label free ultrasensitive optical sensor decorated with polyaniline nanofibers: Characterization and immunosensing application

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<AT>Label free ultrasensitive optical sensor decorated with polyaniline nanofibers: characterization and immunosensing application.

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<ABS-HEAD>Highlights► *In situ* synthesis of polyaniline (PAni) was done on uncladed optical fiber probe. ► Antibodies were immobilized on PAni modified fiber to develop an immunosensor. ► Conformational changes of polyaniline due to binding of protein molecules alter the optical evanescent wave absorbance characteristics of PAni. ► Initial studies show that this immunosensor can detect as low as 5 ng/ml (37 pM) of immunoglobulin.

<ABS-HEAD>Abstract

<ABS-P>Conducting polymers have been studied for decades, and the use of such polymers in sensing applications has been explored extensively. Most of these have exploited the fact that protonation or de-protonation of these polymers, have an effect on their conductivity and conformational structure. We demonstrate a phenomenon, i.e. changes to the spectroscopic properties of conducting polymer polyaniline (PAni), without explicit protonation or de-protonation, due to immunological interactions happening on the surface. To explore the reason behind these spectroscopic changes, PAni was analyzed using Hydrogen Nuclear Magnetic Resonance (HNMR), and Fourier Transformed Infrared (FTIR) spectroscopy. It was further characterized using Scanning Electron Microscope (SEM) imaging and Selected Area Electron Diffraction (SAED). These optical alterations of polyaniline have been utilized to develop a simple, cost effective, yet highly sensitive immunosensor. Human Immunoglobulin G (HIgG) was immobilized on the polyaniline coated fiber-optic probe using cross linker molecules, and goat anti-Human Immunoglobulin G (GaHIgG) was used as the analyte. This study