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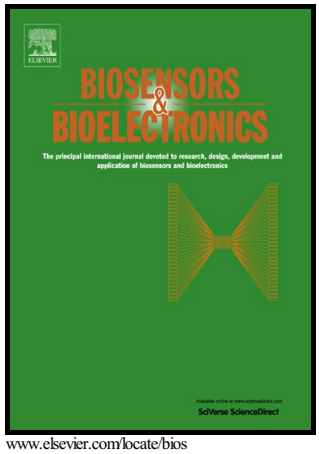

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Abstract

A new type of sensing protocol, based on a high precision metrology of quantum weak measurement, was first proposed for molecularly imprinted polymers (MIP) sensor. The feasibility, sensitivity and selectivity of weak measurement based MIP (WMMIP) sensor were experimentally demonstrated with bovine serum albumin (BSA). Weak measurement system exhibits high sensitivity to the optical phase shift corresponding to the refractive index change, which is induced by the specific capture of target protein molecules with its recognition sites. The recognition process can be finally characterized by the central wavelength shift of output spectra through weak value amplification. In our experiment, we prepared BSA@MIP with modified reversed-phase microemulsion method, and coated it on the internal surface of measuring channels assembled into the Mach-Zehnder (MZ) interferometer based optical weak measurement system. The design of this home-built optical system makes it possible to detect analyte in real time. The dynamic process of the specific adsorption and concentration response to BSA from 5×10^{-4} to 5×10^{-1} μg/L was achieved with a limit of detection (LOD) of 8.01×10^{-12}g/L. This WMMIP shows superiority in accuracy, fast response and low cost. Furthermore, real-time monitoring system can creatively promote the performance of MIP in molecular analysis.

Graphical Abstract