EuroSciCon

EuroSciCon Conference on

Chemistry 2018

February 19-20, 2018
Paris, France

J Org Inorg Chem 2018, Volume: 4
DOI: 10.21767/2472-1123-C1-003

USING SANDWICH METHOD TO INCREASE THE DETECTION SENSITIVITY OF PROCALCITONIN (PCT) IN FIBER OPTIC PARTICLE PLASMON RESONANCE BIOSENSOR

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Septicemia is a serious disease that requires early diagnosis, and procalcitonin (PCT) serves as a diagnostic biomarker for this disease. Therefore, a rapid, sensitive, and cost-efficient platform is urgently needed for septicemia detection. The fiber optic particle plasmon resonance (FOPPR) biosensor based on the integration of gold nanoparticles and fiber optic evanescent wave may provide an ultrasensitive and rapid detection approach. Herein, an ultrasensitive sandwich strategy in the FOPPR sensing platform for PCT detection has been developed. The results demonstrate that the proposed sandwich strategy for PCT provides a wide linear response range from 1 pg/mL to 100 ng/mL and an extremely low limit of detection (LOD) of 0.28 pg/mL (0.021 pM). In addition, the sandwich strategy has advantages of convenience, low-cost, short analysis time (15 min), good specificity, acceptable stability and reproducibility. Finally, the results from the FOPPR biosensor using the sandwich strategy were compared to a clinically validated electrochemiluninescence assay (Roche cobas e411). An excellent correlation coefficient (r=0.99) between the two methods for blood plasma samples from 12 septicemia patients was achieved, indicating that the FOPPR biosensor using the new sandwich strategy has the potential to be used in actual clinical diagnosis of PCT. Furthermore, it is also potentially applicable to the detection of many other biomarkers, and thus provides an ideal technical tool for point-of-care diagnostics.

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