REVOLUTIONARY DIAGNOSTICS – NONTRADITIONAL APPROACHES FOR DEVELOPING BREAKTHROUGH CAPABILITIES AGAINST EMERGING THREATS

Simple And Fast Real-time Monitoring Wearable Cortisol Aptasensor

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The necessity of managing stress levels becoming crucial as the world is suffering from different kinds of stress especially, including the extent of pandemic, coronavirus disease 2019 (COVID-19). Cortisol, a clinically confirmed stress hormone related to depression and anxiety, affect individuals mentally and physically. However, current cortisol monitoring methods require large and complex machines, expert personnel, and long time for data analysis. Here, we present an ultralight, flexible, and wearable cortisol-detecting biosensor using silk as the biosensor substrate. Conductive polymer polyacrylonitrile (PAN) nanofibers (NFs) and the subsequent vapor deposition of carboxylated poly(3,4-ethylenedioxythiophene) (PEDOT) produced by electrospinning, was used as the sensing channel. The conjugation of cortisol aptamer to the sensing channel provided the sensing mechanism for the target molecule. The sensing test was performed with a liquid-ion gated field-effect transistor (FET) on a polyester (PET) film after transferring the silk substrate-based cortisol aptasensor. The sensor performance showed a detection limit as low as 10 pM and high selectivity in the presence of higher concentrations interference materials. This study is a solid example supporting the possibility of further application and on-site monitoring and diagnosis of numerous diseases using a naturally abundant material as a substrate for wearable, swappable, and disposable biosensors.

This research was supported by the Defense Acquisition Program Administration (ADD-911255201)
ACS Sensors 2022, 7, 99−108