Electrospun PS-PSMA Nanofiber as a New Aptasensor Platform

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We report an aptamer immobilized electrospun Polystyrene-Poly (styrene-co-maleic anhydride) (PS-PSMA) nanofiber as a new aptasensor platform for the protein detection. Herein, two thrombin binding aptamers were used as model platform for efficient detection of thrombin in a sandwich manner. The thrombin concentration was measured by fluorescence microscopy and spectroscopy where aptamers were labeled by either fluorescein dye or quantum dots. The results indicate thrombin was captured uniformly on the surface of the nanofiber. The minimum detectable concentration of this sandwich-type biosensor was up to 10 pM of thrombin with dynamic range between 0.1 nM and 50 nM when the quantum dots were used for labeling, whereas 1 nM of limit of detection with dynamic range from 10 nM to 200 nM was obtained for fluorescein dye-labeling. As the diluted human serum spiked samples with thrombin were examined to add the potential of using this aptamers-on-nanofiber, there was no decrease of sensitivity of thrombin detection at all. This aptamers-on-nanofiber system, which is competitive with other sensing platforms and clinically meaningful in terms of its detection limit, is expected to be adopted for the detection of other various targets, because of its simple and easy manipulation.