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Congress Abstract

Molecularly Imprinted Polymer Biofunctionalized Optical Fiber-Tip Quasi-Random Extrinsic Interferometer for Selective Triple-Negative Breast Cancer Cells Detection

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Introduction: The study of triple-negative breast cancer cells detection is one of the important research fields in modern biomedical engineering, due to its aggressive behavior and limited targeting options. One of the promising methods for cancer cell detection is using Molecularly Imprinted Polymers (MIPs) with polydopamine (PDA) as the primary polymer. The main idea of this combination is based on the properties of dopamine, as it shows good compatibility with cells, biomimicry, and biodegradability. By creating specific cell recognition cavities within this PDA-based MIP layer directly on the fiber surface, the platform shows high selectivity level performance.

Methods and Materials: Using bulk imprinting strategy, dopamine was polymerized under alkaline conditions, where pH was in range of 8.0-9.0. For control group, the non-imprinted polymers (NIPs) were prepared by mixing phosphate buffer solution (PBS) with PDA, while MIPs were functionalized with HCC1806 and MDA-MB231 cancer cell lines. During detection process, the response groups were divided into two categories: target and cross groups. Optical responses of these groups were determined by using fiber-optic interrogator at different cell concentrations and the morphology was evaluated via scanning electron microscopy.

Results and Conclusion: The provided optical fiber technology shows great detection, stability, and biocompatibility levels for novel technology and has a great potential for further development towards the label-free detection platforms' integration.

Keywords: Biosensing Techniques; Polymers; Cell Line; Triple Negative Breast Neoplasms