Printed biosensors from carbon nanotube thin-film transistors and non-fouling polymer interface layer for label-free, electronic sensing of disease markers in whole blood

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Value Proposition

The future of diagnostics is in rapid point-of-care detection. The proposed technology is a single-step biosensor that allows for quicker and simpler disease-associated analyte detection.

Technology

We have developed printed biosensor capable of detecting target, disease-specific analytes in whole blood in a single-step process using electrical transduction. Using a fully printed carbon nanotube transistor, passivated using a non-fouling polymer layer, the specific, label-free biosensor operates based on the formation of sandwich antibody formation in the presence of a target analyte. The device is highly customizable as all active layers (including the transistor and biological reagents) are printed using high-throughput techniques such as inkjet and/or aerosol jet printing. We have shown that this device is capable of electrically detecting specific disease markers in whole blood or serum with no rinsing or reagent mixing, proving the device to be a true point-of-care (POC) diagnostic tool. The electrical detection of the assays provides many benefits including ease of use and more immediately known test results.

Advantages

Current immunoassays and whole blood diagnostics often require additional washing or labeling steps, making them not truly point-of care. This technology is a single-step biosensor. Further, the device is highly customizable and made using high throughput techniques such as inkjet and/or aerosol jet printing.

Publications

- US Patent App 16/305,696

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