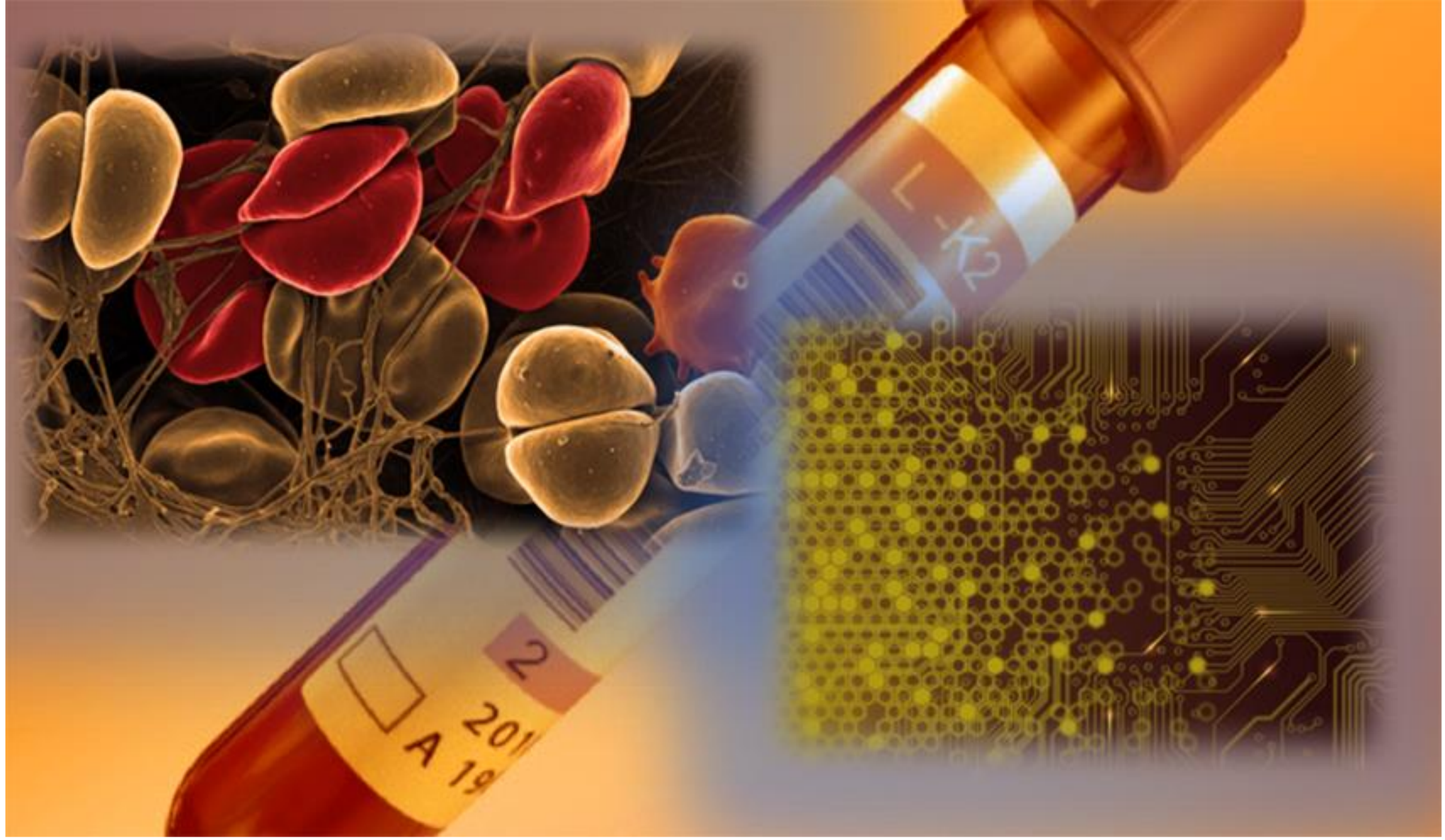

INNOVUS

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A Nano-Biosensor for Cancer Screening

UNIVERSITEIT STELLENBOSCH UNIVERSITY

A nano-biosensor to detect amyloid proteins in blood with high specificity, to screen for and/or follow the progression of cancer and other inflammatory diseases

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BRIEF DESCRIPTION

The global cancer burden is increasing rapidly in developing countries where populations continue to expand. The lack of resources and basic health infrastructure means that most people in developing countries have no access to cancer screening, early diagnosis, treatment or palliative care. Many patients are frequently sent home to die without comfort or palliative care. It is therefore of utmost importance to develop an affordable, reliable, accurate and sensitive cancer biomarker device to detect cancer at an early stage.

Although disease initiation and progression result from genetic and epigenetic changes, it is now well known that inflammation (hallmark of cancer) plays a major role in tumour development and progression (Hanahan and Weinberg, 2011). One serum marker, which is central in the development of inflammation and is associated with inflammatory linked diseases such as cancer, is serum amyloid A (SAA). Currently, SAA levels are detected using enzyme-linked immunosorbent assays (ELISA) and mass spectrometry. These methods are not always that sensitive, and are expensive and time consuming. Scientists world-wide are searching for a reliable, accurate and sensitive cancer biomarker and a point-of-care device so that oncologists can make immediate decisions about the type of treatment required.

UNIQUE CHARACTERISTICS

Tumour markers with absolute specificity are not available and a rapid diagnostic method does not exist.
This nano-biosensor is novel and more sensitive (detects antibodies at pictogram levels) and diagnosis is complete in less than a minute.

VALUE PROPOSITION/BENEFITS

The nano-electric biosensor will allow medical practitioners to diagnose inflammatory responses, at the early onset of cancer much sooner, and much cheaper. It will also allow practitioners to follow the progression of the disease during treatment at a fraction of the current costs. Such a tool could be used in rural Africa and the rest of the globe and will fundamentally change early disease diagnosis as we know it.

TARGET MARKET

All entities in countries who are affected by cancer such as private and state hospitals, government clinics, health care practitioners and mobile clinics.

TECHNICAL DESCRIPTION

The nano-biosensor circuit and nanostructure interface will be designed to allow the detection of SAA from a single drop of blood. Electronic signals emitted from the biosensor are then amplified and analysed by using specifically developed software.

Two different sensing mechanisms will be developed – optic nanofibers and carbon nanofibers. Amyloid-specific binding molecules will be used as a sensing molecule to detect amyloid proteins. These molecules have a high specificity for amyloid proteins and emits a fluorescent signal at a specific wavelength.

PRINCIPAL RESEARCHERS

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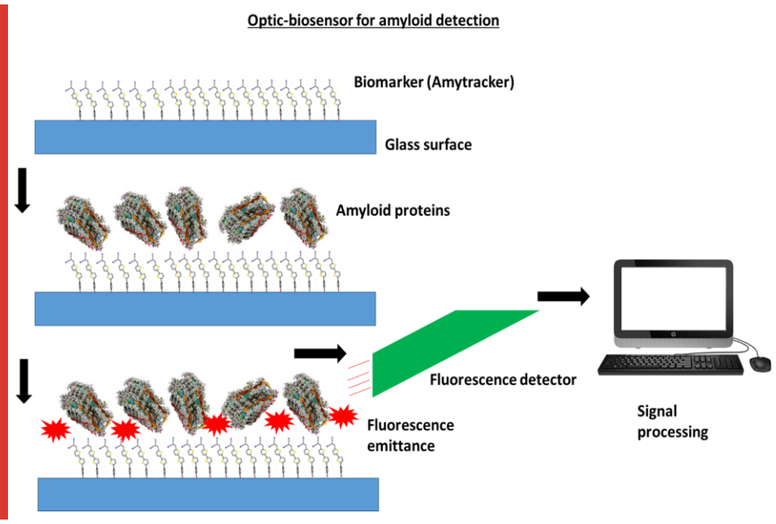
Affordable, reliable, accurate and sensitive cancer biomarker device to detect cancer at an early stage.



INNOVATION STATUS

2 British patent applications have been filed for this innovation:

1. A Method of Detecting Inflammation – British Patent Application No. 1718704.8A
2. A Cancer Nano-Biosensor – British Patent Application No. 1718708.9