

Intel® BioElectronic Chip

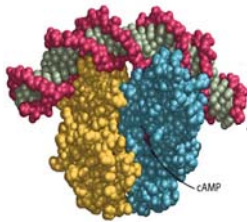
BioElectronic Label free Sensor for Biomarker Detection

(1)

Goal: Enabling Personalized Medicine (PM) through the use of a BioElectronic diagnostic device based on silicon

The Challenge

'Bio world'



How to convert information stored (encoded) in the Bio world into the Silicon world

'Silicon world'

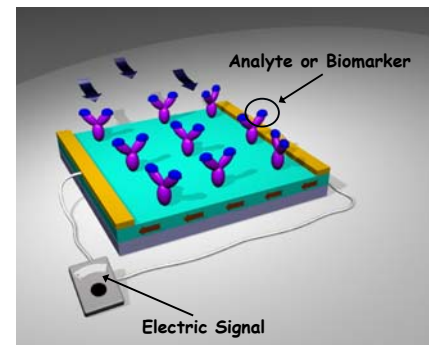
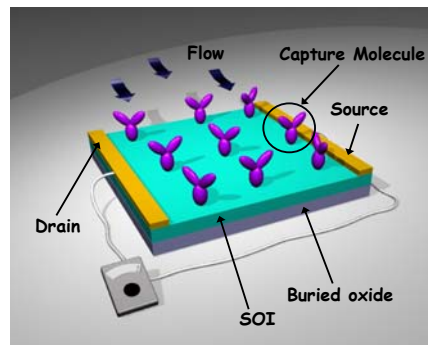


Information flow

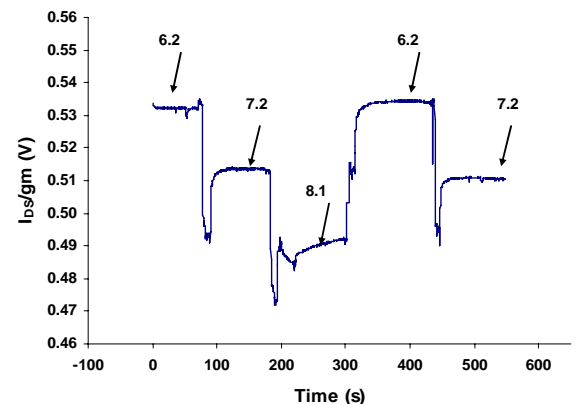
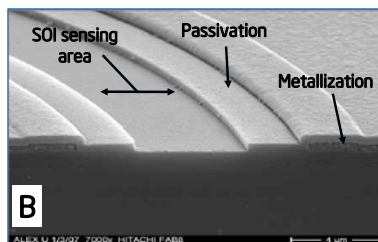
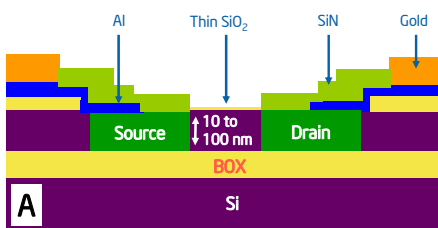
The solution: Bio-Silicon hybrid systems

BioElectronic sensor

1. Significant simplification of diagnosis process by eliminating the need for probing molecules - 'Label-free' diagnostics
2. Develop a general purpose platform that is stable and sensitive enough for a large variety of bio-molecular interactions



Device Configuration and performance



Schematic cross-section of sensing device (A) and Side view SEM image (B). Devices are based on thin 10-100 nm SOI layer covered by native oxide. The sensing area of the 'gate' is shown in the middle bordered by the passivation layer on both side.

Sensitivity of a depletion type (n-type) transistor to pH variations. The figure demonstrates I_{DS}/gm under different pH values (6.2, 7.2 and 8.1) ($V_{GS} = 0.4V$ and $V_{DS} = 1V$).

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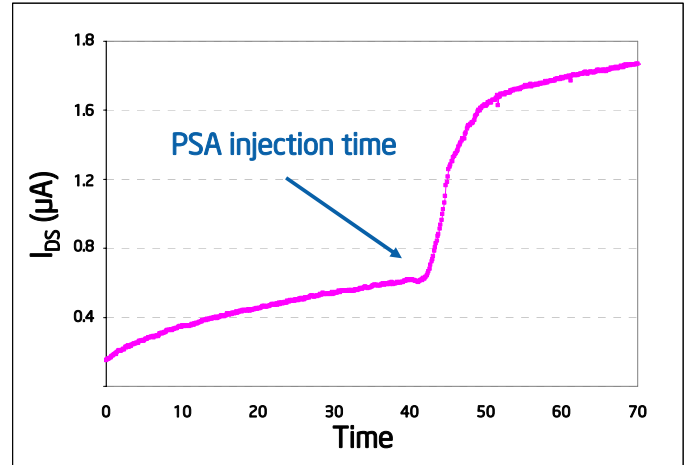
BioElectronic Label free Sensor for Biomarker Detection

(2)

Biomarker detection

Intel® BioElectronic chip will be used to detect diverse biomarkers (indicators of clinical status) in single- and multiplexed configurations.

This example demonstrates the detection of PSA (Prostate Specific Antigen), a marker for prostate cancer.



Potential applications for the BioElectronic chip -

Three basic concepts are presented:

The 'module' concept

This will include vary small disposable sensor that will be connected externally with Intel® MCA for example

BioElectronic chip will be packed into a 'credit card' type disposable accessory



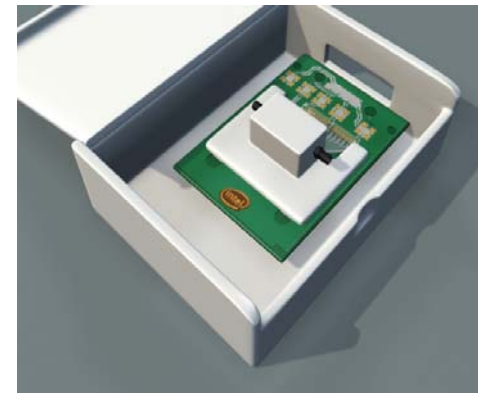
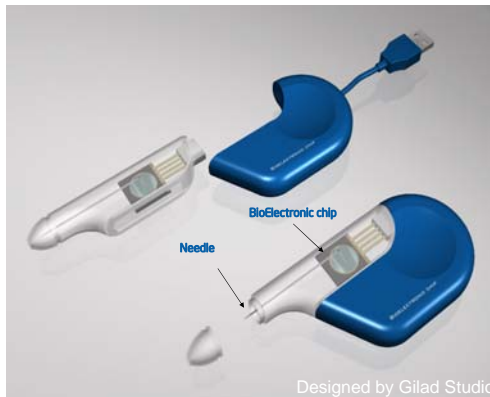
The 'portable' ('pocket size') concept

This device could be made in two configurations:

- Self sustaining (including screen display)
- Versatile connecting device (PC, Cell phone...)

The 'bench-top' concept

At the doctor's office



Intel® (MCA)

The BioElectronic research group (from left to right)

Udi Virobnik, Amihod Doron, Ariel Cohen, Ilan Levy, Andrew Machauf, Moran Horesh, Daniela Ullien (standing), Mordehay Beraha.

The research group is part of Intel Research Israel lab.

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