EmStat OEM showcase: MiSens

The PalmSens Emstat OEM is an integrated part of TÜBİTAK BİLGEM's MiSens fully automated next generation electrochemical biosensor device.

TÜBİTAK BİLGEM

PalmSens
Compact Electrochemical Interfaces

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www.palmsens.com

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1 TÜBİTAK BİLGEM'S Use of PalmSens EmStat

The PalmSens Emstat OEM is an integrated part of TÜBİTAK BİLGEM's MiSens fully automated next generation electrochemical biosensor device.

MiSensTM is capable of doing electrochemical detection. With its unique and patented biochips and REPTM (Real Time Electrochemical Profiling) technology, the device is able to show real time results while taking a measurement. The number of studies performed using integrated electrochemical biosensing systems with the necessary fluidics is rather limited. In addition, mostly the assay procedures are not suitable for automation as they require long incubation times. In response to that, TUBITAK BILGEM's Bioelectronic Devices and Systems Group has developed a new detection platform, which we term Real-time Electrochemical Profiling (REP™). While this technology relies on the fundamental basics of electrochemical immunosensing, in particular amperometry, it has several key features including a new electrode array (patent no: PCT/IB2015/052479), microfluidics based assay and real-time amperometric measurements during the flow of enzyme substrate.

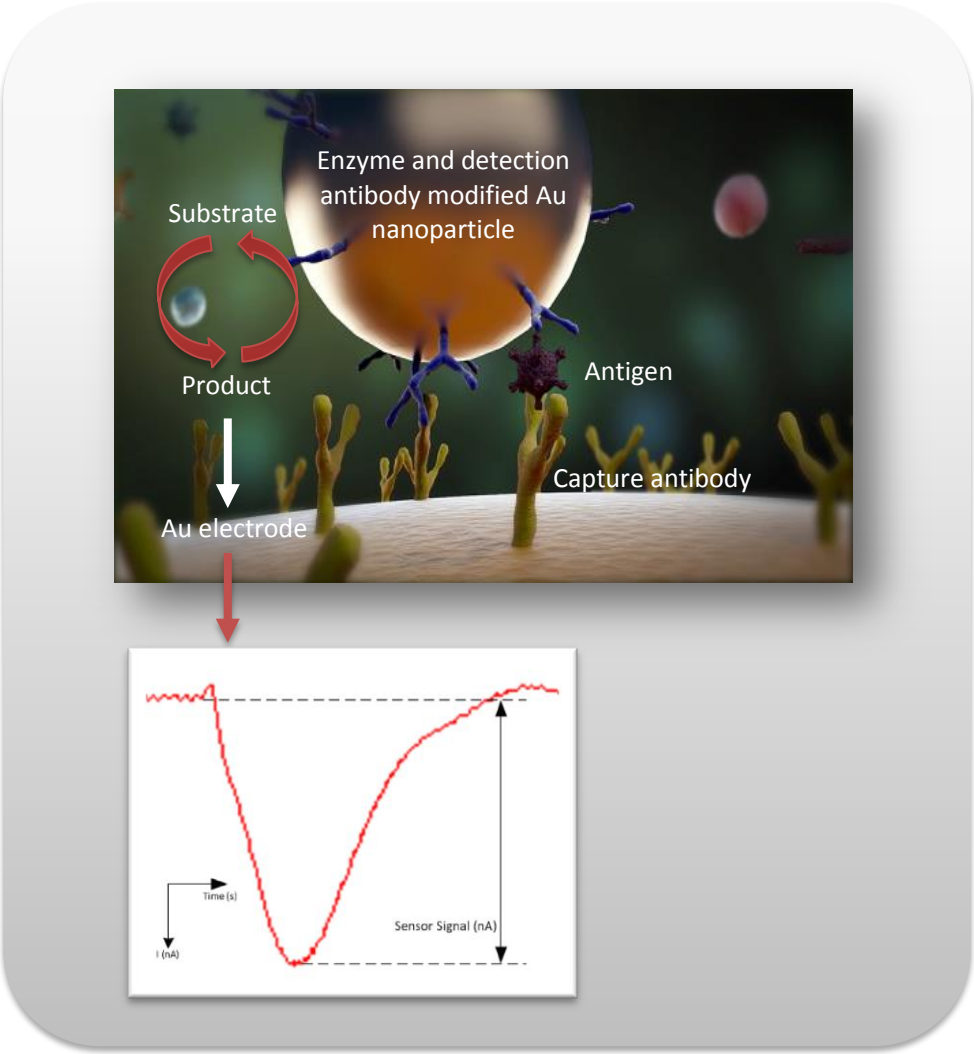

Figure 1. Detection Mechanism and results

The focus for MiSens is on customization and flexibility. With its special control software, MiSens lets users create and design their own experiments comfortably using a wireless tablet. MiSens is a very powerful electrochemical biosensor device that enables fast, reproducible and accurate measurements for researchers at the universities and research labs.

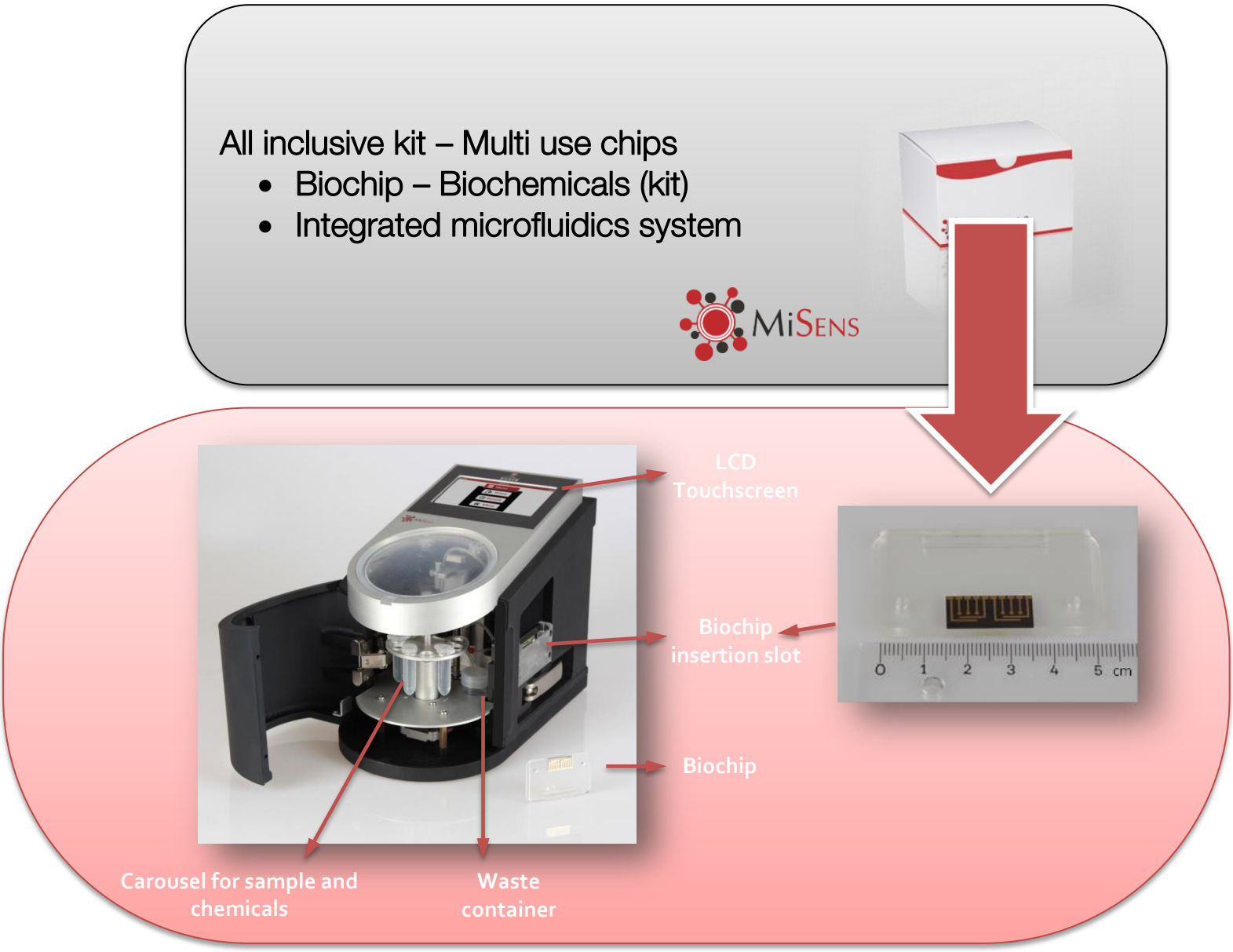

Figure 2. MiSens and kit

Why an automated electrochemical biosensor device?
For more information visit www.biyoelektronik.bilgem.tubitak.gov.tr

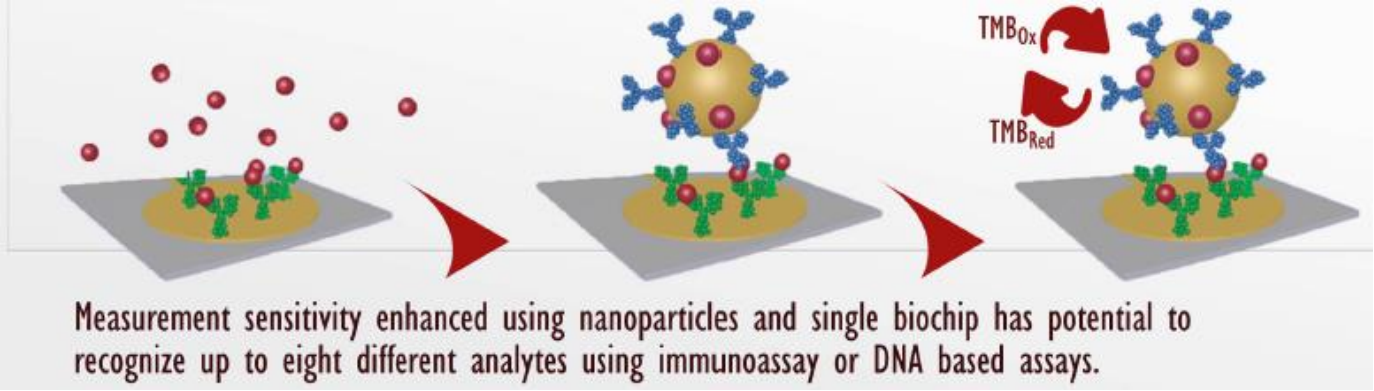

Figure 3. Measurement sensitivity and particles

2 The choice for EmStat

Challenge: Make a small device with powerful measuring capabilities
We wanted to make a small lab and mobile device bearing similar capabilites without sacrificing electrochemical measurement capabilities. We also wanted to have real time results feeding them to the user as we wished.
Another challenge was our desire to build the smallest fully automated biosensor device that includes pumps and motor controllers which can have a negative effect in terms of EMC/EMI on the potentiometer.

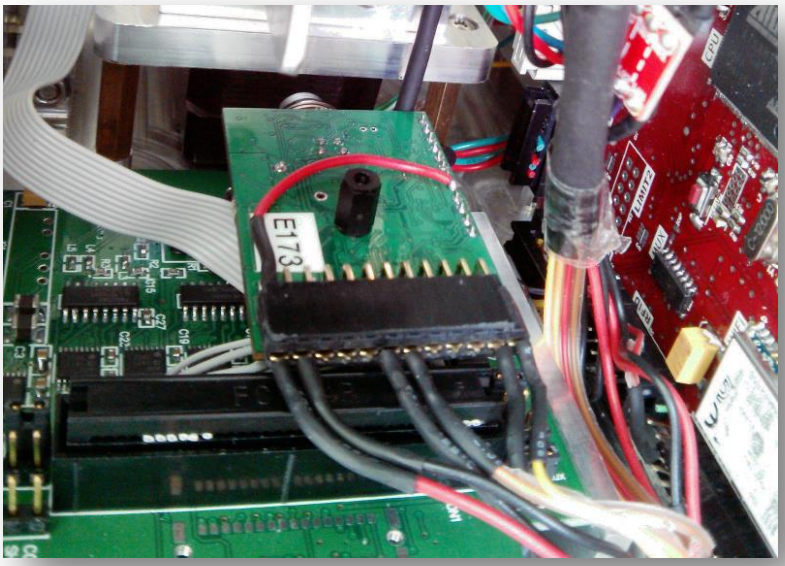

Figure 4 – EmStat in MiSens

These challenges brought us to search for a small embeddable potentiostat with a wide spectrum of measurement options. Our search ended with PalmSens' EmStat OEM as this was a capable yet small potentiostat that we were looking for. The compactness was just what we were looking for and better it had an option to use it with a multiplexer, so we could get multiple measurements at once, since our biochip has eight working electrodes. The EmStat OEM already had a USB interface but we needed a serial interface for our applicaiton. With the help of PalmSens staff we were able to easily convert it to communicate from serial interface. We did extensive testing with the potentiostat and saw that it was immune to noise introduced by surrounding components, far exceeding our expectations. The EmStat OEM potenstiostat made it possible to achieve our design goals without sacrificing functionality.

2.1 How is the EmStat module integrated in our design?

We use EmStat OEM with the multiplexer board from PalmSens and communicate via serial interface. We shield it with a faraday cage to meet EMI/EMC criterias.

"The EmStat OEM potenstiostat made it possible to achieve our design goals without sacrificing functionality."