COMBINING ELECTROCHEMICAL BIO-SENSING, HYBRID PRINTED ELECTRONICS AND WIRELESS COMMUNICATION FOR ENABLING REAL-TIME AND REMOTE MONITORING OF LACTATE.

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Introduction:

Detection of Lactate is important for the monitoring of anaerobic metabolic processes and find application in:
- Sport medicine
- Bioreactor technology

Conventional PCB-Based electronic can not provide:
- comfort and Form-factors for wearability
- low cost for single use.

Hybrid-electronic on flexible and/or stretchable substrate can provide desired:
- Form factors
- Costs

Herein we report on the development of a bio-sensing platform, based on hybrid-electronic, for the real-time and in-situ monitoring of lactate.

System components:

Si-based & mounted components:

Potentiostat (LMP91000)
Programmable Analog front and Micro-power electrochemistry
Microcontroller (PIC24F16KM202)
Nanowatt XL™ Technology 20-Pin General Purpose
NFC module (NT3H1101)
Programmable Low power Battery
Nominal voltage 3V Capacity10mAh Shelf life 5 years

Screen-printed components:

Circuitry
Alternated layers of Ag and insulators printed on PET substrate.
Biosensor
2 electrodes Prussian-blue & Lactate oxidase based sensor
Antenna
Display PEDOT-PSS Low-voltage

Results:

Real-time, in-situ and wearable chemo bio-sensors demand the development of:
- Easy to use
- Easy to integrate
- With high connectivity
- Flexible
- Mass producible
- Low costs
- Potentially disposable sensing platforms.

Envisaging the future

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