PRINTED BIOSENSORS - A LOW COST PLATFORM FOR DIVERSE DETECTION AND DEFENCE PREPAREDNESS

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Biosensors offer an opportunity to monitor soldier physical and mental readiness and the state of their environments in real time. They can detect a wide variety of potential problems as they arise, enabling troops to act swiftly and appropriately. Drawing on our capabilities in functional roll-to-roll (R2R) printing, our printed biosensor platform can be tailored to meet a range of needs, providing a pathway for reliable, large-scale, low-cost production.

COMPETITIVE ADVANTAGE

- Organic electronic sensors are inexpensive, manufactured at large scale using low-cost R2R printing techniques and can be readily tailored to detect a variety of organic targets
- Self-administered and immediate, biosensors remove the logistical burden and waiting periods associated with laboratory testing of biological samples
- Using a digital profile linked to the detection device, sample results can be easily recorded for all soldiers and monitored over the course of their career or for individual missions

SUCCESSFUL APPLICATIONS OF RESEARCH

- Detection of hydration levels in elite athletes via sweat
- Detecting and identifying peptides L-reduced glutathione and neuropeptide Y for human stress management
- Development of the Saliva Glucose Biosensor diagnostic platform for diabetes management
- Ongoing development of diagnostic tests within the following diagnostic modalities - cancer, allergen and hormone biomarkers

PARTNERS

- Asian Office of Aerospace Research and Development
- Pepsi
- IQ Group
- Australian National Fabrication Facility (ANFF)
- National Collaborative Research Infrastructure Strategy

IMPACT

- Alert troops before they reach their limits of physical endurance, preventing heat injuries and training fatalities
- Enable early identification of post-traumatic stress disorder, stress and anxiety
- Accurate, low-cost, onsite drug testing in real time
- Integrated into combat ensembles, biosensors could alert troops to the presence of chemical or other environmental threats, maximising survivability
- Enable troops to maintain peak physical performance via regular, real time feedback of key bodily systems

CAPABILITIES AND FACILITIES

The printing production facility, provided by the ANFF, enables biosensor development and production by:

- Initial material synthesis capabilities, providing high quality chemical feedstocks on demand
- R2R coating lines capable of producing the ultra-thin multilayer structure present in the biosensors
- R2R metal deposition capability, providing a scalable method for connecting to the biosensors
- Detailed characterisation and testing facilities such as probe-stations, semiconductor parameter analyser, and yield metric analyser

MORE INFORMATION

PROFESSOR PAUL DASTOOR
Priority Research Centre for Organic Electronics
T: +61 2 4921 5426
E: paul.dastoor@newcastle.edu.au

2019 1125 | CRICOS Provider 00109J