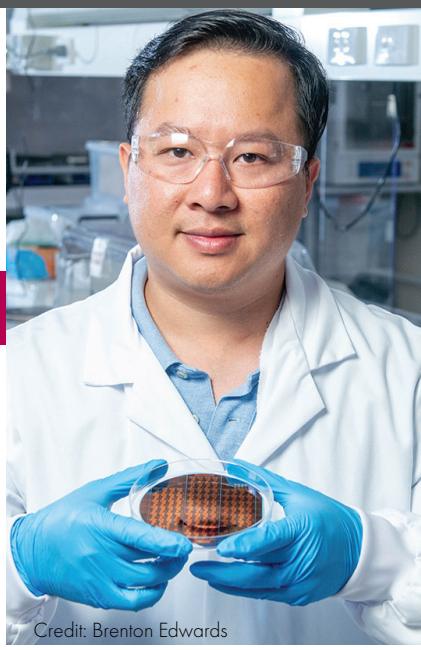
Handheld device diagnosing pre-eclampsia enables early intervention

Providing micro and nano fabrication facilities for Australia's researchers, students and industry

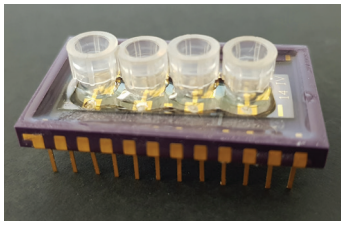


Credit: Brenton Edwards

Australian researchers are working towards improving prenatal care with the development of an affordable and disposable device to diagnose pre-eclampsia – and its severity – within half an hour.

The hand-held diagnostic device developed by Professor Benjamin Thierry, Dr Duy Tran and their team from the University of South Australia's Future Industries Institute (UniSA FII) requires just a single drop of blood to quickly and accurately measure pre-eclampsia bio-markers.

Made possible through support from the ARC Centre for Bio-Nano Science (CBNS) and the South Australian node of the Australian National Fabrication Facility (ANFF-SA), the device will enable early intervention care for mothers who are at risk or diagnosed with the life-threatening condition.



About 76,000 pregnant women and 500,000 babies die from pre-eclampsia each year, worldwide, with women in developing countries seven times more likely to develop pre-eclampsia because of delayed diagnosis and a lack of access to hospitals.

The core technology of the device, the sensor, was born at ANFF-SA where Dr Tran has been able to fine-tune and optimize its parameters with assistance from ANFF-SA's technical experts, facilities and world-class instruments.[1]

Driven to develop technologies that don't exist in order to address biomedical problems, Dr Tran has built on local expertise to integrate his cutting-edge sensing technology within cost-effective and easy-to-operate diagnostic devices that can be operated with minimal training by nurses and other primary healthcare providers in regional and remote communities, both here in Australia and worldwide.

"The ANFF-SA staff are dynamic, very supportive and open-minded. They are also very flexible which is critical as there are not many facilities that are willing to try, or even suggest new nanofabrication approaches, which is what I like the most about ANFF-SA," said Dr Tran.

With the initial support of the ARC, the prototype developed by Dr Tran and PhD student Ms Thuy Pham has been successfully validated on four women with confirmed pre-eclampsia and will be trialed in Vietnam in the near future.

The next generation of the device is currently being developed under support of the Medial Device Partnership Program (MDPP) as a handheld analyzer unit with single-use disposable sensing cartridges, anticipated to be manufactured for as little as two dollars.

Working towards bringing their sensing platform to where it is needed, the team is establishing a spin off company with the support of UniSA Venture and the MDPP. The ANFF-SA will continue to play a central role in pilot manufacturing and sensor optimization.

"ANFF-SA has delivered great support, instruments and people so we really don't see a need to go elsewhere," said Dr Tran. "It's where the R&D started so it makes sense to keep the research here and we look forward to keep working with the team to reach our exciting goals."

The sensor was initially designed for rapid and sensitive diagnosing pre-eclampsia at the point of need regardless of geography distance and infrastructure settings. However, Dr Tran says the flexibility of the universal platform they have developed will enable them to diversify its applications in the future.

"A crucial aspect towards bringing such cutting-edge technology in real-life use is to deeply engage with end-users to understand their specific challenges. I'm keen to continue to engage and to explore new opportunity for our diagnostic platform to benefit the community."

Contact ANFF-SA to find out how we can support your research and development for your next project.

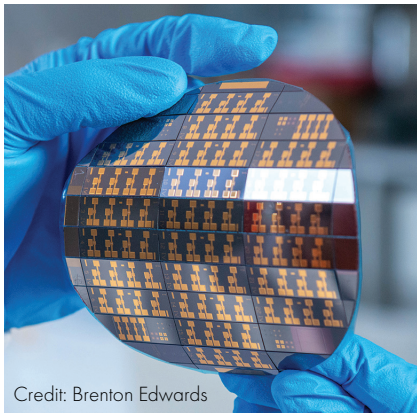
1. Pham, T.T.T., Tran, D.P. and Thierry, B., 2019. High performance indium oxide nanoribbon FETs: mitigating devices signal variation from batch fabrication. Nanoscale Advances, 1(12), pp.4870-4877.

OUR CAPABILITIES:

ANFF-SA's state-of-the-art facilities house more than $15 million of cutting-edge equipment, including high-quality clean room laboratories and the latest in virtual design and simulation software.

Providing open access to researchers, academics and industry, ANFF-SA offers professional training and collaboration with specialist technicians in the fields of:

- Advanced sensing
- Point-of-care
- Smart interfaces
- Lab on a chip
- Mineral processing
- Biofabrication
- Screening platforms



Credit: Brenton Edwards

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