

On-chip screening for nanoparticle toxicity

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



A tiny device, capable of testing nanoparticles for toxicity, is being developed to protect the health and safety of the public and the manufacturing industry.

The use of nanoparticles in applications like healthcare, chemical synthesis, disinfection, and energy is growing rapidly. Yet, every new particle must be safe and effective, putting pressure on current testing protocols that are costly and slow.

Utilising the Australian National Fabrication Facility - SA node's world-class equipment and facilities, a team of University of South Australia (UniSA) and Monash University researchers are prototyping a miniaturised cell-laden microfluidic device to accelerate testing of nanoparticles for toxic effects.

The device exploits laminar flow to guide cells and nanoparticles to microscale testing sites within a channel. These locations can then be monitored over time, so that a single experiment can report many nanotoxicity test outcomes based on combinations of different cells and particles.

PhD student Scott McCormick has anchored viable white blood cells and skin cells in a microchannel and studied the effect of flow on detachment.

The study dovetails with the successful demonstration of a 5-channel screening chip, developed by Dr Tommy Tong (UniSA, and now at Monash University). The team's research is published in the high-quality journals Lab on a Chip and Biofabrication.

The research team benefits from ANFF access to rapid prototyping capabilities, including ANFF-SA's direct-write lithography which allows a quick transition from concept to laboratory testing.

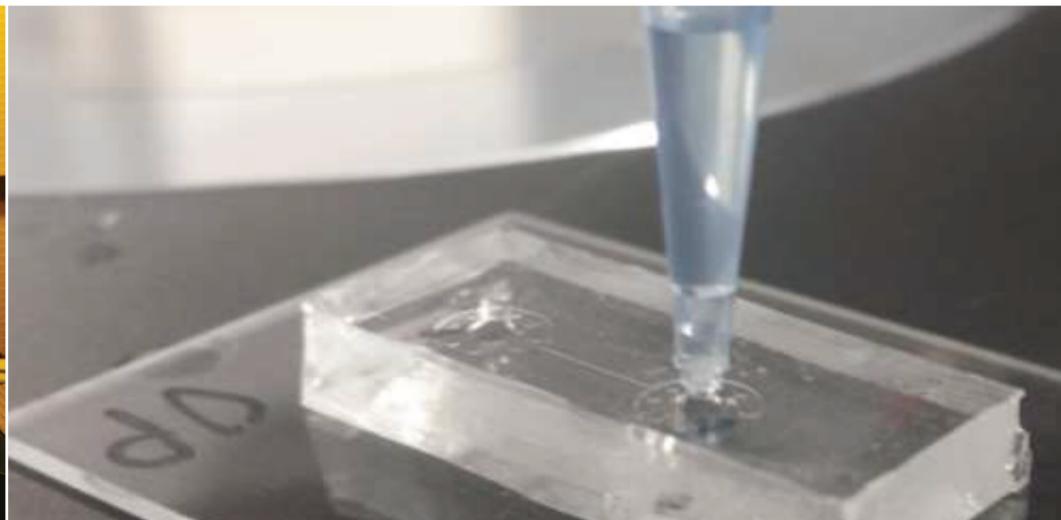
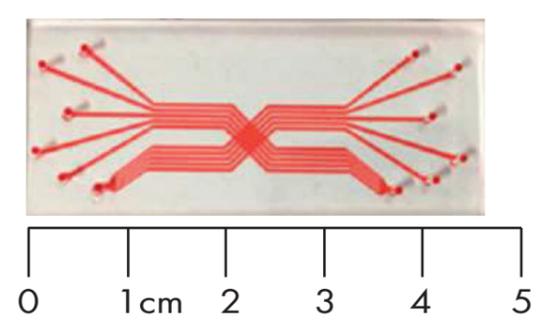
"Access to ANFF-SA's state-of-the-art fabrication equipment, facilities and highly skilled staff has been crucial to my work," said Scott. "ANFF-SA allows my PhD training to include high-performance facilities and access to technical expertise."

Hopefully further development of the concept will enable improved regulation and safety for the use of nanoparticles in consumer and industry applications.

The concept may improve personalised medicine by testing, for example, multiple chemotherapy drugs against a patient's cancer cells to find the most effective dosage prior to administering.

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Scott McCormick,
PhD Candidate”

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South Australian Node of the Australian National Fabrication Facility

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