



## SOR Printable Brain Inspired Computing Hardware

Western Australia - December 30<sup>th</sup> 2020 - Strategic Elements Ltd (ASX:SOR) is pleased to report that testing has confirmed that the printable Nanocube Memory technology has potential as printable brain-inspired (neuromorphic) computing hardware. Work at the University of New South Wales confirmed that the Nanocube Memory structure and operation allows it to **combine computing and memory** in one place in a way similar to how biological neurons operate.

### Hardware Solution to Brain Inspired Computing

Many in the memory technology sector believe that the future of computing will not be about cramming more components on a chip but in rethinking processor architecture from the ground up to emulate how a brain efficiently processes information.

The artificial synapses fabricated by UNSW using the Nanocube Memory technology provides a potential **hardware solution** that has combined data storage and processing abilities, a key to neuromorphic computing.

The technology has the potential to store a range of values (as resistance states), rather than just the traditional one and zero, allowing it to mimic the way the strength of a connection between two biological synapses can vary. Changing those synaptic weights (connection strength) in artificial synapses in neuromorphic computing is one way to allow the brain-based system to achieve self-learning.

A potential **hardware** solution has the ability to store and process data within the same component. This reduces latency and power consumption **as information does not need to be sent back and forth between the memory and processing unit**. This technology could potentially enable neuromorphic hardware to emulate high processing ability of the human brain with low energy consumption.

### Printed Brain Inspired Hardware

Current data processing and storage technologies are based on conventional silicon CMOS (complementary metal-oxide semiconductor) technology which are rigid, requires high temperature processing and expensive manufacturing facilities.

Printable artificial synapses could potentially enable combined data processing and storage for printed/flexible electronics, the lack of which have held back more complex applications to be realized. In particular resource constrained IoT devices are always in need of hardware that consume less power and energy, as these are the major constraints for compact systems with limited battery supply.

### Testing of Nanocube Memory to Emulate Human Brain

In order to test the artificial synapses fabricated using the Nanocube Memory technology for synaptic plasticity, a memristor device was fabricated and subjected to consecutive positive and negative current-voltage (I-V) sweeps which showed incremental decrease in resistance of the memristor device with positive voltage sweeps and incremental increase in resistance of the memristor device with negative voltage sweeps. This shows the core synaptic function of synaptic plasticity of the memristor technology.

Next, when electrical signals are applied to a biological synapse, the connection strength between neurons can be excited (potentiation) or inhibited (depression) which can be interpreted as the memorizing and forgetting behavior of the human brain.

### Further Work

The UNSW Nanoionics laboratory is now closed as part of the UNSW shut down period for Christmas and New Year and will re-open in the first week of January. Further early stage work on features such as stability, potentiation, depression, latency and power requirements will continue and be reported in Q1 2021.

The Company also notes that it is very pleased with progress of the printable self-recharging battery technology and remains on track to announce further information in January 2021.

### Strategic Elements Background

Investors in SOR potentially **pay no tax on capital gains from selling their SOR shares** as the Company operates under a Federal Government program setup to encourage investment into innovation. Strategic Elements operates as a 'venture builder' where it generates high risk-high reward ventures and projects from combining teams of leading scientists or innovators in the technology or resources sectors. The Company is listed on the ASX under the code "SOR". More information on the Pooled Development Program should be read on the Company's website.

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This announcement was authorised for release by Strategic Elements' Board of Directors.