

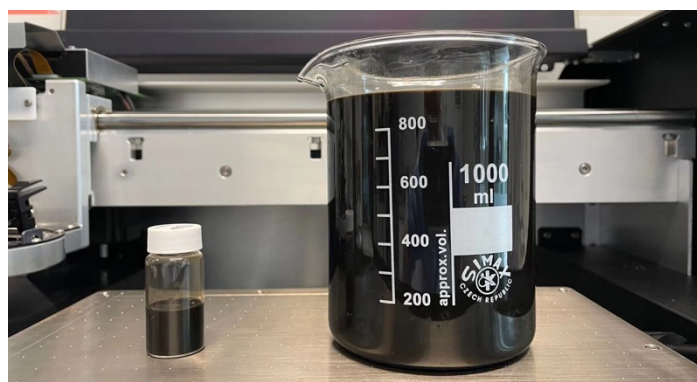
## SOR Self-charging Battery Ink Successful Scale Up

Western Australia – December 1<sup>st</sup> 2020 - Strategic Elements Ltd (ASX:SOR) has achieved a critical milestone with its **self-charging battery technology** by manufacturing a 1 litre batch size of Battery Ink with the capacity to produce 2000 battery cells. The technology is demonstrating strong potential to scale up with production capacity rapidly increasing tenfold from 200 to 2000 battery cells.

Intellectual Property gained through development of the Company's printable memory ink technology has enabled the Company and the University of New South Wales to achieve this milestone **rapidly and very early** in the development process. The next key milestone is fabrication of a prototype battery pack of multiple connected Battery Ink cells producing 3.7 Volts due for completion in January 2021.

### The scaled up ink was used to fabricate five Battery Ink cells that:

- Successfully harvested energy from humidity in the air and generated a minimum of 0.8 Volts over a testing period of two hours.
- Were able to achieve 1cm in size and 10-20 microns thick (thinner than human hair).
- Successfully achieved very fast re-charging time of three minutes.
- Showed no degradation in performance compared to the smaller scale 200 ml batch size ink.



### Graphene Oxide Technology

Due to high cost of large volume production and difficulty in controlling electrical properties **graphene** electronics are currently mostly limited to relatively small volumes and mainly restricted to R&D and academic uses.

However, one of the key advantages of the Battery Ink technology is that it is based on a **graphene derivative** called graphene oxide (GO) which is much more available, cheaper and easier to manufacture than graphene due to superior dispersity. GO based technologies therefore have the potential to enter production sooner. Testing of the Battery Ink shows that an individual Battery Ink cell **contains tens of thousands of layered nanosheets of graphene oxide**.

### Battery Ink Cell Advantages

Battery Ink cells have strong potential competitive advantages over existing lithium based batteries that suffer from size, rigidity, weight, safety (flammable), environmental issues and most significantly require replacement or re-charging of batteries.

	Lithium Batteries	New Scaled Up Battery Ink
<b>Charging facility</b>	Manual charging or plug into power	Self-charging through humidity gradient in the air
<b>Charging time</b>	Hours	Minutes
<b>Flexibility</b>	Rigid	Potentially Flexible, wearable
<b>Hazard</b>	Potentially flammable	Not – flammable, non-toxic
<b>Weight</b>	Heavy	Extremely thin and lightweight
<b>Disposal</b>	Environmental issues	Environmentally friendly

## Electronic Skin Patch Example Sector

The potential is highlighted by looking at one example application of electronic skin patches. Skin patches are wearable products that have integrated electronic components such as sensors and communication components attached to the surface of the skin to relay vital information about the human body. These are wearable products attached to the body such as cosmetic, strain, diabetes or cardiovascular monitoring. They produced USD 10 billion in revenue in 2019<sup>1</sup> despite most successful products today still being relatively bulky devices requiring manual charging.

Human skin is known to generate elevated levels of humidity to 90%. **The scaled up ink Battery Ink cells were tested** to determine if they could operate in humidity of 65 -85%. All Battery Ink cells generated 0.8 Volts over the testing period of two hours with no sign of degradation. Further testing will be conducted in the future to replicate the humidity levels of the skin. This shows strong potential for the Battery Ink cells to provide a flexible, light, self-recharging power source for the electronic skin patch sector that is forecast to grow to nearly USD 40 billion by 2030<sup>1</sup>.

## 3.7 Volt Battery Pack Milestone

The company will continue to refine, test and improve the scaled up ink as part of its ongoing development plan. However the next milestone in focus is to fabricate a successful prototype battery pack containing multiple connected self-charging battery cells capable of producing 3.7 Volts from humidity in the air. Work will also occur concurrently on increasing current output at lower humidity levels. **The prototype battery pack is expected to be completed in January 2021.**

## About the Battery Ink Technology

The self-charging battery technology is being developed under a collaboration with the University of New South Wales and CSIRO partially funded by the Federal Government<sup>2</sup>. The Battery Ink cells are ideally suited for use in Internet of Things (IOT) devices and wearable technologies. The global battery market for IOT was worth USD 8.7 billion in 2009 and forecast to be USD 15.9 billion in 2025<sup>3</sup>. The Battery Ink is being developed by integrating significant existing ink formulation and printed electronics intellectual property from the Company's Nanocube Memory Ink technology with an advanced graphene oxide material.

## Printable Neuromorphic Memory Potential

The Company has also commenced testing its Nanocube Memory technology for its potential in printable brain-inspired (neuromorphic) computing. 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. A series of significant synaptic functions will be emulated. **Results remain on track and are expected to be available in December 2020.**

## Other Strategic Elements Activities

The Company has stated its interest in pursuing additional opportunities that leverage the enormous increase in the amount of data being created and consumed across government, consumer and business sectors. **To date no agreement has been entered into and the Company will update the market when appropriate.**

The Company is also developing an **Autonomous Security Vehicle (ASV)** for perimeter security. The Global Perimeter Security Market is forecast to be USD 282.26 Billion by 2025<sup>4</sup>. The Company is exclusively collaborating with giant **US Fortune 100 Company Honeywell** to build autonomous security vehicles for the correctional justice sector<sup>5</sup>. The parties are currently working with the WA Department of Justice to deploy a fully autonomous robotic security vehicle for the Eastern Goldfields Regional Prison in Kalgoorlie to inspect, test and confirm the integrity of the secure perimeter.

## 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.

<sup>1</sup> <https://www.idtechex.com/en/research-report/electronic-skin-patches-2020-2030/743> <sup>2</sup> ASX Announcement 27/10/20

<sup>3</sup> <https://www.marketsandmarkets.com/Market-Reports/battery-iot-market-153084557.html> <sup>4</sup> <https://dataintel.com/report/perimeter-security-market/>

<sup>5</sup> ASX Announcement 16/10/20