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# SOR Battery Ink Generates Milliamps From Moisture

Western Australia, September 20th 2021 - Strategic Elements Ltd (ASX:SOR) has achieved a key milestone with its moisture-based battery technology producing more than a milliamp of electrical current from humidity in the air. Prototype Battery Ink cells produced 100mAh of electric charge over 3 days. The milestone of milliamp-range current output is a significant achievement as it increases the potential array of applications that could be powered by the technology.

The electronic skin patch sector is the initial commercial focus for the technology as it produced USD 10 billion in revenue in 2019 and is forecast by IDTechEx to grow to nearly USD 40 billion by 2030.[1] It also has lower requirements (e.g. duration, current, voltage) than other electronics sectors.

**Successful Milliamp Development**
Health-related skin patches integrate electronic components such as sensors that are attached to the surface of the skin. The Company's objective was to fabricate prototype Battery Ink cells targeted towards this sector producing one milliamp of electrical current.

Commercially available products such as glucose monitoring patches are approximately 6cm x 6cm in size and use low-cost batteries with a capacity of 220 mAh (milliamp hours). Battery life is approximately 3 days, which is a significant issue for users. It also prevents manufacturers from integrating additional functions into the devices as this would drain the battery even faster.

The Company successfully fabricated a 6cm x 6cm prototype achieving over 1mA (milliamp) of current output under load over a 35-hour testing period. The prototype Battey Ink cells produced over 100 mAh (milliamp hours) of electric charge over 3 days. Battery Ink cells could either be used to directly power a device such as the above or compliment a battery to extend device life. These different use cases provide alternative commercialisation and partnering options for the Company.

**Significant further improvement in performance is expected over the next few months as the prototype ink becomes increasingly optimised for use in screen printing equipment.**

The Company has also successfully re-designed the battery cell architecture using larger battery cells whilst reducing the number of cells required. This resulted in a very simple battery structure with fewer components and more reliability allowing for simpler manufacturing.

**Further Development**
The Battery Ink is being developed by integrating significant existing ink formulation and printed electronics IP from the Company's Nanocube Memory Ink technology. Development has progressed from low voltages to 0.8V per cell, small scale ink to 1L batches and from microamp to milliamp range of electric current output. Fabrication has moved from lab methods to small area screen printing of the Battery Ink, which has set the foundation for the next stage of advancement in the technology.

Initial focus remains on the skin patch segment of the electronics sector as it has a very large global market, most current requirements are lower (500 $\mu$A – 5 mA) with less capacity ( 220mAh) and duration needs are shorter (1- 7 days). Other benefits of the Battery Ink technology such as the thin, lightweight, flexible, environmentally friendly, non-flammable nature of the battery cells make it an ideal candidate for the electronic skin patch segment.

*1 Electronic Skin Patches 2020-2030, IDTechEx, 2020*

**Next Steps**
In the short-term development will remain focused on the larger Battery Ink cells and simpler architecture specifically targeted towards the electronic skin patch sector. The Company's objective is to increase current output to over 5mA and produce at least 220 mAh of electric charge from a single Battery Ink device in Q4, 2021.

The Battery Ink technology is still in early development and the fundamental upper limits of aspects such as maximum power output, duration, energy density remain unknown. Multiple avenues to potentially increase performance significantly have been identified by the team at UNSW.

Secondary work has also commenced to various aspects such as ink formulation, battery cell size and architecture relevant to applications requiring higher performance than electronic skin patches. The Company will communicate these developments as appropriate.

**About the Collaboration**
Development is under an Australian Research Council part-funded collaboration between the Company and the University of New South Wales (announced 30/7/20). The group at UNSW have developed deep experience in electronic inks, energy harvesting and storage over the past 10 years and are applying that in development of the Battery Ink technology. UNSW School of Materials Science and Engineering is ranked #1 in Australia for material science and have a number of partnerships with leading companies such as Boral, Hitachi Chemical, One Steel and many more. UNSW has world-class infrastructure and equipment geared towards advanced materials engineering and fabrication.

**About the Company**
The Australian Federal Government has registered Strategic Elements as a Pooled Development Fund with a mandate to back Australian innovation. The Company operates as a venture builder where it generates high risk-high reward ventures and projects from combining teams of leading scientists or innovators. Investors in SOR potentially pay no tax on capital gains from selling their SOR shares as the Company operates under the Pooled Development program setup to encourage investment into innovation.

The Company is listed on the ASX under the code "SOR".
More information on the Pooled Development Program is available on the Company's website.

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