



Successful Large Scale Batch Production of Nanocube Memory Ink

Strategic Elements (ASX:SOR) is pleased to announce the successful production of a large scale batch of Nanocube Memory Ink with approximately 400 times the volume of previous batches.

- The work was conducted in conjunction with scientists from the Nanomaterials and Devices Team at CSIRO Manufacturing.
- Successfully scaling up production of the ink from millilitres to litres has enabled the team to progress to trialling the Memory Ink with industrial printing and coating technologies such as slot die.
- Due to the positive outcome of the first stage of the project, CSIRO has agreed to continue development of the Nanocube Memory Ink through a secondary program.

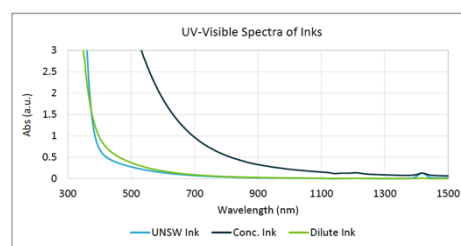
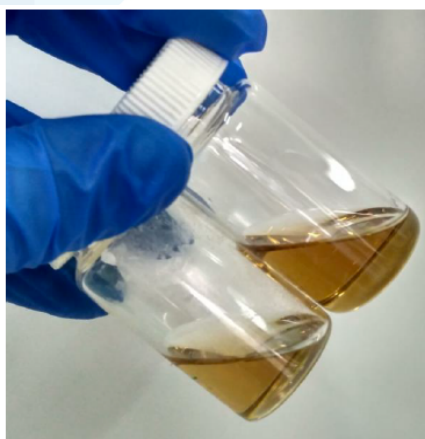
The Nanocube Memory Ink was invented at the University of New South Wales by a team led by Professor Sean Li from the School of Materials Science and Engineering. The versatile ink contains billions of nanoscale cerium oxide cubes that can be printed or coated onto silicon and non-silicon surfaces such as glass or plastic. The commercial goal is to bring memory and sensing to devices and surfaces with different shapes and new flexible forms not possible with rigid silicon based technologies.

The volume of ink produced in batches at UNSW was in the millilitre range, sufficient for prototype production. Subsequently, the Company approached the team at the CSIRO to assist with developing a method to create batches of Nanocube Ink in the litre scale.

Detailed Results

The ink produced by CSIRO was 10 times more concentrated than the ink previously produced, however it was observed to have the same core characteristics:

- TEM images revealed the synthesised material had a nanocube morphology and had a similar polydispersity as the nanocubes previously synthesised on a small scale.
- Powder X-ray diffraction confirmed that there were no crystalline contaminants present in the final product.
- UV-Vis Spectroscopy of the scaled-up concentrated ink confirmed that after dilution the CSIRO and UNSW inks are of similar concentrations.
- A series of preliminary depositions of the Nanocube Ink using a slot die coating technique was conducted. Early experiments with un-optimised ink were promising, with a uniform transparent film being deposited with no obvious defects observed under optical microscopy.



Further Work - CSIRO

A further program is currently being finalized with CSIRO which in summary will:

- optimise the ink, including for slot die coating and printing of devices,
- produce devices on various substrates,
- perform device measurements on ink performance,
- work with the University of New South Wales and VTT Finland technical teams.

Further Work - VTT Finland

Due to recent results, a new program is being initiated with VTT and specialists within the printed electronics team, to analyse and optimise memory ink film thickness and device operation and performance. Additionally, the VTT team will test standard industry electrode architecture and configurations. A further announcement will be made regarding this program.

Further Work - UNSW

In addition, the research group of Professor Sean Li at UNSW has recently acquired advanced printing and slot die coating equipment (only the second installation of it globally).

This equipment has unique functionality to combine slot die with printing to expand the capability in order to produce advanced electronic materials on industrial scale.

Larger batch sizes of ink will also enable the Nanocube ink to be printed and coated with this equipment.



A development program with UNSW is being negotiated that will potentially include trial depositions of the Nanocube Ink on the advanced slot die printing equipment acquired by UNSW.

R&D Rebate

The Company has commenced submitting a Research and Development Tax Incentive Rebate for domestic and overseas expenditure incurred on research and development in FY17. The R&D program permits a 43.5% rebate of eligible research and development expenditure. Although the final cash rebate is yet to be determined, the Company believes it may be substantial.

Key Development Partner – VTT Technical Research Centre

VTT Technical Research Centre of Finland and is one of the leading research and technology organisations in Europe VTT is one of world's leading research and technology companies. It has over 6000 customers and over 1,200 patents and patent applications in its patent portfolio. VTT has been engaged in the long-term development of printed electronics for over 15 years and is trusted by industry leading companies around the globe, for the development and production of printed electronics products.

Key Development Partner – CSIRO

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is the federal government agency for scientific research in Australia. CSIRO Manufacturing research is based on multi-disciplinary scientific and engineering capabilities and uses world-class infrastructure. It partners with industry to develop innovative products and processes that allow Australian manufacturers to be globally competitive and environmentally sustainable. Successful CSIRO inventions include WIFI, plastic banknotes, Hendra virus vaccine, extended wear contact lenses and Raft polymerisation.

Company Comment

Managing Director Charles Murphy said “We are very pleased with the outcome of the first stage of work with CSIRO. The Company is very fortunate to be working with world-class organisations such as CSIRO, VTT and UNSW and we will continue to build on these results in the next stage of work”.

About Strategic Elements Ltd

Strategic Elements shares are listed on the Australian Stock Exchange under the code “SOR”. The Company is registered under the Pooled Development Program run by the Australian Federal Government to encourage investment into SME’s. SOR focuses on backing innovation in the **technology and resource sectors**. To assist Pooled Development Fund’s to raise capital, the Federal Government enables most shareholders in a Pooled Development Fund to [make capital gains and receive dividends tax-free](#). In return the Company must back only Australian SME’s.

More Information

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