ASX Announcement (ASX:**AXE**) 26 November 2019

First-phase prototype of graphene-based biosensor

Highlights

- Archer's graphene ink formulations ("graphene inks") are successfully printed and tested in a prototype device for biosensing ("prototype").
- The printing process can potentially be automated for market competitive, low-cost, prototype production.
- The prototype demonstrates a key early-stage milestone validating the viability of graphene inks' functionality and use for biosensor applications.
- Archer maintains 100% ownership of a provisional patent lodged to protect the graphene inks and prototype technology intellectual property (IP).
- Biosensor commercialisation to continue through the development of proof-of-concept prototypes to support a full patent application.

Archer Materials Limited ("Archer", the "Company") (ASX:**AXE**) is pleased to announce the Company has progressed its graphene-based biosensor technology development by building a first-phase prototype device ("prototype") to test the printing and performance of graphene inks produced from the inventory of Carbon Allotropes ("graphene inks").

Commenting on the Company's biosensor development, Archer CEO, Dr Mohammad Choucair, said: "We have reached a key development milestone towards commercially exploiting the IP underpinning the graphene-based biosensor technology. This achievement provides support for a full patent application, that would give Archer exclusive rights to commercially benefit from the IP. The materials and processes used to build the prototypes are not prohibitively expensive, which is an advantage in the printable biosensor market."

Graphene Inks and Prototype Testing

Each prototype circuit board integrates an array of 32 gold-coated-nickel interdigitated electrodes ("Electrodes") (Image 1). The electrodes are prototyping components and [the final design and chemistry] are subject to change. Graphene inks are printed directly onto the Electrodes using aligned extrusion printing (Image 1) to create the sensors. This process could potentially be translated to automated screen-printing, for low-cost prototype manufacturing.

The sensors displayed excellent electrochemical properties, which is a fundamental requirement for Archer's biosensing technology. A functional biosensor still requires the measurement of biomolecules on the graphene surface. The graphene inks were printed and patterned as interdigitated electrodes on various substrates to demonstrate versatility and robustness, including transparent and flexible materials for biosensing applications (Image 2).

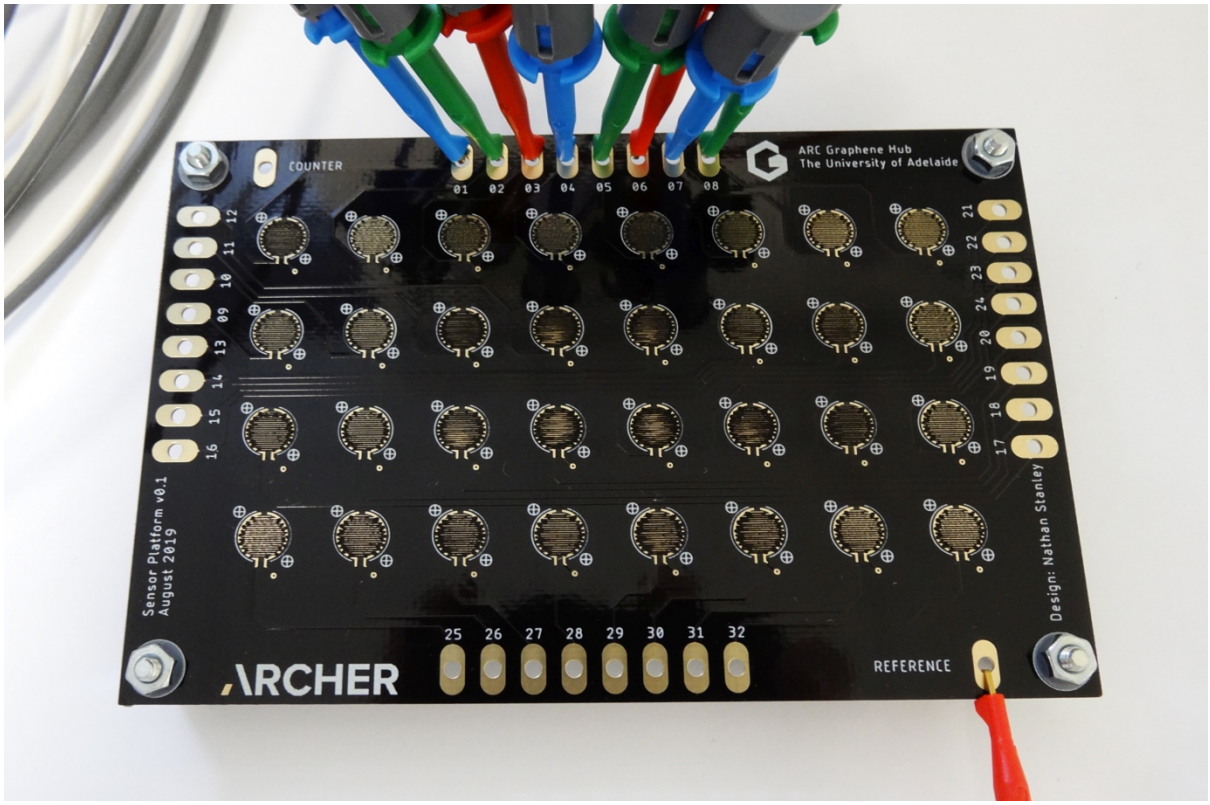

Image 1. Archer's first-phase prototype graphene biosensor technology built at the University of Adelaide ARC Graphene Hub. To create the biosensor components, graphene ink formulations are printed on a 4 x 8 array of interdigitated gold-plated-nickel electrodes (with micron-scale features). Graphene acts as a sensing interface to detect biochemicals. The 32 sensing electrodes are connected to a computer to monitor, test, and collect data in real-time.

The high-quality graphene used in the graphene ink formulations is prepared from non-graphitic feedstocks and is available in the inventory of Carbon Allotropes, a wholly owned subsidiary of Archer. Using in-house alternatives to graphite for processing graphene inks strengthens Archer's independent IP ownership position. The quantity and quality of the non-graphitic graphene used is suitable for rapid prototyping and future device integration.

Next Steps

The development focus is on manufacturing a commercially viable graphene-based biosensor technology and the registration of a full patent application protecting the underlying materials technology IP. This involves optimising ink formulations and their processing methods linked to the provisional patent claims, and identifying transduction methods, bioreceptors, analytes, coupling and assay reagents for the proper function of the biosensor technology.

Archer intends to commercialise the biosensing technology by seeking to establish commercial partnerships, including licencing agreements, with highly resourced organisations including biotechnology companies, that could allow for product scale, IP transfer, and distribution channels.

More information on Archer's biosensor technology commercial pathway can be found in ASX Announcement 30 October 2019.

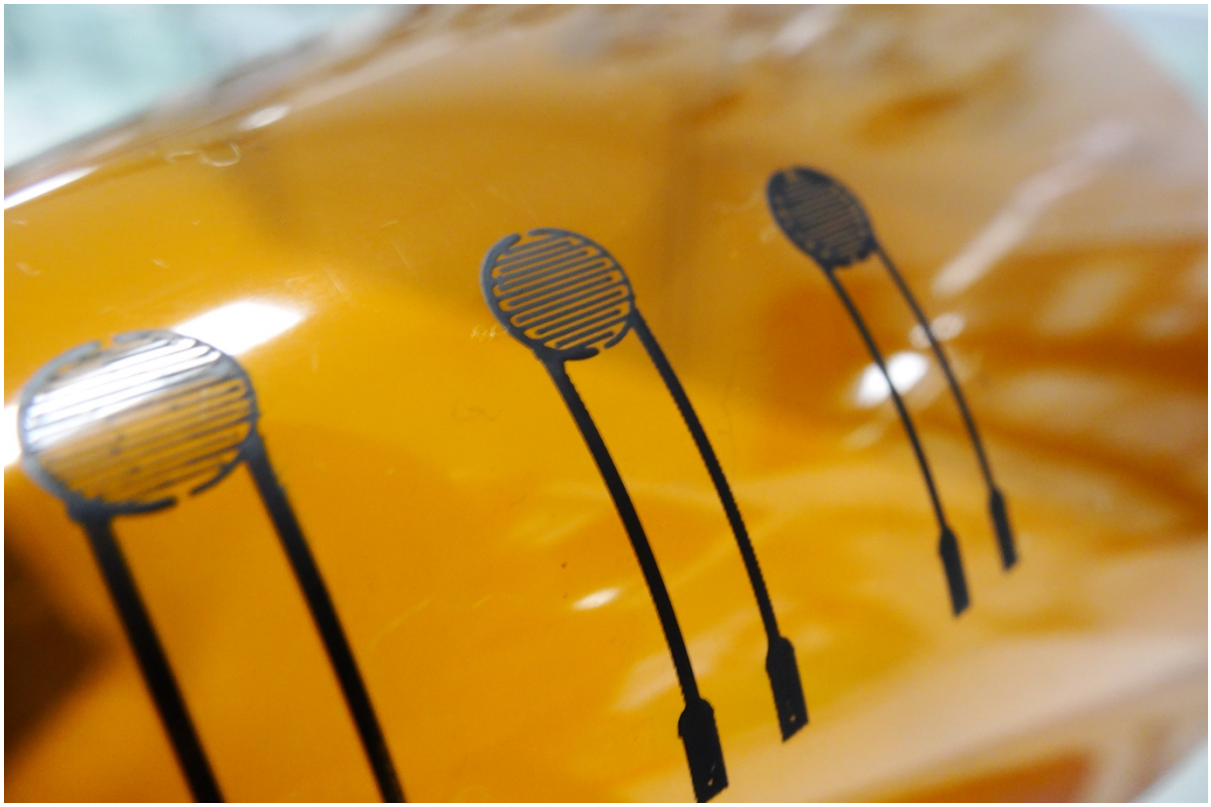

Image 2. Printed Graphene interdigitated electrodes (black patterns) patterned with micron-sized features on a flexible film substrate. The interdigitated pattern is analogous to the gold-coated-nickel electrodes in Image 1.

Background and Market Summary

Archer's Biosensor Development

Archer is developing a potential solution to printable biosensors capable of complex detection of disease. This potentially disruptive solution to point of care diagnostics involves the use of graphene, the thinnest material known, which could act as an ultrasensitive biochemical interface. The uniqueness of such a biosensor is the use of digital manufacturing to print critical graphene components integrated into one sensor. The development of printable graphene biosensors is envisioned to impact industries servicing human health, including medical diagnostics.

Archer is engaged in a collaboration agreement with the University of Adelaide ARC Graphene Hub and a material transfer agreement with a leading German Biotech ("Collaborations"). The Collaborations seek to target high value, high growth markets servicing human health applications by developing and implementing graphene-based materials for use in complex biosensing devices. Archer filed a provisional patent for a novel ink formulation with the aim of fabricating a proof-of-concept printable biosensor, comprising components capable of detecting disease state markers, such as antibodies or antigens (ASX Announcement 19 February 2019).

Market & Key Growth Catalysts

The global biosensor market revenue is expected to grow to US$27 billion by 2022[†]. There is a global need for healthcare to become cheaper, efficient and more accessible[‡]. Biosensors can reduce patient (end-user) wait times by bypassing traditional infrastructure requirements and lengthy testing processes in disease management. The key driving factors of growth are aging populations in North America, Asia and Europe. Europe is the largest contributor in the printed sensor market. Electrochemical biosensors hold a major share in the biosensor market.

Biosensors form part of the growing A$300+ billion revenue global biotechnology industry[§]. With a low industry concentration, large companies use strategic acquisitions to expand their market share and access crucial intellectual property describing products that are commercially viable. Over 75% of biotechnology businesses are located in Europe and North America. Approximately 30% of costs in the industry are related to materials, and the margin in the industry is approximately 20%-30%.

About Archer

Archer provides shareholders exposure to financial returns from innovative technologies and the materials that underpin them. The Company's strategy is to build an industry-leading Materials Technology company, that delivers maximum value to shareholders through the commercialisation of assets at various stages of the materials lifecycle. Archer has strong intellectual property, broad-scope mineral tenements, world-class in-house expertise, a diverse advanced materials inventory, and access to over $300 million of R&D infrastructure.

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[†] Biosensors Market by Application, Global Forecast to 2022. Market and Markets, 2017.
[‡] 2018 Global Healthcare Outlook. Deloitte, 2018.
[§] Ozelkan, A. IBISWorld Industry Report - Global Biotechnology. IBISWorld. 2017.