

ASX Announcement ([ASX: AXE](#))

16 November 2022

Early-stage prototype of biochip system platform

Highlights

- In a major milestone towards biochip commercialisation, Archer has implemented an integrated system platform for biosensing.
 - Archer will use the biochip platform for quickly testing in-house biosensing chips to obtain the relevant data for establishing commercial partnerships.
 - The current system hardware and software paves the way for future designs that embed single-chip multiplexing.
 - Global semiconductor companies see sensors representing semiconductor products with the greatest growth opportunity in the industry[†].
 - The biochip technology is being developed in-house by Archer staff and Archer owns 100% of the related intellectual property.
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Archer Materials Limited (“Archer”, the “Company”, [“ASX: AXE”](#)) is pleased to inform shareholders that the Company has implemented an early-stage prototype of an integrated biochip platform with automated liquid sample handling and readout. The work is a major milestone towards Archer’s biochip technology commercialisation.

Archer’s biochip innovation aims to integrate graphene field effect transistors (“gFETs”) into advanced fluidic systems to create miniaturised lab-on-a-chip device platforms for medical diagnostics. In particular, the integration of gFETs with on-chip fluidics to potentially enable multiplexing, *i.e.*, the ability to parallelise the detection of multiple biologically relevant targets fluids, on a chip.

Archer has made significant technological progress over the last year that fundamentally link to the development of a prototype biochip technology system platform, recently designing and fabricating an operational liquid-gated gFET, *i.e.*, a wettable transistor.

For the first time, the Company has now developed, built, and configured a method, device, and prototype operational system platform for lab-on-a-chip sensing of the electronic properties of biologically relevant fluid samples (Image 1). This is a major milestone towards commercialisation of Archer’s biochip technology.

Commenting on Archer’s biochip development progress, Company CEO Dr Mohammad Choucair said: “This is a significant step in the development of Archer’s biochip that has the potential for commercial applications. Archer will focus on building advanced and sophisticated versions of this system which could be used in commercial or applied research settings.

“The system will allow the Archer team to accurately, reliably, reproducibly, and quickly obtain data related to the Company’s biochip devices, which is importantly, required to establish commercial partnerships with global companies organising around the high-growth biosensing and diagnostics market”.

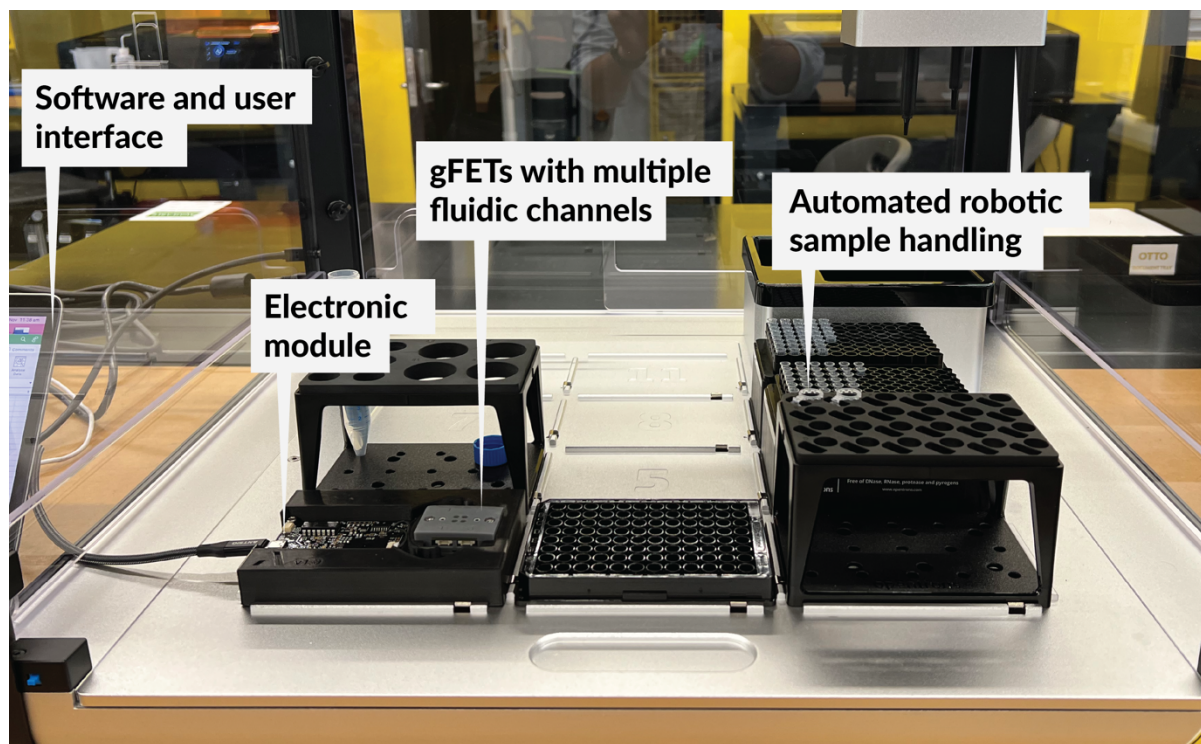


Image 1. Archer's early-stage prototype biochip system platform. Archer will now use the technology to perform tests and device optimisation that are commercially relevant. Typically, fluid sample is pipetted onto the active sensing site using an automated programmable robot, to complex multiple fluidic channels, i.e. to the wettable gFET. In this way, the electronic properties of the fluid sample can be tested and analysed, and the results electronically read-out by the user on a computing device connected to custom designed hardware modules and software.

The end-to-end prototype system platform enables high throughput testing that incorporates gFET chips (i.e. biochip component) integrated with multiple fluidic channels, an automated sample handling robot, readout electronics, and software and user interface on a laptop.

The software and user interface was custom built by Archer and is designed to be used in development, providing an easy way to run tests on Archer's biochips with different designs. The software is built on several packages in Python. The automated testing uses a programmable robot, which directly communicates with the biochip control and readout hardware.

The system platform setup is a powerful tool in advancing Archer's biochip development, enabling the improvement of the sensing device active sites, and automating liquid delivery to the chip using feedback from the sensor itself to allow complete hands-off and remotely controllable testing of prototype devices.

Archer will be able to quickly assess the impact of design changes within the biochip and the effectiveness of detection mechanisms. This is anticipated to lead to accelerated development of the Company's proposed sensing pathways to detect biologically relevant information and reduce the cost of each development cycle.

The current hardware and software in the system platform is designed to run using a chip with single isolated gFETs as sensors, as gFETs offer an ultrasensitive approach to analyte detection over conventional electronic sensors used in current lab-on-a-chip devices. However the early system platform paves the way for the possibility of single-device multiplexing in future designs.

Atom-thin graphene and its application in developing Archer's biochip

Graphene is an advanced material with electronic, chemical, and physical properties on the nanoscale that make its use in FETs for biosensing applications highly advantageous[†]. Key advantages are often described as being easy operation, fast response times, real-time monitoring, high specificity and sensitivity, microfluidic integration, and multiplexing capability. The properties of graphene have been well studied scientifically in the field for over 15 years[§].

About Archer's biochip

Archer's biochip is lab-on-a-chip technology the Company is developing to enable the complex detection of some of the world's most deadly communicable diseases. Archer is currently focused on micro- and nano-fabrication of the biochip device components and combining these components with biochemical reactions to detect diseases, which pose significant technological challenges to potentially commercialising lab-on-a-chip devices.

About Archer

Archer is a technology company that operates within the semiconductor industry. The Company is developing and commercialising advanced semiconductor devices, including chips relevant to quantum computing and medical diagnostics.

The Board of Archer authorised this announcement to be given to ASX.

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[†] <https://advisory.kpmg.us/articles/2022/global-semiconductor-industry-outlook-2022.html>

[‡] <https://pubs.rsc.org/en/content/articlelanding/2021/AN/DOAN01661F>

[§] <https://www.nature.com/articles/s42005-021-00518-2> and <https://onlinelibrary.wiley.com/doi/abs/10.1002/adfm.201604040>