

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

8 April 2021

Archer begins sub-10 nanometre biochip fabrication

Highlights

- Archer commences biosensor nanofabrication process to sub-10 nanometre size, the current best-in-class in the semiconductor industry[†].
 - The significant reduction of size in biosensor components allows for hundreds of millions of biosensing devices on a 1 cm² biochip.
 - Miniaturisation to the sub-10 nanometre regime is a key requirement for the operation and end-use of Archer's biochip.
 - Some of the most sophisticated lithography facilities and systems for prototyping semiconductor devices are being utilised by Archer staff in Sydney, Australia.
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Archer Materials Limited ("Archer", the "Company", "[ASX:AXE](#)") is pleased to inform shareholders that the Company has commenced development towards a key technological milestone of achieving sub-10 nanometre biochip components. Archer staff are now directly operating the world-class lithography systems and instrumentation required to achieve this milestone in a [research and prototype foundry](#).

Sub-10 nanometres (nm) represents global best-in-class in the semiconductor industry

Miniaturisation to below 10 nm is required for the successful development of Archer's biochip (1 nanometre is a billionth of a metre). The Company recently made a step-change in its biotech development by miniaturising key biosensor components to nanoscale chip formats on silicon wafers (ASX ann. [22 Mar 2021](#)) with feature sizes of 100-150 nm from centimetre ("cm") size (ASX ann. [31 Aug 2020](#)) (i.e. 1 million+ sensor components in the same cm² area).

Company staff are now trained to directly utilise the Elionix ELS-125 electron-beam lithography system and associated instrumentation (Image 1) ("E-beam"), in Sydney, Australia. Archer aims to use the E-beam to create sub-10 nm features for its prototype biochip devices. In doing so, the Company would overcome significant barriers to entry, including pattern design and process optimisation, for on-chip fabrication of biosensor components.

Commenting on Archer's nanofabrication development, Archer CEO Dr Mohammad Choucair said "Archer has progressed to one of the most advanced forms of nanofabrication after recently translating biosensor components onto silicon wafers. We are expanding on this strength with in-house capability to build a robust biochip IP portfolio. This is key to Archer's long-term growth, and near-term speed of execution in its deep tech development".

"Best-in-class capabilities in nanofabrication is a global competitive advantage in the multibillion-dollar point of care medical diagnostics industry. One of the reasons why there are few companies in the world developing and commercialising biochips is because it's difficult to achieve precision engineering at the nano scale".

[†] <https://www.chiefscientist.nsw.gov.au/independent-reports/australian-semiconductor-sector-study>
<https://www.youtube.com/watch?v=MtYEmR9F8OM> (Intel Unleashed: Engineering the Future)



Image 1. Elionix ELS-125 electron lithography system. The vertical circular tower is where the electron-beam is located, while the chip is introduced through the load lock (the rectangular area with the protruding rod). The multi-million-dollar E-beam system is housed in a cleanroom environment in Sydney, Australia, and is manufactured in Japan.

A greater degree of flexibility in the design and fabrication of Archer's biochip device

Archer's biochip design principles involve using proprietary graphene-based materials in integrated circuits (*i.e.* to fabricate graphene-based transistors), to form the key sensing elements in its biochip technology. The largest technological barriers to commercialising such devices involve nanofabrication that link to high-value advanced manufacturing.

The biochip end-use is initially aimed at addressing the complex detection of diseases affecting the respiratory system, as they remain the world's most deadly communicable diseases[‡]. Archer's aim to miniaturise its biochip transistor components for graphene integration would enable broad-scope functionality in multiplexing for disease detection.

About Archer

A materials technology company developing innovative deep tech in quantum computing, biotechnology, and reliable energy. The Company has strong intellectual property, world-class in-house expertise, a unique materials inventory, and access to Tier 1 technology development infrastructure.

[‡] <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>

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

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