

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

4 November 2021

Early-stage assembly of biochip components

Highlights

- Archer fabricates and integrates nanosized biochip components in microfluidic channels on chip compatible substrates.
 - The microfluidic channels are less than 20 micrometres in width (about 3 times thinner than a human hair).
 - The work validates the Company's early-stage capabilities in developing a significant aspect of lab-on-a-chip devices[†], required for the future operation of Archer's biochip.
 - Lab-on-a-chip devices are a subset of Sensors/MEMS products that represent a high-growth opportunity in the semiconductor industry[‡].
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Semiconductor company Archer Materials Limited ("Archer", the "Company", "[ASX: AXE](#)") is pleased to provide shareholders with a technical progress update on Archer's 'lab-on-a-chip' technology ("biochip"). Archer owns 100% of the biochip technology intellectual property.

The Company is developing a biochip that would allow tiny amounts of liquid or gas samples (e.g. saliva, blood, breath, etc.) to be analysed. The biochip requires the advanced fabrication of features like hair-thin microfluidic channels that allow sample processing such as mixing, chemical or physical reactions. These channels also allow the transportation of samples to smaller built-in sensors for analysing biochemical targets, for example, of viruses or bacteria. The Company has successfully fabricated microfluidic channels required for the biochip and integrated sensor components and other features within them on a silicon wafer, demonstrating for first time the fabrication, miniaturisation, and integration of critical biochip components.

Configurable and unoptimised nanosized biosensor component features were *nanofabricated* within miniaturised microfluidic channels that were *microfabricated* to create several intricate designs on a silicon wafer in a semiconductor research and prototyping cleanroom environment (Image 1). This significant early-stage development at the micro- and nano-scale demonstrates the potential for increased compatibility with functions required for lab-on-a-chip biosensing and integration on board chip devices[†], including for Archer's biochip.

This is significant, as the Company has now, with its in-house capability, miniaturised microfluidic channels to 20 micrometres or less in width on silicon, potentially allowing for 3,000+ channels within 1 cm², and has also integrated nanosized biosensor components within these channels. As part of Archer's biochip design principles for operation, critical components including sensor components must be fabricated *inside* the microfluidic channels.

[†] Journal also focuses on critical issues and significant applications Lab on a Chip technology may address:
<https://www.rsc.org/journals-books-databases/about-journals/lab-on-a-chip/>

[‡]<https://advisory.kpmg.us/articles/2021/global-semiconductor-industry-outlook-2021.html>; KPMG Global Semiconductor Industry Survey Findings (2021 and 2020).

Commenting on the biochip development progress, Archer CEO Dr Mohammad Choucair said: "The Archer team has been ultra-focused on strengthening and expanding our nano- and micro-fabrication capabilities, including for the development of Archer's biochip, as this is one of the biggest challenges to potential commercialisation of lab-on-a-chip technology.

"We have demonstrated miniaturisation with deliberate, precision control of nanosized components' fabrication and positioning for integrating biosensing functions on chip substrates, which Archer ultimately aims to translate into a sophisticated and unique biochip technology."

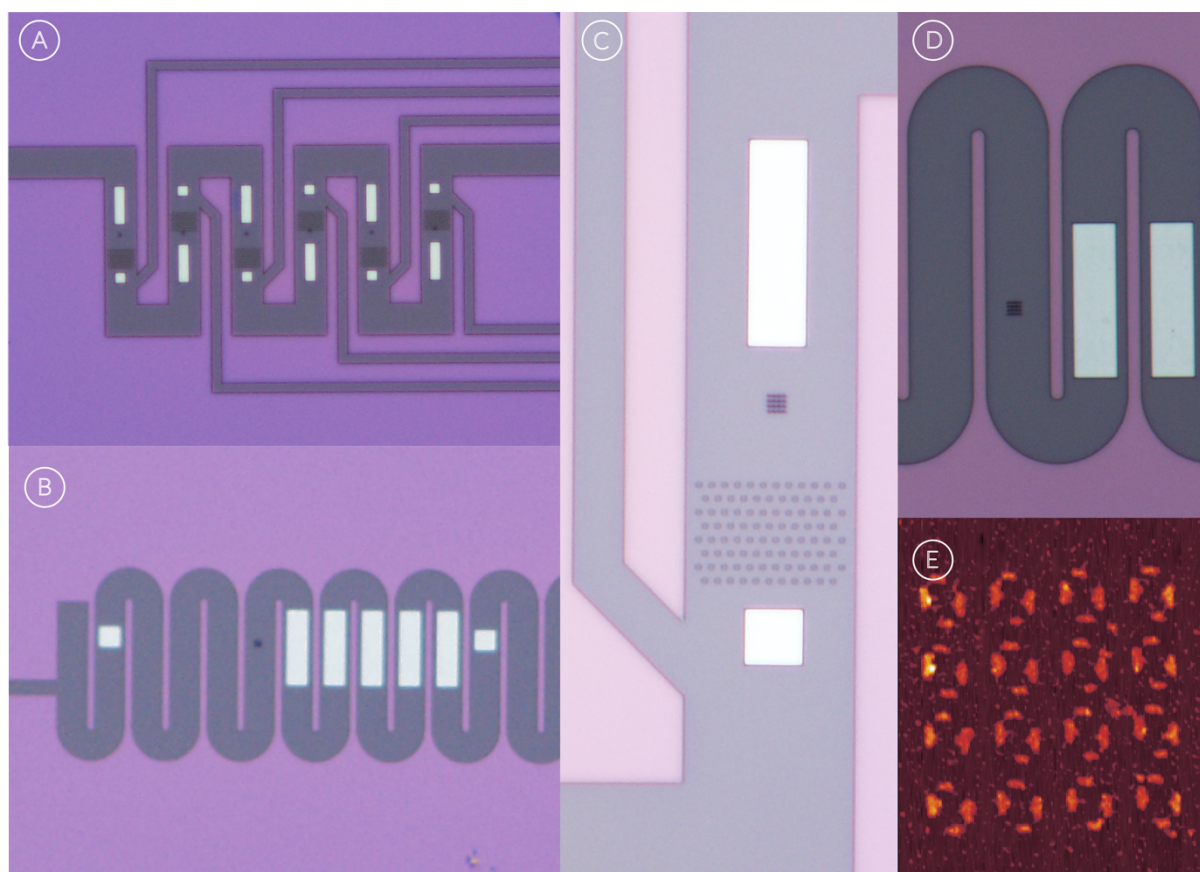


Image 1. Early-stage biochip assembly. A and B are images of two different fabricated patterns of on-chip microfluidic channels which would allow for controlled gas or liquid sampling (e.g. droplets of biological specimens that may include saliva, blood, breath etc.) shown in the darker shaded regions on the purple background. The microfluidic channels are less than 20 micrometres in width (approx. 3 times thinner than a human hair) and the entire componentry assembly is less than a millimetre in size. Additionally, features of B which are magnified and shown as the tight continuous curves in D and the magnified region of A showing small nanometre square arrays of pillars (approx. 500 nanometres in height) present above the white square region magnified in C, would allow for mixing of samples, providing potential increased functionality for Archer's biochip. The white squares and rectangle areas in A and B are pre- and post-sensing mixing stations and storage wells for chemical reactions. The pattern assemblies shown in A and B integrate electrode routing for 96 biosensing areas and are an unoptimised proof of concept. The image in E shows a highly magnified area of the nanosized biosensing electrodes (approx. 100 nanometres in size) that can be seen in C and D as a 4 x 4 electrode array, which would allow for biosensing and is nanofabricated using various metals. Archer's biochip development involves designing the sensing components in E to incorporate graphene materials and complexes thereof in transistors for performing biosensing (i.e. graphene processed and/or produced on-chip).

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. The biochip development commenced in Nov 2020 (ASX ann. 5 Nov 2020). The Company strengthened its biochip fabrication capabilities (ASX ann. 22 Mar 2021), working towards best-in-class sub-10 nanometre fabrication (ASX ann. 8 Apr 2021), and establishing chip testing operations (ASX ann. 11 Jun 2021). Archer is currently focused on micro- and nano-fabrication of the biochip device components, which is a significant technological challenge 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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