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ASX Announcement (ASX: **AXE**) 20 June 2022

Fabrication of nanodevices towards qubit readout

Highlights

- Complex nanodevices fabricated in first step towards qubit readout.
- The nanodevices will be used to perform quantum measurements that fundamentally link to qubit operation.
- Archer's innovation in control and readout devices is aimed at integrating its qubit material in mobile compatible technology.
- Archer is the only ASX listed company and one of a few players in the world developing qubit processor technology.

Archer Materials Limited ("Archer", the "Company", "ASX: **AXE**") is pleased to provide shareholders with a technical progress update on Archer's ^{12}CQ quantum computing chip technology ("^{12}CQ chip").

Archer's ^{12}CQ quantum technology comprises a carbon nanosphere adapted to store a qubit. Control and readout devices are required to set the qubit and read the qubit stored on the carbon nanosphere. A control device is used to perform quantum operations on the qubit with a readout device measuring the results.

The control and readout of Archer's electron spin-based qubit is a fundamental requirement for the future operation of the ^{12}CQ chip. The development of complex lithography patterning methods to produce control and readout electronics compatible with scaling in a semiconductor foundry is required for the integration Archer's ^{12}CQ chip into mobile platforms.

The Company has previously announced validation of the *classical* behaviour of single and few-qubits and related device fabrication (*e.g.*, ASX ann. 22 Feb 2021), and the on-chip detection of *quantum* information for macroscopic quantities of qubit material using mobile compatible technology (ASX ann. 1 Feb 2022), that have direct implications on the Company's control and readout development.

Archer has now successfully fabricated nanodevices that will allow probing of *quantum* behaviour in its qubit material that is of fundamental importance to the ^{12}CQ chip technology operation (Image 1).

The nanodevice fabrication reported in this Announcement is the first step towards the readout of quantum states from few and single qubits used in Archer's ^{12}CQ technology.

Archer's recent technology advances and talent recruitment (ASX ann. 15 Mar 2022 and 30 May 2022) is paving the way for the implementation of complex quantum electronic nanodevices.

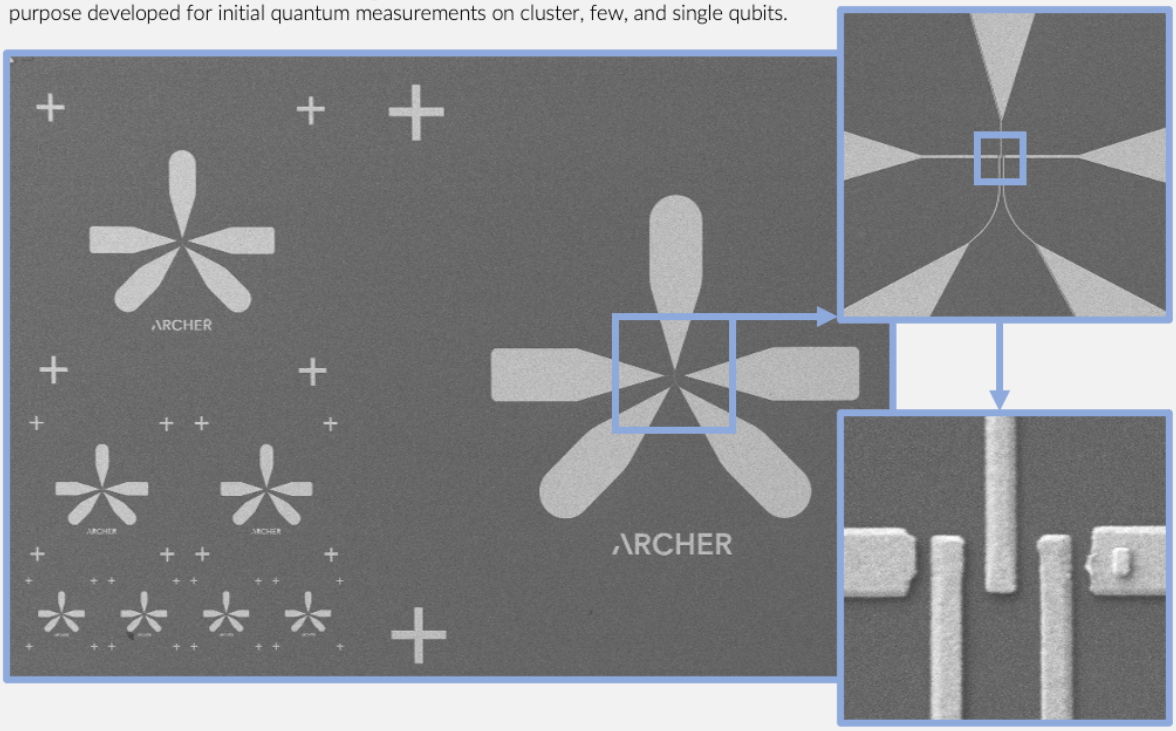
Significant innovation is required to produce the nanodevices. Nanofabrication was performed using state-of-the-art lithography and specialised software, to obtain feature sizes compatible with a few to single qubits.

The fabrication process is repeatable and reproducible at scale, solving challenges related to complex nanodevice proximity effects and the on-chip integration of micron and nanometre size features.

Commenting on the ^{12}CQ technology progress, Archer CEO Dr Mohammad Choucair said: "This work marks a significant a ramp up of development towards reaching Archer's goal of on-chip qubit control and readout.

"The nanodevices are intended to translate the quantum behaviour of the ^{12}CQ qubit material for on-chip information processing and provide a potential pathway to mobile integration."

Image 1. An example of typical electronic nanodevices fabricated towards qubit readout. The complex features, that appear as a lighter shade, are of various sizes and proximity, purpose developed for initial quantum measurements on cluster, few, and single qubits.



Further information on Archer's global competitive advantage and tech differentiation

The scientific breakthrough made in 2016 to realise Archer's ^{12}CQ qubit material is available online in the peer-reviewed scientific journal Nature Communications, which reports the advantages, technological trade-offs, and the technological barriers that have been overcome towards realising practical quantum computing, over several other qubit proposals.

Patent information related to the ^{12}CQ chip qubit and proposed device(s) is available online, including examiner reports, through the WIPO website.

About Archer

Archer is a technology company developing advanced semiconductor devices, including processor chips that are relevant to quantum computing. Archer is developing the ^{12}CQ chip, a world-first qubit processor technology, that could potentially allow for quantum computing powered mobile devices ('QPMDs').

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

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