

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

23 July 2024

Archer develops new Biochip gFET test procedure and processing for better functionality

Highlights

- Archer Materials has developed a graphene transistor test procedure to assess the gFET sensor performance and ensure consistency over time. The tests study the gFETs under different conditions and under different electrical operation modes
- Archer determined new ways to electrically operate the gFET sensor - speed and direction of the voltage applied to the gate
- New test procedure allows Archer to use new ways to detect substances under different operating conditions using data analysis and machine learning
- Archer is now determining how best to improve stability and durability of the gFET sensors by developing proprietary materials modification steps and adding special ultrathin protective coatings.
- Archer has also initiated experiments with semiconductor companies in the US to investigate novel processing steps as means to enhance sensing sensitivity.
- Recent work includes extensive testing of Archer's gFETs, focusing on factors such as electrical biasing conditions and the impact of repeated use and liquid exposure.
- Archer has been actively collaborating with several foundries in Europe and the US to develop its Biochip gFETs,

Archer Materials Limited ("Archer", the "Company", "ASX: AXE"), a semiconductor company advancing the quantum technology and medical diagnostics industries, has developed a standardised procedure for testing its graphene field effect transistors ("gFETs") manufactured by its European suppliers.

The new procedure was developed to ensure the gFETs work correctly before using them in sensors.

Archer determined new ways to electrically operate the gFET sensor – speed, and the direction of the voltage applied to the gate (a part of the transistor). These factors change how the transistor responds based on the liquid and the number of ions in the liquid (tiny, charged particles), ultimately setting the sensitivity and speed of the sensor. Through this ability, Archer can use new ways to detect substances under different operating conditions using data analysis and machine learning.

Understanding and changing these aspects allows Archer to potentially produce a sensor that can quickly and accurately detect different substances.

The team also examined how different settings, like the electrical biasing conditions and voltage sweeps, to see how they affect the transistor (gFET) operation. In addition, testing was done on how storing and using the transistor repeatedly impacts its performance, as well as what happens when different liquids are applied to it.

Archer is now determining how best to address gFET stability and durability issues. They are investigating protection of the transistor by adding special ultrathin coatings and employing precision materials modification steps during the fabrication process. This work will help Archer move to the next phase of developing a sensing method.

Archer has collaborated with several European foundries to develop and test gFETs for the Company's Biochip and the new procedure will ensure consistency, reliability, and sensitivity with our partners.

In addition, Archer has initiated experiments with semiconductor companies in the US to investigate novel processing steps into the gFET fabrication flow. This work is complementary to the fabrication already done in the European foundries and will provide a route to producing more sensitive sensing devices.

This latest work builds on earlier gFET design fabrication milestones, including a multi-project wafer run with a German foundry (ASX ann. 9 Nov 2023), a whole four-inch wafer run at a foundry in the Netherlands (ASX ann. 14 Sept 2023), and a six-inch wafer run at a Spanish foundry. Archer also recently advanced its Biochip gFET chip design with a significant size reduction, with the miniaturised chip designs sent for fabrication to a foundry partner in the Netherlands (ASX ann. 11 Mar 2024).

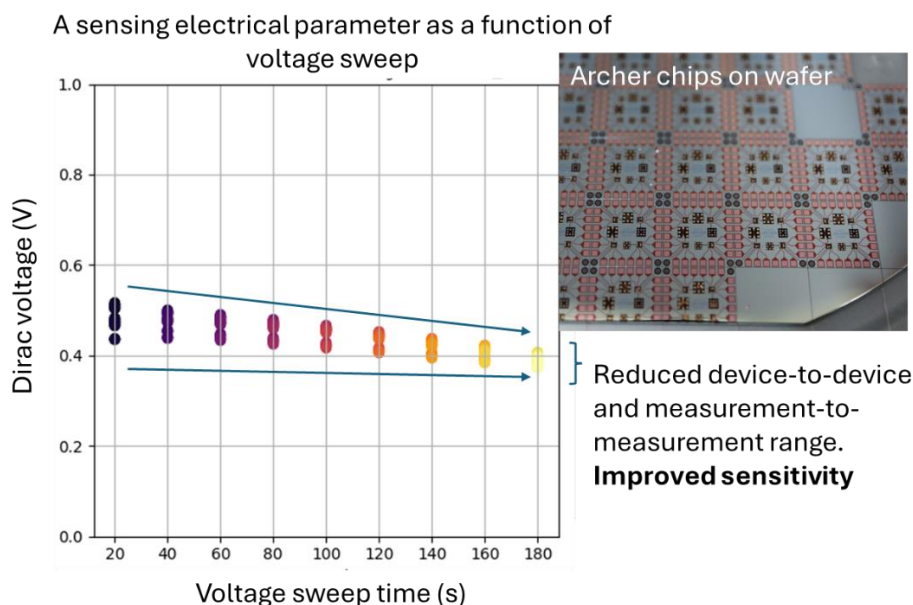


Image 1. Example electrical data from gFET testing. The graph shows improved measurement-to-measurement and chip-to-chip variability with voltage sweep conditions. A photo of the gFET chips on a wafer is shown alongside.

Commenting on the gFET test work, Greg English, Executive Chair of Archer, said,

“The newly developed standard procedure for the extensive testing of gFETs will help improve the manufacture of the Biochip through our European foundry partners. This includes focusing on factors such as voltage settings and the impact of repeated use and liquid exposure. The Archer team discovered that the speed and direction of voltage applied to the gate significantly influence the transistor's response. This finding will aid in developing advanced detection methods using data analysis and machine learning.

“By comparing gFET devices from different suppliers, Archer is identifying the most stable and accurate gFETs for future development activities and final use.”

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

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About Archer

Archer is a technology company that operates within the semiconductor industry. The Company is developing advanced semiconductor devices, including chips relevant to quantum computing and medical diagnostics. Archer utilises its global partnerships to develop these technologies for potential deployment and use across multiple industries.
www.archerx.com.au