
Archer Materials Miniaturizes Biochip gFET Chip Design

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Archer Materials Limited, a semiconductor company advancing the quantum computing and medical diagnostics industries, has designed a miniaturised version of its Biochip graphene field effect transistor (gFET) chip for fabrication at a commercial foundry.

The [Archer](#) Biochip contains a sensing region of which the gFET is the core component. Each gFET chip contains multiple gFETs, each of which is a transistor, which acts as a sensor. Archer has miniaturized the total chip size by redesigning the layout of the circuits creating these gFET transistors. The new miniaturized design has been sent to a foundry partner for a whole-wafer fabrication of reduced size gFET chips, which Archer intends to integrate with other parts of the Biochip technology.

The new gFET chip design has been significantly reduced in size over earlier designs of 10mm x 10mm to 1.5mm x 1.5mm. It will be tested on a four-inch wafer which is expected to produce 1375 chips on it, compared to the 45 chips produced using earlier designs in previous four-inch wafer fabrication runs.

The chip will be fabricated by Applied Nanolayers (ANL), based in the [Netherlands](#), which has fabricated earlier designs of Archer's gFETs (ASX ann. 14 Sept 2023). Independent to wafer runs at ANL, Archer has also sent gFET designs to a foundry in [Spain](#) for fabrication, with delivery anticipated within the first half of 2024 (ASX ann. 11 Dec 2023).

Archer applies the 'fabless' chipmaker model by designing, researching, and developing its chips, while outsourcing manufacturing to specialised companies in the semiconductor supply chain. This includes the creation of a new miniaturized Biochip gFET chip design, sending the design for a whole wafer run in a commercial foundry, and deciding on the chip assembly and semiconductor device electronics packaging and related electrical testing.

The wafer will be diced and assembled at Archer's newly established outsourced semiconductor assembly and testing (OSAT) partner, AOI Electronics in [Japan](#). The OSAT includes moulding, dicing, and lead frame design for this dedicated wafer assembly, and also device electronic shorting and related packaging testing. These new capabilities are key in advancing the Biochip development to interfacing and integration with miniaturized gFET chip sensor designs. Delivery of the packaged chips is anticipated in mid-2024.

Background

Archer's Biochip innovation is focused towards integrating gFETs into advanced fluidic systems to create miniaturized lab-on-a-chip platforms for medical diagnostics. If successful, this could enable the ability to parallelise the detection of biologically relevant targets on a chip.

Archer Materials has previously confirmed the fabrication and electrical conductivity of earlier generations of gFET chip designs by the manufacturer of chips at semiconductor foundries in Europe. The current development which is subject to this announcement follows Archer's progress on gFET chip designs for parallelised (multiplexed) sensing through four-inch wafer runs by ANL (ASX ann. 14 Sept 2023).

Archer continues to strengthen its relationships with global foundry partners.

Commenting on the miniaturization of the Biochip gFET chip design, Dr Mohammad Choucair, CEO of Archer, said, "The significant reduction in the size of the Biochip was a great achievement by the Archer team. We have developed in-house expertise and know-how in gFET chip design.

"By working with Applied Nanolayers and AOI Electronics on the miniaturized gFET chips, we are strengthening our relationships with semiconductor supply-chain partners."

Read the [original article](#) on Business Wire.