



 <sup>12</sup>CQ TECHNOLOGY  
 BIOCHIP TECHNOLOGY



ARCHER



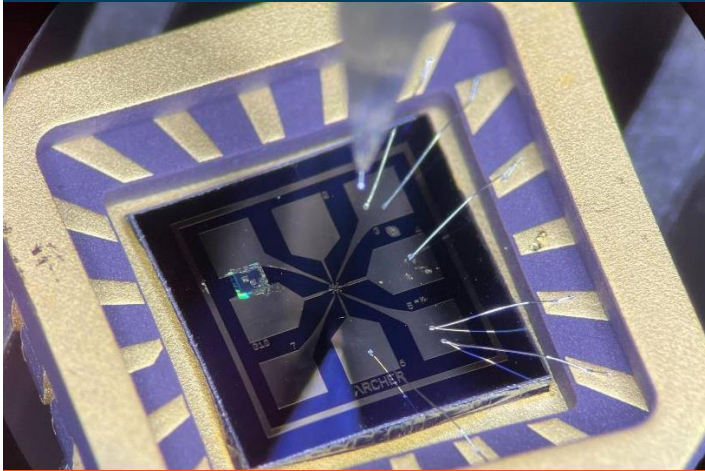
# Archer Materials

Investor Presentation | November 2024



Archer Materials is building on its foundation of carbon-based technologies to develop products that will help solve critical problems.

## Quantum Technology



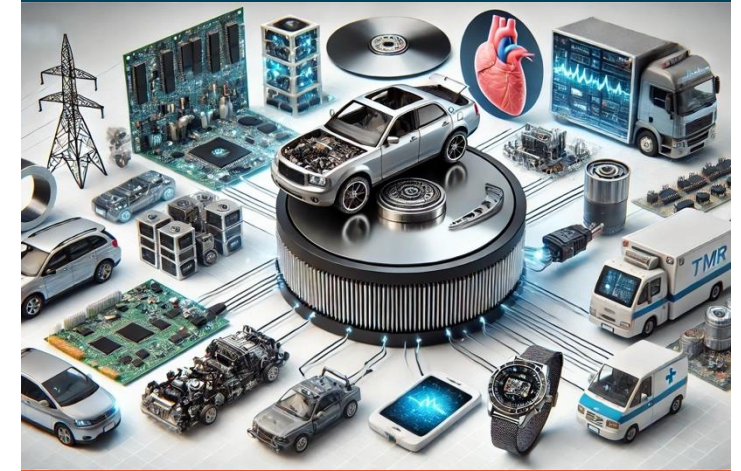
A carbon-based quantum device for applications like sensing and computing and the possibility of integrating with other electronics.

## Biochip



Highly sensitive, chip-based graphene sensors for at-home management and treatment of chronic diseases.

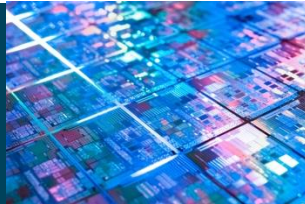
## TMR Sensor



TMR sensors are more sensitive, have higher bandwidth and lower power consumption.

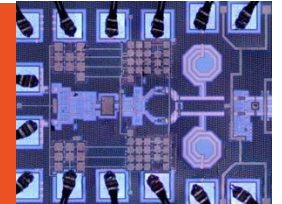
## Technology development strategy focussed on megatrends.

### Quantum Technologies



- Quantum computing offers unprecedented processing power for solving complex problems
- Advanced quantum sensors allow for highly precise measurements
- Quantum computing accelerates AI algorithms, enhancing machine learning, pattern recognition, and data processing

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**12CQ Project**

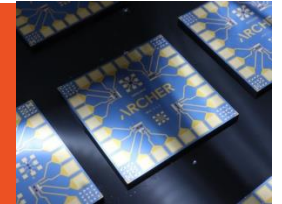


### Ageing Population



- Increased focus on “at home” care.
- Development of easy-to-use home diagnostic tools that allow elderly users to monitor chronic conditions like diabetes, cardiovascular health, and kidney function.
- Focus on cost-effective solutions that make home testing affordable, potentially reducing the burden on the public healthcare system

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**Biochip**

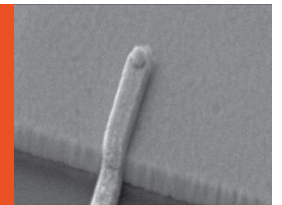


### Digitalisation



- Increasing use of data analytics and big data technologies – exponential growth in data centres
- New technologies required to make data centres more efficient and cost-effective
- Technological advancement driving exponential growth in the digital economy

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**TMR sensor**



### Decarbonisation



- Structural trend driving exponential growth of renewable energy sources
- Existing transmission network unable to cope with influx of renewable energy
- AI and technology solutions are required to make the network stable

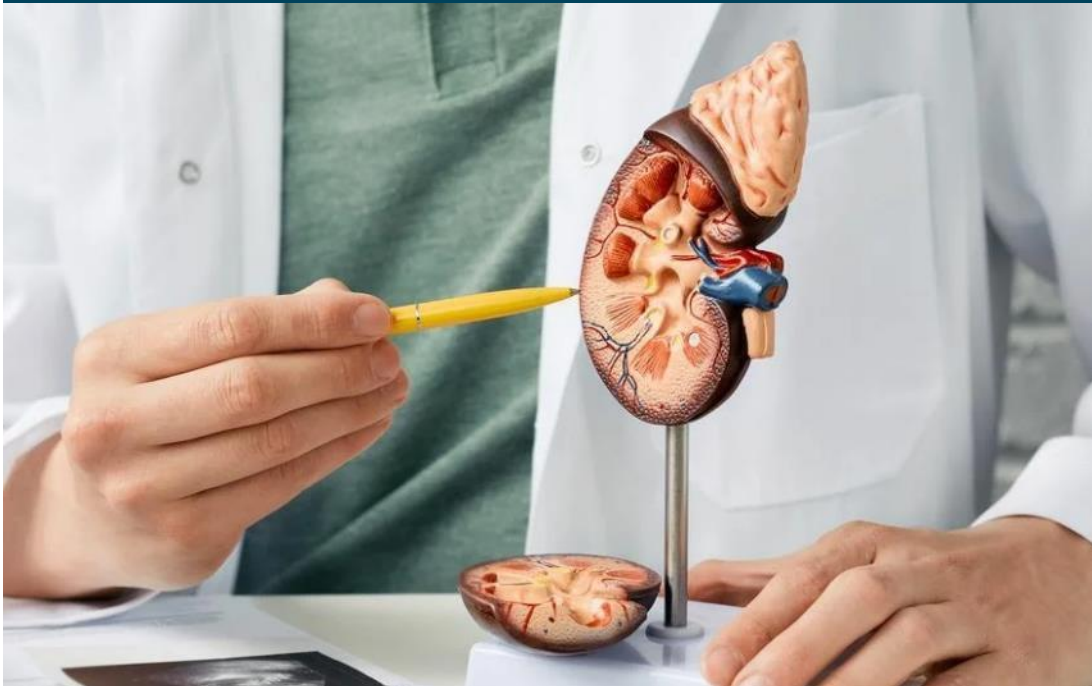
Archer is assessing  
new technologies  
for development





# Biochip – the problem & addressable market

Archer is developing a biochip that uses the highly sensitive, high speed, low power sensors to detect ions that could be integrated into a lab-on-a-chip device for advanced medical diagnostics.



Chronic kidney disease affects more than 850 million people (>10% of the population).<sup>1</sup>

Abnormal potassium levels can be lethal → kidney disease patients are at high risk as the kidneys control electrolytes like potassium.

Testing can only be done in a clinical setting with analysis done via a lab. Current testing is performed monthly, which is too slow and not done frequently enough.

>US\$3B total addressable of the >US\$80B renal disease market.<sup>2</sup>

Extendable to heart disease and treatment.

Extendable to other ion sensing applications in medicine and agriculture.

1. Kidney Care UK "1 in 10 people...", Hill N. et al. PLOS ONE (2016)

2. Yole "Biosensors Marketing Report 2024-32", Market Research Future "Renal Disease Market Report". Bottom-up estimate using refs above

# Biochip – a ‘lab-on-a-chip’ for at home testing

Developing a biosensor, based in graphene field effect transistors (gFET) to test for potassium in chronic kidney disease.

High accuracy to bring testing for diseases like chronic kidney disease into the home at a low cost.



Game changing at-home potassium testing



High frequency of testing enables physicians to more effectively monitor and manage patients with the best available therapies and treatment.



Improved treatment for dialysis patients.



Potassium lowering drugs produced by pharmaceutical companies could be safely and regularly prescribed.



Patients in remote areas are empowered to take-action before its too late.

MUTUAL BENEFIT FOR ARCHER AND DRUG COMPANIES

# Biochip – Potassium Sensing - Status

Proof of concept

Feasibility

Development & Optimisation

----- Launch

## *BEGINNING THESE PHASES*

Work ramping up in Sydney-Archer

Forming partnerships with global diagnostics companies

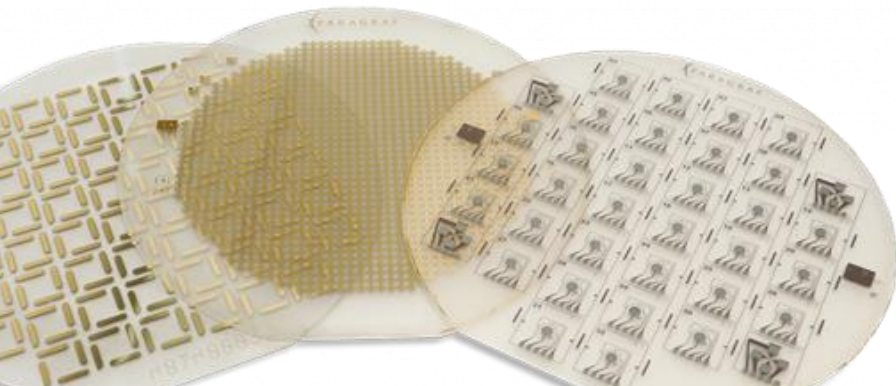
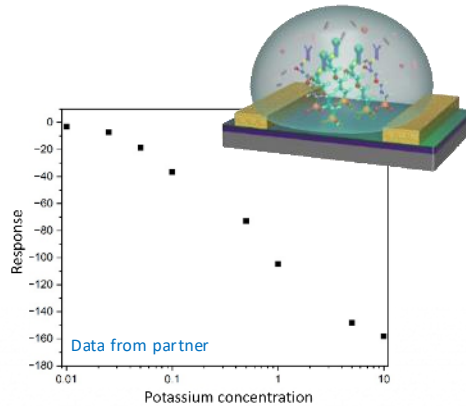
Building access to clinical advisors, potential trial locations

Building academic partnerships in Australia

Initial data

Foundry  
supplier  
sourced

Academic  
support

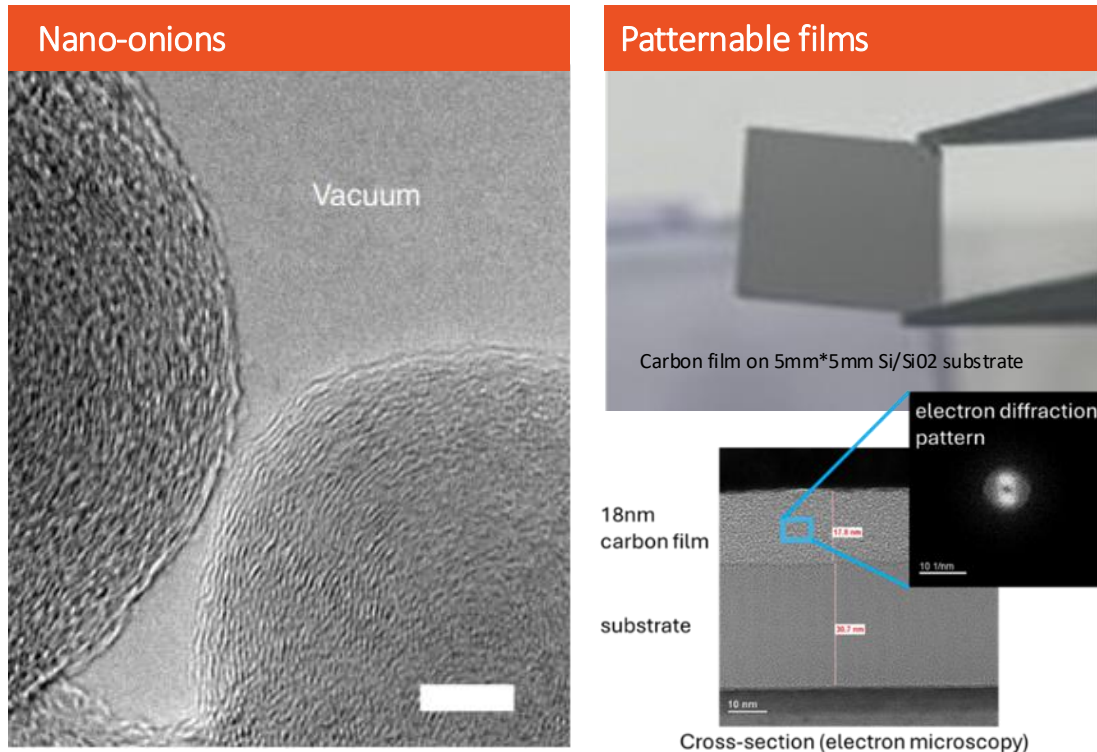




# Quantum technology

## Carbon Materials

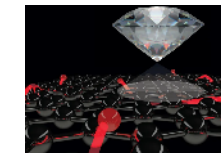
## Applications



Magnetometers



MHz to THz detectors



Magnetic microscopes



Qubits

NEARER TERM

LONGER TERM

Quantum computing enables hundreds of use cases each with significant value-creation potential.



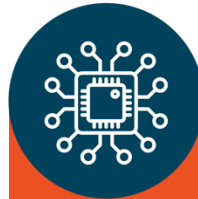
4 types

of computational problems and how quantum computing addresses them.

100+

USE CASES

Machine learning applications will impact most, if not all, industries.



#### SIMULATION

Precisely and efficiently simulate the dynamics of a quantum system.

- **Pharma:** drug discovery  
\$40 billion to \$80 billion
- **Aerospace:** computational fluid dynamics  
\$10 billion to \$20 billion
- **Chemistry:** catalyst design  
\$20 billion to \$50 billion
- **Energy:** solar conversion  
\$10 billion to \$30 billion
- **Finance:** market simulation (used in derivatives pricing)  
\$20 billion to \$35 billion



#### OPTIMISATION

Efficiently optimise solutions from complex and large data.

- **Logistics:** network optimization  
\$50 billion to \$100 billion
- **Insurance:** risk management  
\$10 billion to \$20 billion
- **Finance:** portfolio optimization  
\$20 billion to \$50 billion
- **Aerospace:** route optimization  
\$20 billion to \$50 billion



#### MACHINE LEARNING

Process data sets to reduce noise and simplify computations faster.

- **Automotive:** autonomous vehicle AI algorithm design  
Up to \$10 billion
- **Finance:** money laundering and fraud prevention  
\$20 billion to \$30 billion
- **Tech:** generative, foundation and horizontal AI  
\$50 billion to \$100 billion



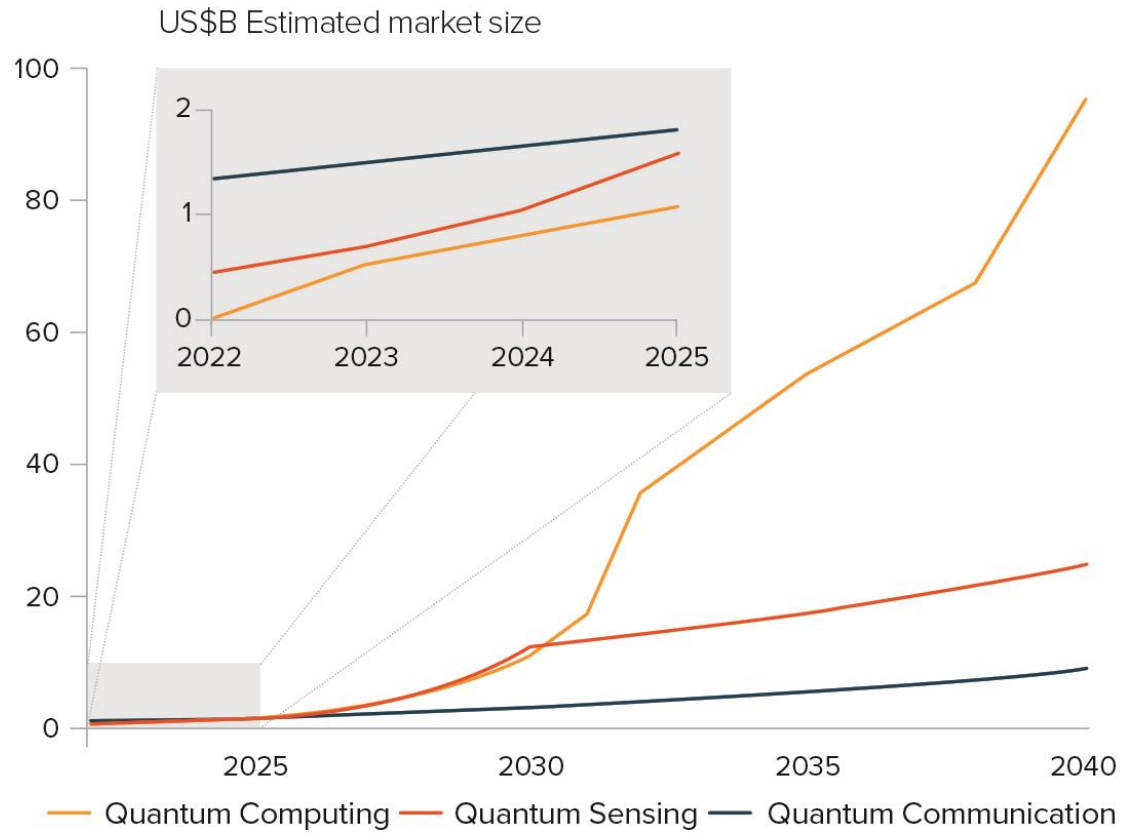
#### CRYPTOGRAPHY

Improve encryption protecting critical information.

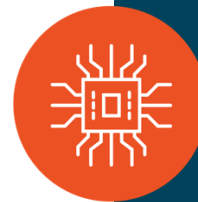
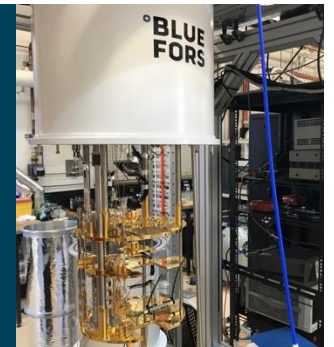
- **Government:** encryption and decryption (related to secure communications and cybersecurity)
- **Corporate:** encryption (related to secure communications and cybersecurity)  
Up to \$10 billion



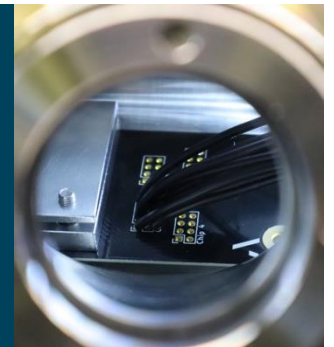
Archer considers quantum technology to be the next great technological advance.  
Expected large scale adoption after 2030.



Adoption of quantum tech expected to increase with quantum hardware maturity

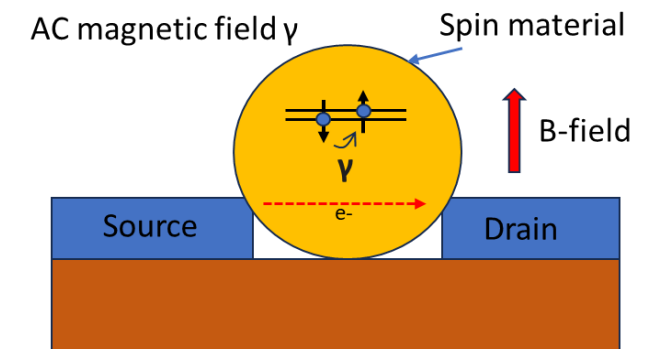
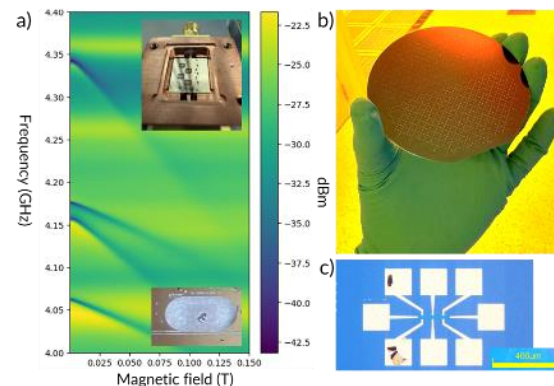
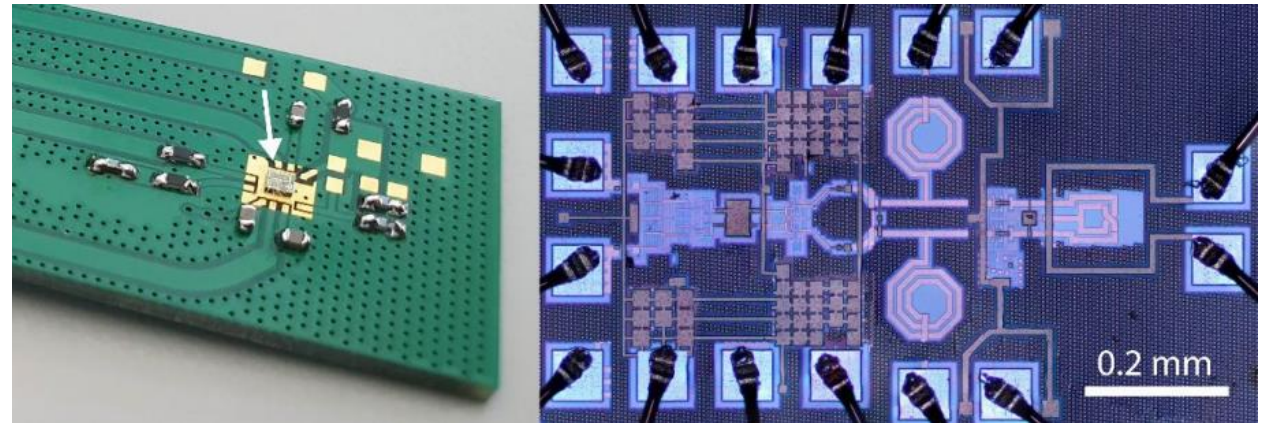


Quantum computing is expected to rapidly increase in share of total quantum value



# Quantum technology – Status

- Recently bolstered manufacturability and scalability with a new carbon film.
- Probing microscale volumes of carbon material using pESR chip.
- Working with external collaborators to make progress on three fronts:
  - Improving materials properties and scaling to wafer-scale synthesis and processing;
  - Developing microwave resonant circuits to both probe and later control electron spin; and
  - Begun work on electrically detected spin resonance for readout.
- Building on team's expertise to investigate TMR sensors





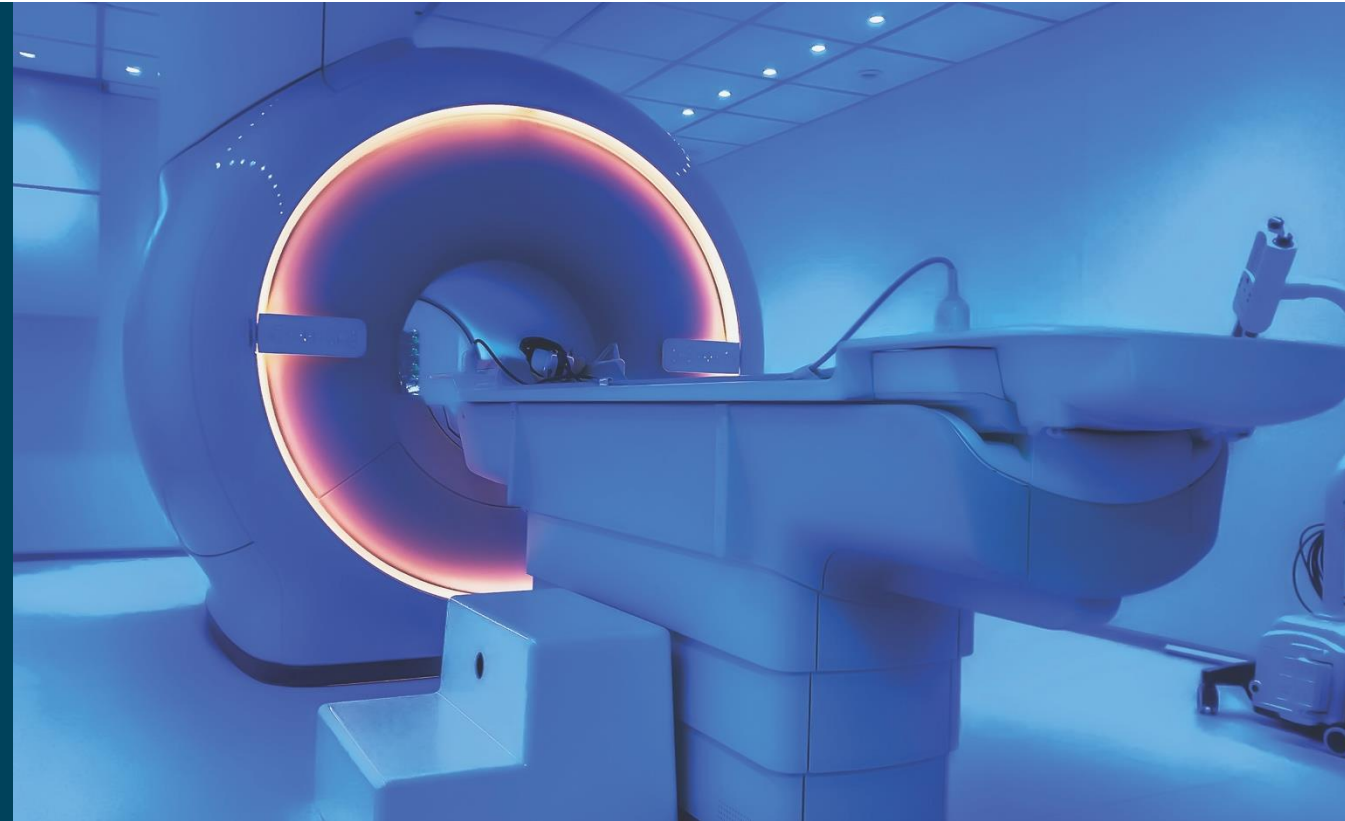
# Archer set to tap into high growth TMR sensor market

- Overseas foundry to develop a tunnel magnetoresistance (“TMR”) sensor for Archer for commercial use in industrial applications.
- TMR sensors are ideal for many applications, including artificial intelligence, data centres, automotive, and the Internet of Things (IoT).
- TMR leverages quantum phenomena to provide a performance edge over classical incumbents.
- Part of Archer’s  $^{12}\text{CQ}$  project, and leveraging its expertise in quantum mechanics to design advanced TMR sensors.
- Archer will finalise its TMR sensor design in the coming weeks, with the first prototypes to be delivered before the end of the year.
- Early next calendar year, Archer will commence work to optimise the TMR sensor design and engage with potential customers, potentially bringing forward revenue opportunities while it continues  $^{12}\text{CQ}$  quantum development.



## TMR Sensors – Key benefits

- High Sensitivity and Accuracy
- Ideal for detecting very small magnetic fields.
- Bidirectional sensing capabilities
- Low Power Consumption
- Enables use in battery-powered devices.
- Versatility
- Suited for various industries, including (but not limited to) automotive, medical devices, and IoT.





# Two-Year Milestones

## Year 1

Complete R&D phase and prototyping with MultiDimension Technology.

Secure partnerships with manufacturers in key industries.

## Year 2

Begin commercialisation and sales.

Launch pilot projects in key verticals with initial customers.

Archer has the foundations in place to advance its technology towards commercialisation in global markets.

### **Future technologies**

Archer's devices look to solve high value problems.

### **Strong partnerships**

Archer has partnerships with foundries to help manufacture its technologies and with leading research institutions to help develop its technologies.

### **Growing markets**

Archer's technologies have a range of applications across growing markets such as medical diagnostics, data centres, IoT, and automotive.

### **IP portfolio**

A growing IP portfolio of granted and pending patents across key markets such as North America, APAC, and Europe.



# Thank you

## ASX Code: AXE

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

Archer Materials Limited  
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