

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

21 October 2022

First Quarter Activities Report and Appendix 4C

For the three months ending 30 September 2022

Significant Activities

- The Company is well capitalised with approximately \$25.3 million cash and no debt.
 - Hong Kong patent granted, marking the successful grant of all ¹²CQ chip patent applications in Archer's current portfolio across Australasia, Europe, and the US.
 - Archer has commenced working with a tier-one semiconductor manufacturer, GlobalFoundries, towards industry fabrication of its ¹²CQ chip technology.
 - Significant advances made in ¹²CQ chip development that support the potential for practical solutions to quantum-enabled mobile devices.
 - Archer achieves its targeted goal of sub-10nm feature size fabrication in its biochip development, in a major tech development breakthrough for the Company.
 - The Company is actively and regularly pursuing exposure to international global semiconductor industry participants.
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Archer Materials Limited ("Archer", the "Company", "[ASX: AXE](#)") is pleased to provide its Quarterly Activities Report and Appendix 4C for the three months ending 30 September 2022 ("Quarter").

Commenting on first quarter activities, Greg English, Executive Chairman of Archer, said, "The granting of the ¹²CQ chip Hong Kong Patent during the Quarter means that the patent applications in the current ¹²CQ chip portfolio have now been granted, with protection given by the patent systems in the US, China, Japan, South Korea, Europe, and Australia.

"The grant of all ¹²CQ patents in the relevant jurisdictions was the culmination of years of hard and persistent work by our CEO, Dr Mohammad Choucair, and his team.

"In July, Archer performed state-of-the-art 3D Electrostatic Finite Element Modelling in conjunction with in-house software development to show the ¹²CQ device's compatibility with existing fabrication processes. This work was followed by the agreement with GlobalFoundries to advance the development of the ¹²CQ quantum chip technology.

"The agreement with GlobalFoundries will provide Archer with access to the technology facilities and manufacturing processes of GlobalFoundries and will allow the companies to work together on ¹²CQ device and circuit design and technology development.

"During the Quarter, we developed advanced lithography semiconductor fabrication processes to reach sub-10 nm biochip device components. Archer staff ambitiously set out to achieve sub-10 nm fabrication to bring Archer in-line with the feature size lithographic processing capability of leading players in the semiconductor industry."

Quarterly Activities to 30 September 2022

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. The Company is progressing the development of its ^{12}CQ quantum computing qubit processor chip (" ^{12}CQ chip") and 'lab-on-a-chip' biochip technology ("biochip").

Technology development and commercialisation activities

^{12}CQ Chip

Archer's ^{12}CQ chip is a world-first qubit processor technology the Company is developing that would allow for mobile quantum computing powered devices. During the Quarter, Archer made significant steps in the development of its ^{12}CQ quantum chip technology, including nanofabricating devices that electrically integrate its qubit material (Image 1).

The devices were fabricated on a silicon wafer using foundry-compatible lithography processes. Archer used the devices to demonstrate that a controlled electric current can be passed through the qubit material at room-temperature.

The on-chip electronic transport characteristics of the qubit material were in agreement with previous state-of-the-art electronic transport measurements performed on *isolated* qubit material (ASX ann. [22 Feb 2021](#) and [15 Jun 2020](#)) that qualitatively and quantitatively validated the advantageous conductance properties of the qubit material in the context of quantum technology applications.

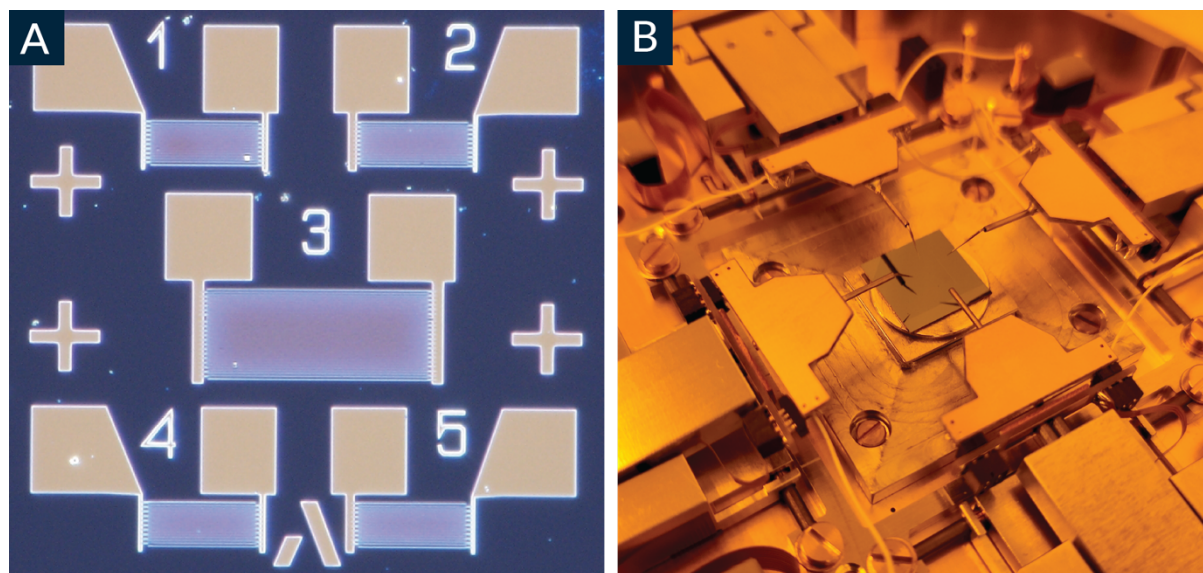


Image 1. On-chip electronic transport in Archer's qubit components. A Five individual nanofabricated integrated devices, designed and purpose built by Archer staff, for the room temperature electronic transport measurements. **B** State-of-the-art instrumentation used in the electronic transport measurements, housed in an Australian semiconductor foundry.

To scale the fabrication of Archer's ^{12}CQ chip devices and components, the Company will need to work with industrial-scale manufacturers in the global semiconductor supply chain. The Company must use sophisticated device modelling and simulations to determine which commercial foundries could address the Company's future fabrication.

During the Quarter, Archer performed state-of-the-art 3D Electrostatic Finite Element Modelling in conjunction with in-house software development relevant to the Company's qubit material. The modelling simulated quantum electronic device ("QED") architectures related to qubit *control* and *readout* to obtain a precise estimate for the lower-bound on the devices' critical feature size.

The complex simulations resulted in a minimum requirement for QED feature sizes that would be specifically compatible with existing standard industrial-foundry processes, including Extreme Ultra Violet Photolithography. Integrating qubit materials with complex *control* and *readout* electronics compatible with existing industrial-scale foundries is a significant challenge in developing quantum processors.

During the Quarter, Archer commenced working with GlobalFoundries towards industry fabrication of its ^{12}CQ chip technology. Archer will access the technology facilities and manufacturing processes of GlobalFoundries to explore pathways for potential high-volume manufacturing of ^{12}CQ chip devices and components.

Archer will work closely with GlobalFoundries on device and circuit design, technology development, and high-volume chip fabrication.

During the Quarter, the Company expanded on its ^{12}CQ chip technology patent protection with the granting of a patent in Hong Kong. With the grant of the Hong Kong patent, all pending patent applications in the current ^{12}CQ chip portfolio have been granted (Exhibit 1).

Archer's Biochip

Archer's biochip is a unique graphene-based technology that the Company is developing to enable the complex detection of some of the world's most deadly communicable diseases. Archer is currently focused on micro- and nano-fabrication of the biochip device components and combining these components with biologically relevant reactions to detect diseases. Archer owns 100% of the biochip technology intellectual property (Exhibit 1).

In April 2021, the Company announced that it had commenced nanofabrication processes with the aim of developing sub-10 nm size biochip features representing the current 'best-in-class' in the semiconductor industry (ASX ann. [8 Apr 2021](#)). The Company recently made significant progress towards sub-10 nm fabrication (ASX ann. [30 May 2022](#)).

During the Quarter, Archer fabricated sub-10 nm features reproducibly and reliably by developing several advanced lithographic processes on a silicon wafer in a clean-room environment. The work is a significant technical achievement and represents a technology development breakthrough for the Company.

Archer's sub-10 nm feature fabrication is in line with the current semiconductor industry best-in-class for chip feature sizes and provides the Company with a significant competitive advantage.

The advanced lithographic processes required precision engineering and state-of-the-art fabrication instruments to reach lateral control over feature sizes below 10 nm (corresponding in this work to covering a width of approximately 50 silicon atoms on the wafer surface).

The extreme miniaturisation would give Archer greater flexibility, capability, and higher integration density in its lithographic processes for the design and fabrication of its technologies. For example, sub-10 nm fabrication could allow for biochip device development to span a magnitude of feature sizes for a broad range of potential sensing applications.

Exhibit 1. Description of Archer's technology patents and patent applications

Filing Date	Technology Summary																		
3 Dec 2015	<p> A quantum electronic device. Quantum electronic devices for processing qubits represented by an electron spin on a new type of carbon nanomaterial and methods for using this material in quantum computing.</p> <table> <tr> <th>Stage & Coverage</th><th>Patent/Application Number</th></tr> <tr> <td>Granted</td><td></td></tr> <tr> <td>Japan</td><td>6809670</td></tr> <tr> <td>South Korea</td><td>10-2288974</td></tr> <tr> <td>China</td><td>4606612</td></tr> <tr> <td>United States of America</td><td>11126925</td></tr> <tr> <td>Europe</td><td>3383792</td></tr> <tr> <td>Australia</td><td>2016363118</td></tr> <tr> <td>Hong Kong</td><td>1256636</td></tr> </table>	Stage & Coverage	Patent/Application Number	Granted		Japan	6809670	South Korea	10-2288974	China	4606612	United States of America	11126925	Europe	3383792	Australia	2016363118	Hong Kong	1256636
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Australia	2016363118																		
Hong Kong	1256636																		
15 Feb 2019	<p> Graphene complexes and compositions thereof. Complexes comprising graphene compositions, methods of synthesising these complexes and compositions, and the use of these complexes and compositions in biomolecular sensing.</p> <table> <tr> <th>Stage & Coverage</th><th>Patent/Application Number</th></tr> <tr> <td>Pending</td><td></td></tr> <tr> <td>Australia</td><td>2020220236</td></tr> <tr> <td>United States of America</td><td>17429442</td></tr> </table>	Stage & Coverage	Patent/Application Number	Pending		Australia	2020220236	United States of America	17429442										
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Pending																			
Australia	2020220236																		
United States of America	17429442																		
1 Dec 2021	<p> Detection and quantification of nucleic acids.</p> <table> <tr> <th>Stage & Coverage</th><th>Patent/Application Number</th></tr> <tr> <td>Provisional Patent</td><td></td></tr> <tr> <td>Australia</td><td>2021903898</td></tr> </table>	Stage & Coverage	Patent/Application Number	Provisional Patent		Australia	2021903898												
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31 Mar 2022	<p> Fabrication and processing of graphene electronic devices on silicon with a SiO₂ passivation layer.</p> <table> <tr> <th>Stage & Coverage</th><th>Patent/Application Number</th></tr> <tr> <td>Provisional Patent</td><td></td></tr> <tr> <td>Australia</td><td>2022900845</td></tr> </table>	Stage & Coverage	Patent/Application Number	Provisional Patent		Australia	2022900845												
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Provisional Patent																			
Australia	2022900845																		
<p>Patent Family</p> <p> ¹²CQ chip  Biochip</p>																			

Financial update

The Company's cash balance at the end of the Quarter was \$25,339,000.

The Company holds 1,633,944 shares (post share consolidation on a 1 for 4 basis in May 2022) in Canadian Stock Exchange listed Volatus Capital Corp (CSE:VC) and 11,571,119 shares in ASX listed ChemX Materials Ltd (ASX:CMX). The Company also holds 2,892,780 quoted options in CMX.

Archer's accompanying Appendix 4C cashflow report for the quarter includes an amount of \$153,000 at item 6.1, relating to executive and non-executive director fees paid as salaries and wages, and includes payment of a short term incentive (STI) made to the Executive Chairman in respect of STI achievement for the performance year ended 30 June 2022.

Corporate

Annual Report

The Company's Annual Report 2022 was lodged to ASX on 21 September 2022.

Issued Capital

Date	Shares	Options
Start of Quarter	248,467,207	34,850,000
New issues during Quarter	Nil	1,500,000 ⁽¹⁾
Options Exercised/forfeited during Quarter	Nil	1,050,000 ⁽²⁾
End of Quarter	248,467,207	35,300,000
Date of this Report	248,467,207	35,300,000

(1) 1,500,000 unlisted options, exercisable at \$1.79 by 31 May 2025.

(2) 1,050,000 unlisted options with an exercise price of \$1.79 and expiring 31 May 2025 lapsed in accordance with the terms of which they were issued.

Stakeholder events and outreach

Archer's CEO, Dr Mohammad Choucair, gave a company presentation at the ASX Small and Mid-Cap Conference on 14 September 2022. The Company also electronically distributed a number of Newsletters and Commentary to shareholders during the Quarter, including:

- [CEO Commentary](#): BIO International Convention 2022, San Diego , USA
- [Newsletter](#): Archer takes quantum leap forward
- [Newsletter](#): Quantum computing chip patents secured globally
- [CEO Commentary](#): Securing semiconductor supply chains
- [CEO Commentary](#): The semiconductor decade
- [Presentation \(Video\)](#): ASX Small & Mid-Cap Conference
- [CEO Interview](#): Archer Materials with Proactive at ASX Small and Mid-Cap Conference
- [Newsletter](#): Archer breaks through sub-10nm, work begins with GlobalFoundries

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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For more information about Archer's activities, please visit our:

Website:

<https://archerx.com.au/>

Twitter:

<https://twitter.com/archerxau>

YouTube:

<https://bit.ly/2UKBBmG>

Sign up to our Newsletter:

<http://eepurl.com/dKosXI>

Appendix 4C

Quarterly cash flow report for entities subject to Listing Rule 4.7B

Name of entity

Archer Materials Limited

ABN

64 123 993 233

Quarter ended ("current quarter")

30 Sept 2022

Consolidated statement of cash flows	Current quarter \$A'000	Year to date (3 months) \$A'000
1. Cash flows from operating activities		
1.1 Receipts from customers	-	-
1.2 Payments for		
(a) research and development (exclusive of wages allocated to R&D)	(53)	(53)
(b) product manufacturing and operating costs	-	-
(c) advertising and marketing	-	-
(d) leased assets	(1)	(1)
(e) staff costs	(841)	(841)
(f) administration and corporate costs	(233)	(233)
1.3 Dividends received (see note 3)	-	-
1.4 Interest received	11	11
1.5 Interest and other costs of finance paid	-	-
1.6 Income taxes paid	-	-
1.7 Government grants and tax incentives	25	25
1.8 Other (provide details if material)		
1.9 Net cash from / (used in) operating activities	(1,092)	(1,092)

2. Cash flows from investing activities		
2.1 Payments to acquire or for:		
(a) entities	-	-
(b) businesses	-	-
(c) property, plant and equipment	(26)	(26)
(d) investments		
(e) intellectual property	(7)	(7)

Consolidated statement of cash flows		Current quarter \$A'000	Year to date (3 months) \$A'000
	(f) other non-current assets	-	-
2.2	Proceeds from disposal of:		
	(a) entities	-	-
	(b) businesses	-	-
	(c) property, plant and equipment	-	-
	(d) investments	-	-
	(e) intellectual property	-	-
	(f) other non-current assets	-	-
2.3	Cash flows from loans to other entities	-	-
2.4	Dividends received (see note 3)	-	-
2.5	Other (provide details if material)	-	-
2.6	Net cash from / (used in) investing activities	(33)	(33)

3.	Cash flows from financing activities		
3.1	Proceeds from issues of equity securities (excluding convertible debt securities)	-	-
3.2	Proceeds from issue of convertible debt securities	-	-
3.3	Proceeds from exercise of options	-	-
3.4	Transaction costs related to issues of equity securities or convertible debt securities	-	-
3.5	Proceeds from borrowings	-	-
3.6	Repayment of borrowings	-	-
3.7	Transaction costs related to loans and borrowings	-	-
3.8	Dividends paid	-	-
3.9	Other (provide details if material)	-	-
3.10	Net cash from / (used in) financing activities	-	-

4.	Net increase / (decrease) in cash and cash equivalents for the period		
4.1	Cash and cash equivalents at beginning of period	26,464	26,464
4.2	Net cash from / (used in) operating activities (item 1.9 above)	(1,092)	(1,092)
4.3	Net cash from / (used in) investing activities (item 2.6 above)	(33)	(33)

Consolidated statement of cash flows		Current quarter \$A'000	Year to date (3 months) \$A'000
4.4	Net cash from / (used in) financing activities (item 3.10 above)	-	-
4.5	Effect of movement in exchange rates on cash held	-	-
4.6	Cash and cash equivalents at end of period	25,339	25,339

5.	Reconciliation of cash and cash equivalents at the end of the quarter (as shown in the consolidated statement of cash flows) to the related items in the accounts	Current quarter \$A'000	Previous quarter \$A'000
5.1	Bank balances	1,794	1,419
5.2	Call deposits	23,545	25,045
5.3	Bank overdrafts	-	-
5.4	Other (provide details)	-	-
5.5	Cash and cash equivalents at end of quarter (should equal item 4.6 above)	25,339	26,464

6.	Payments to related parties of the entity and their associates	Current quarter \$A'000
6.1	Aggregate amount of payments to related parties and their associates included in item 1 * The above payments relate to fees and salaries paid to Directors during the quarter.	153
6.2	Aggregate amount of payments to related parties and their associates included in item 2	-
<i>Note: if any amounts are shown in items 6.1 or 6.2, your quarterly activity report must include a description of, and an explanation for, such payments.</i>		

7.	Financing facilities <i>Note: the term "facility" includes all forms of financing arrangements available to the entity.</i> <i>Add notes as necessary for an understanding of the sources of finance available to the entity.</i>	Total facility amount at quarter end \$A'000	Amount drawn at quarter end \$A'000
7.1	Loan facilities	-	-
7.2	Credit standby arrangements	-	-
7.3	Other (please specify)	-	-
7.4	Total financing facilities	-	-
7.5	Unused financing facilities available at quarter end	n/a	
7.6	Include in the box below a description of each facility above, including the lender, interest rate, maturity date and whether it is secured or unsecured. If any additional financing facilities have been entered into or are proposed to be entered into after quarter end, include a note providing details of those facilities as well.		
	n/a		

8.	Estimated cash available for future operating activities	\$A'000
8.1	Net cash from / (used in) operating activities (item 1.9)	(1,092)
8.2	Cash and cash equivalents at quarter end (item 4.6)	25,339
8.3	Unused finance facilities available at quarter end (item 7.5)	-
8.4	Total available funding (item 8.2 + item 8.3)	25,339
8.5	Estimated quarters of funding available (item 8.4 divided by item 8.1)	23.2 quarters
	<i>Note: if the entity has reported positive net operating cash flows in item 1.9, answer item 8.5 as "N/A". Otherwise, a figure for the estimated quarters of funding available must be included in item 8.5.</i>	
8.6	If item 8.5 is less than 2 quarters, please provide answers to the following questions:	
8.6.1	Does the entity expect that it will continue to have the current level of net operating cash flows for the time being and, if not, why not?	
	Answer: n/a	
8.6.2	Has the entity taken any steps, or does it propose to take any steps, to raise further cash to fund its operations and, if so, what are those steps and how likely does it believe that they will be successful?	
	Answer: n/a	
8.6.3	Does the entity expect to be able to continue its operations and to meet its business objectives and, if so, on what basis?	
	Answer: n/a	
	<i>Note: where item 8.5 is less than 2 quarters, all of questions 8.6.1, 8.6.2 and 8.6.3 above must be answered.</i>	

Compliance statement

- 1 This statement has been prepared in accordance with accounting standards and policies which comply with Listing Rule 19.11A.
- 2 This statement gives a true and fair view of the matters disclosed.

Date: 21 October 2022.....

Authorised by: By the Board.....
(Name of body or officer authorising release – see note 4)

Notes

1. This quarterly cash flow report and the accompanying activity report provide a basis for informing the market about the entity's activities for the past quarter, how they have been financed and the effect this has had on its cash position. An entity that wishes to disclose additional information over and above the minimum required under the Listing Rules is encouraged to do so.
2. If this quarterly cash flow report has been prepared in accordance with Australian Accounting Standards, the definitions in, and provisions of, *AASB 107: Statement of Cash Flows* apply to this report. If this quarterly cash flow report has been prepared in accordance with other accounting standards agreed by ASX pursuant to Listing Rule 19.11A, the corresponding equivalent standard applies to this report.
3. Dividends received may be classified either as cash flows from operating activities or cash flows from investing activities, depending on the accounting policy of the entity.
4. If this report has been authorised for release to the market by your board of directors, you can insert here: "By the board". If it has been authorised for release to the market by a committee of your board of directors, you can insert here: "By the [name of board committee – eg Audit and Risk Committee]". If it has been authorised for release to the market by a disclosure committee, you can insert here: "By the Disclosure Committee".
5. If this report has been authorised for release to the market by your board of directors and you wish to hold yourself out as complying with recommendation 4.2 of the ASX Corporate Governance Council's *Corporate Governance Principles and Recommendations*, the board should have received a declaration from its CEO and CFO that, in their opinion, the financial records of the entity have been properly maintained, that this report complies with the appropriate accounting standards and gives a true and fair view of the cash flows of the entity, and that their opinion has been formed on the basis of a sound system of risk management and internal control which is operating effectively.