



ASX: ECT

Commercialising US-Made MXenes for Defence & Advanced Materials

Commercialising Flash Joule Heating for advanced MXene production and PFAS destruction

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Aussie Equities Day 2026 by Spark+

Photograph: Flash Joule Heating reactor, Gator Point Technology Campus, Texas. Image courtesy of Metallium Ltd.



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Xenica acquisition and MXene programme

Completion of the acquisition of Xenica Materials Pty Ltd remains subject to shareholder approval at the Extraordinary General Meeting to be held on 22 October 2026. The sublicense held by Xenica Inc from MXene Inc is not a customer contract. Any future revenue from MXenes depends on, among other things, completion of the acquisition, successful and repeatable scale-up, production to customer specifications and customer qualification. Results from the initial FJH synthesis runs are preliminary and further runs are required to demonstrate repeatability at scale. Market size estimates are third-party estimates and methodologies vary.

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Investment Case

Rice-licensed technology, defence-led markets, funded to key catalysts



A US-focused pathway to commercial MXene supply using a faster, acid-free production platform

US\$100+/g

MXENE PRICING

= US\$100,000+/kg reference pricing for high-quality US-produced $\text{Ti}_3\text{C}_2\text{T}_x$ powder

1 JAN 2027

US SOURCING CATALYST

Executive Order 14415 restricts sourcing waivers from non-compliant sources

MINUTES

NOT 48–72 HOURS

Exclusive Rice FJH licence replaces acid etching — the same platform destroys PFAS

A\$12m

PLACEMENT

Pro-forma cash of A\$13.7m; Tranche 2 subject to approval at the 22 October EGM

FIRST RUNS

MXENE SYNTHESIS

Two FJH flash runs completed with positive results; independent testing next

CAPITALISATION & CASH

Market capitalisation

A\$47.1m

Less: cash (30 June 2026)

A\$1.7m

Enterprise value

A\$45.4m

Placement (T2 subject to EGM)

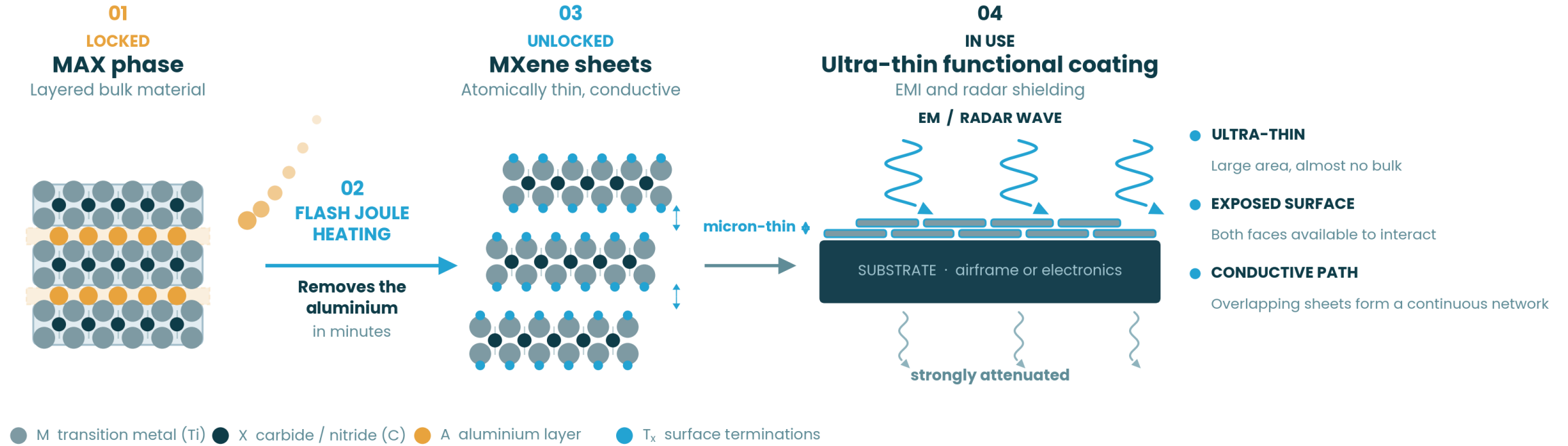
A\$12.0m

Pro-forma cash

A\$12.3m

What Are MXenes

A high-performance 2D nanomaterial — customisable at the atomic level for almost any application



In 2D, nearly all of the material is surface — and the surface is what does the work.

WHAT THAT UNLOCKS

- | | | | |
|--|---|---|--|
| 01 High conductivity
Metallic conduction; absorbs incident EMI | 02 Hydrophilicity
Mixes with water for inks and membranes | 03 Versatile surface chemistry
Terminations tune the material per use | 04 Ultra-thin coatings
Applied as ink, film, powder or coating |
|--|---|---|--|

Significant Demand, Constrained by Supply

Production, not utility, has held the MXene market back



COMMERCIAL VALUE TODAY

US\$100+/g

High-quality US-produced $\text{Ti}_3\text{C}_2\text{T}_x$ powder

High-value product forms

Ink, film, powder and coatings drop into existing designs at a premium

Supply is the bottleneck

Conventional production etches with hydrofluoric acid over ~48–72 hours

EXISTING DEMAND POOLS



EMI & radar shielding

Defence — electromagnetic and radar signature management



Energy storage

Supercapacitors and fast-charge battery electrodes



Sensors & electronics

Conformal, room-temperature sensing; display electrodes



IR & thermal coatings

Low-emissivity coatings, membranes and pollutant removal

The constraint is commercial production, not demonstrated utility.

Demand signals — patents, agency funding and corporate programmes — are outrunning supply. A company that can achieve cost-effective, commercially scalable production has the potential not only to capture an existing market, but to expand it.

A Faster, Cleaner Way to Make MXenes

Flash Joule Heating, an acid-free process developed at Rice University's Tour Lab



01

Electrical pulse

A high-current pulse through a heating element

› 02

Extreme heat

~600°C reached in seconds

› 03

MXene synthesis

No bulk acid handling, no toxic etchant



Metallium Ltd FJH reactor (test unit) — Gator Point, Texas

PROVEN AT SCALE · Universal Matter, a Rice / Tour Lab spin-out, already uses FJH to make graphene at industrial scale

MINUTES

not 48–72 hours of acid etching, with no bulk acid handling or toxic waste

~74%

lower processing cost than chemical etching, from faster run times and less waste treatment¹

>90%

purity, with ~56–72% yields reported for FJH MXenes¹

VERSUS LEGACY APPROACHES

	CVD	Hydrofluoric acid	Fluoride-free	FJH
Output per batch	<0.1 g	10–100 g	1–10 g	~250 g*
Scalable	X	–	–	✓
Safe & non-toxic	–	X	X	✓
Cost-effective	X	X	–	✓
Good shelf life	X	X	–	✓
Varied chemistries	✓	X	✓	✓
Purity	✓	✓	X	✓

WHAT THIS CHANGES

Batch output moves from grams to hundreds of grams without hydrofluoric acid, removing the two constraints — throughput and acid handling — that have kept MXene supply small and costly.

Sources: Jose et al. (2025); Xu et al. (2026), based on the production of $\text{Ti}_3\text{C}_2\text{T}_x$. * Based on initial test work using Metallium Ltd's test reactor on a limited precursor supply. ¹ Based on published research on specific laboratory formulations. Photograph: Flash Joule Heating reactor (test unit), Gator Point Technology Campus, Texas. Image courtesy of Metallium Ltd.

Defence Is the First Target Market

Specification-led procurement, constrained supply and a dated US sourcing catalyst



DOMESTIC SOURCING CATALYST

1 JAN 2027

US Executive Order 14415 restricts sourcing waivers from non-compliant sources, which ECT expects to accelerate qualification of domestic supply



Kilogram scale

PROCUREMENT VOLUME

Defence buys qualified material in kilogram quantities at premium prices, so revenue can begin well before mass-market volumes

DEFENCE USE-CASES³



EMI & radar shielding

Micron-thin films that block EMI and suppress radar signatures²



IR signature management

Low-emissivity coatings that mask heat signatures



Rugged energy storage

Soldier-worn and platform power surviving heat, cold and shock



Sensing

Conformal sensors for uniforms, vehicles and unmanned systems

Specification-led

HOW DEFENCE BUYS

Procurement selects on performance against specification — and high-quality Western MXene supply remains constrained

~US\$2.0bn

DEFENCE RADAR-ABSORBING MATERIALS¹

Segment of a US\$4.3bn market by 2033 (defence ~ 47%) — one of several MXene defence applications

For ECT, the initial commercial challenge is qualification — not building a tonne-scale commodity plant.

A Small Production Footprint Can Support High-Value Revenue

MXenes are high value-density materials — the initial commercial model is kilogram scale, not tonne scale

REFERENCE PRICE

US\$100+/g

= US\$100,000+ per kilogram

High-quality US-produced $\text{Ti}_3\text{C}_2\text{T}_x$ powder

TARGET CAPABILITY

~1 kg/day

≈ 250–300 kg per year (illustrative)

At Gator Point once optimised — target, not guidance

Kilogram-scale production — not tonne-scale commodity production — is the relevant initial commercial model.

WHAT CONVERTS CAPABILITY INTO REVENUE

01 Specification

Product form, purity and consistency define the grade a customer will buy

02 Qualification

Defence and advanced-materials customers qualify to specification before they purchase

03 Contracted terms

Realised price depends on grade, volume and contract — not on reference pricing

Meaningful commercial value does not require commodity-scale output.

Reference pricing is not a forecast of ECT realised pricing, sales volumes or revenue. Commercial pricing will depend on product specification, qualification, customer requirements, product form and contracted terms. Production targets remain subject to successful optimisation and repeatability testing.

The US Commercial Stack Is Assembled



IP, US production, military end-use rights and feedstock in place — customer qualification is the next step



↑ **MAX PHASE FEEDSTOCK** ✓ **secured · feeds ECT / Metallium production**
Initial 4kg of US defence-aligned precursor delivered — sufficient for ~15–40 runs; additional suppliers in discussion

CUSTOMER QUALIFICATION PATHWAY

● **Sample** › ○ **Specification testing** › ○ **Qualification** › ○ **Supply agreement** › ○ **Repeat orders**

LIKELY CUSTOMER CATEGORIES Defence primes · advanced-materials manufacturers · coatings suppliers · aerospace and electronics groups · energy-storage developers

Customer engagement and sample qualification are the next commercial milestones.

The pieces required to manufacture, qualify and sell US-produced MXene are now assembled.

MXene Formation Confirmed

The programme has moved from process theory to physical product

2

FJH synthesis runs completed

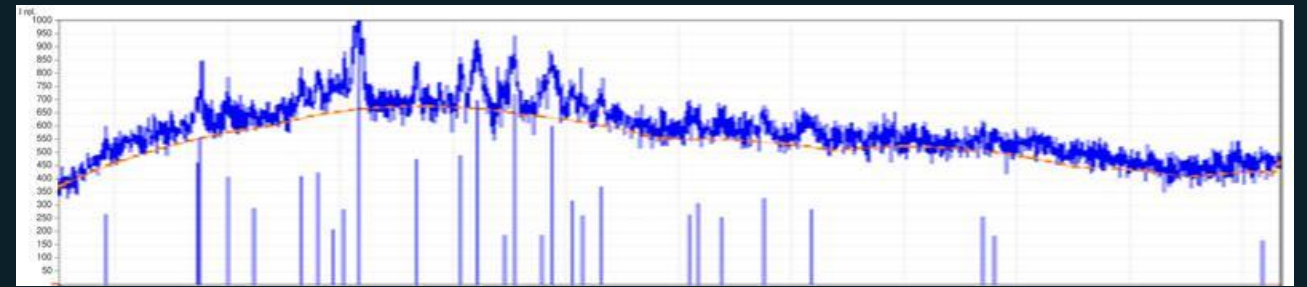
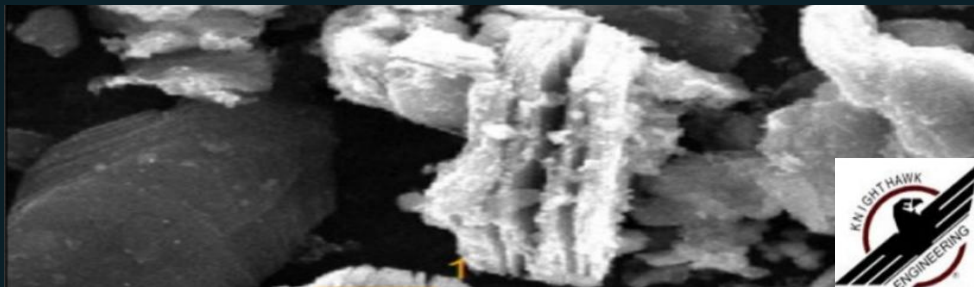
400 g

MAX phase per batch, plus 400 g carbon filler

31%

peak yield, from 30 to 60 minute runs

TECHNICAL EVIDENCE



“MXene formation confirmed by in-house SEM and XRD, and third-party laboratory XRD.”

- Layer spacing matches chlorine-terminated MXene
- Al preferentially removed while Ti was better retained
- Pathway identified to increase MXene conversion

Can it form? ✓

Can it be repeated?

Can it meet specification?

Can customers qualify it?

Can production scale?



SECOND FJH APPLICATION

Destroying 'Forever Chemicals'

PFAS contamination is widespread and costly; REM destroys it permanently

THE PROBLEM

79,000+

contaminated US sites

US\$3.0bn

treatment market (2026)¹

1,000 yrs

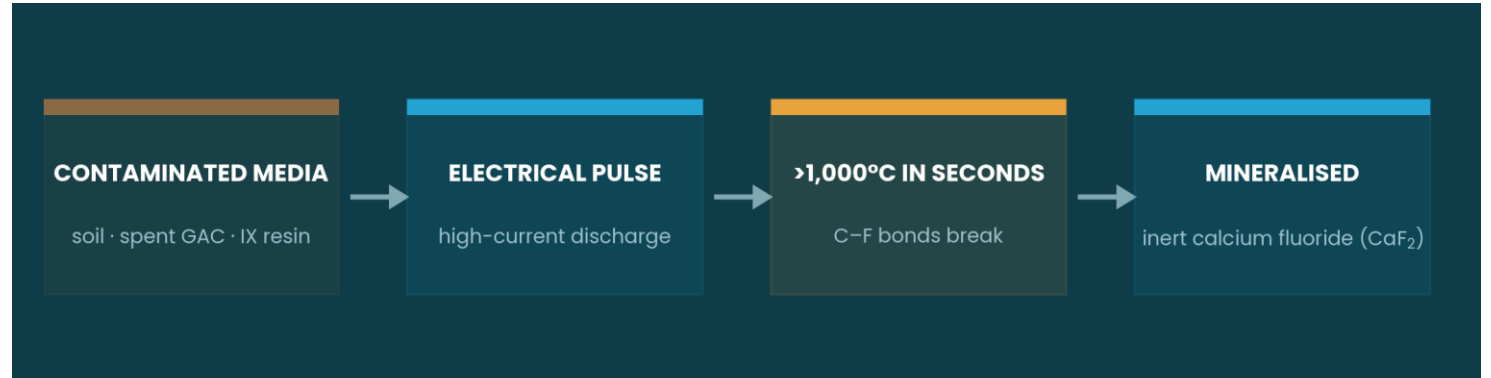
to break down naturally

EXISTING TREATMENTS FALL SHORT

Slow and chemical-heavy · create secondary pollution · high transport costs · co-contamination

Same FJH platform. Second commercial application.

Rapid Electrothermal Mineralisation (REM) — patented FJH process from Prof. James Tour, Rice University. MXenes remain the lead commercial story; PFAS is platform optionality on the same core technology.



A second large market, additional IP value, a separate route to commercialisation — one reactor platform.

RESULTS TO DATE

>99%

removal of various PFAS in contaminated soils (laboratory)

96–99.9%

fluorine accounted for as inorganic fluoride on GAC and IX resins (laboratory)

22 kW

pilot system, ~18x the power of the laboratory prototype



STATUS

- Licence expanded to PFAS-laden GAC
- Performance data submitted to the US EPA
- Field demonstration targeted Q1 2027

One FJH platform. Two high-value markets.

MXENES — THE LEAD COMMERCIAL STORY



PFAS — THE SECOND WORKSTREAM

22 kW , **Field demo**
 pilot system built , targeted Q1 2027

REM destroys PFAS on the same FJH platform — >99% removal of various PFAS in contaminated soils, with 96–99.9% of fluorine accounted for as inorganic fluoride (laboratory). Licence expanded to PFAS-laden GAC; performance data submitted to the US EPA.

NEAR-TERM CATALYSTS

22 OCT 2026

EGM — Xenica completion and Tranche 2

NEXT

Process refinement and repeatability

NEXT

Independent testing and customer samples

H2 2026

REM PFAS field demonstration

TARGET

Scale-up toward ~1kg per day

ECT is moving from technology ownership into commercial execution.



Thank you

Commercialising Flash Joule Heating for advanced materials
and environmental remediation

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ASX: ECT

Environmental Clean Technologies Limited

Photograph: Flash Joule Heating reactor (test unit), Gator Point Technology Campus, Texas. Image courtesy of Metallium Ltd.



Broad Applications Beyond Defence

Option value beyond the defence-led commercial pathway — civilian adoption is gated by scalable supply, not demand

Electronics¹

US\$8.7bn

EMI shielding market · 2026

- Matches copper shielding at 1/20th the thickness, without extra bulk or weight
- Samsung, LG and Murata have explored MXene electrodes to replace brittle ITO in displays
- Can be coated on almost any material

Water Treatment²

US\$3.0bn

PFAS treatment market · 2026

- Raises PFAS rejection from 72% to over 96%
- Captures short-chain PFAS that slip through carbon filters — the most-regulated to remove
- A natural fit alongside ECT's REM PFAS destruction technology

Energy Storage³

US\$1.4bn

Supercapacitor market · 2025

- Up to 10x the energy density of surface-only carbon supercapacitors
- Unlocks fast-charge batteries: supercapacitor speed, battery capacity
- US\$40m+ of US DoE funding since 2023

Sensors⁴

US\$6.5bn

Flexible sensor market · 2024

- Bends and stretches with skin without cracking or losing signal
- Brain-computer-interface electrodes announced by Datasea (Jan 2026)
- Runs at room temperature, avoiding heat and power drain

Four separate markets, one production constraint — each is gated by the availability of consistent, affordable, commercially supplied MXene. Defence remains the first commercial target.