Graphene Manufacturing Group

ENERGY SAVING AND ENERGY STORAGE SOLUTIONS

www.graphenemg.com

TSXV:GMG

June 2022

Graphene Manufacturing Group

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Graphene Manufacturing Group

BOARD OF DIRECTORS & ADVISORY TEAM

Craig Nicol (Founder, Managing Director & CEO)

Craig Nicol has a career of over 20 years in delivering large scale innovation including leading multi-billion-dollar gas and LNG value chains in Australia and Asia Pacific and managing sales and marketing teams across Asia Pacific working for Shell International. Craig has a Bachelor of Engineering degree in Manufacturing Systems (Honours) and a bachelor's degree in Business Marketing from the Queensland University of Technology. Craig is a member of the Australian Institute of Company Directors (AICD) and is also the Chair of the Australian Graphene Industry Association (AGIA).

Guy Outen (Chair & Director)

Guy Outen has over 35 years of experience with Royal Dutch Shell plc in various roles including EVP Strategy & Portfolio where he worked with the Shell CEO and Board to create amongst other outcomes Shell's New Energies focusing on lower emissions. Guy Outen has a Bachelor of Commerce (Honours) and a Masters of Commerce (Economics) from Melbourne University. Guy Outen is a Senior Advisor to Boston Consulting Group, a Fellow Australian Society of Certified Practicing Accountants (FCPA) and Chartered Governance Institute (FCG); a Member of the Institute of Directors UK and the Australian Institute of Company Directors (AICD).

Rob Shewchuk (Director)

Rob Shewchuk has over 25 years of experience in executive and director experience. Rob is based in Calgary, Alberta, Canada. Rob is the President & CEO of LithiumBank Resources Corp, Director of GMG, Director of Spectre Capital Corp, and Director of Verses Technologies Inc. Rob began his career as an Equities Trader on the floor of the Alberta Stock Exchange in 1995 for Yorkton Securities Inc. Rob became a licensed broker at Yorkton in 1998 and worked on the Equities desk through 2004. Rob joined Standard Securities Capital Corporation where he became Chairman in 2006. Rob merged Standard Securities with Wolverton Securities Ltd in 2009 and became a Director of Wolverton Securities until 2016 when it was purchased by PI Financial Corp.

Robbert de Weijer (Director)

Robbert de Weijer has a career of over 25 years in mega project delivery and operations and leadership of ASX-listed oil and gas exploration and production companies. Robbert led Shell's North Sea Southern production assets, a team of more than 1,500 people and annual operating expenditure of A$900 million. Robbert has bachelor's degrees in Mechanical Engineering and Business Administration from Utrecht, The Netherlands

Will Ollerhead (Director)

Will Ollerhead has over 30 years of experience in the capital markets and corporate finance field. Mr. Ollerhead was the CEO of Cuspis Capital Ltd. and has served on several other boards of both public and private companies, and not-for profit organizations, as chairman, director, and as a member and chair of audit committees. He has operated Ollerhead Capital since its founding in 1997, providing corporate finance advisory services and managing a private investment portfolio.

ADVISORY TEAM

Bob Galyen (USA)

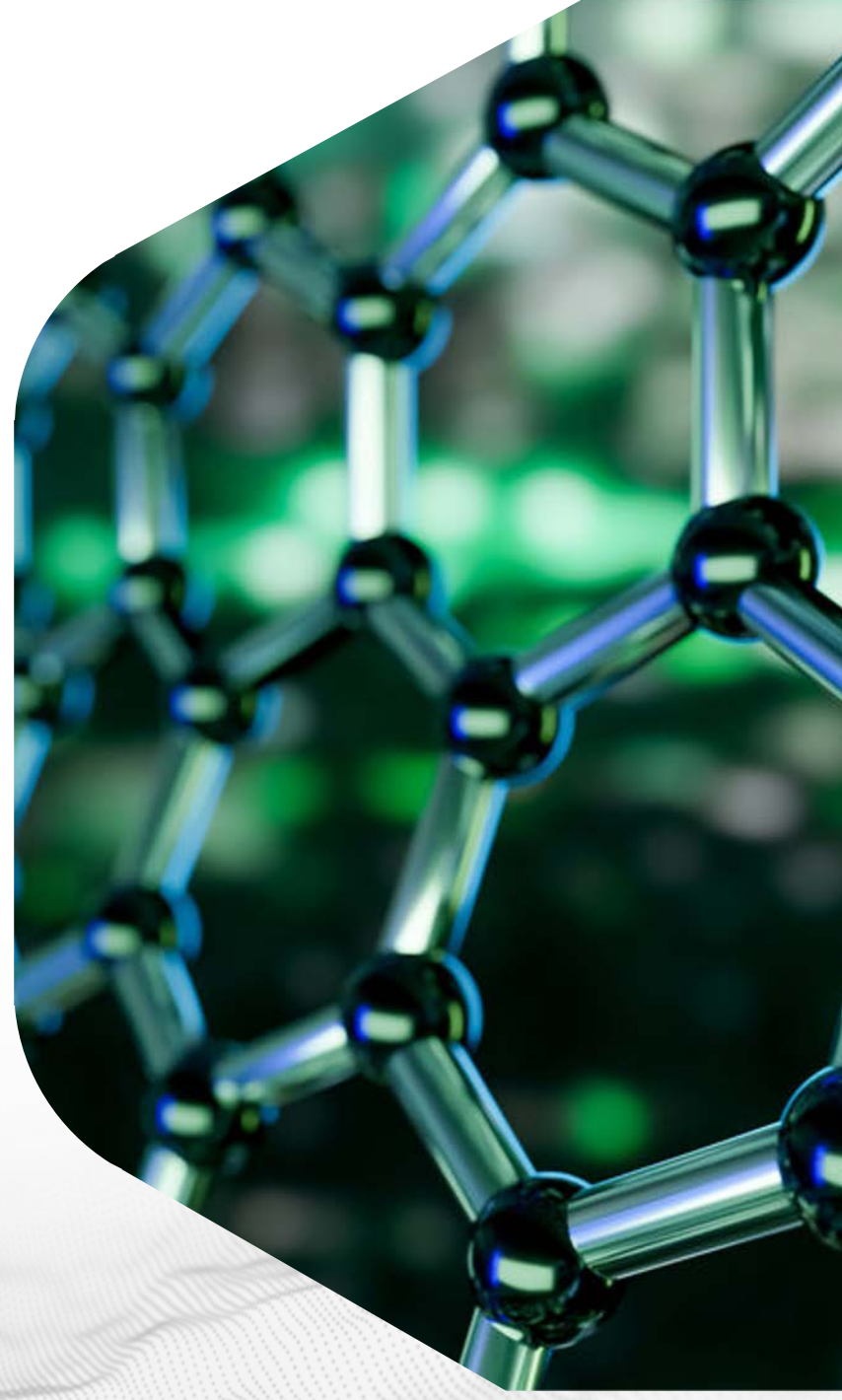
Bob Galyen is a highly experienced executive in the battery energy storage world and science/engineering-based communities. Bob was previously the Chief Technology Officer (CTO) of Contemporary Amperex Technology Company Limited (CATL). CATL is widely known as the largest lithium ion battery manufacturer in the world – supplying electric vehicles and high efficiency storage systems. He serves on multiple Committees of Directors and Technical Advisory Boards.

Professor Dan Brett (UK)

Dan Brett is Professor of Electrochemical Engineering at the University College London (UCL), a top ranked University, where he is a director of the Electrochemical Innovation Lab (EIL) and Advanced Propulsion Lab (APL). He is an academic founder of the Faraday Institution (a UK battery research programme with a consortium of over 20 UK universities and 50 businesses – including 450 researchers) and member of its Expert Panel.

GRAPHENE MANUFACTURING GROUP LTD

- Is a **disruptive clean-technology** company that has recently listed on TSX-V under the symbol GMG.
- Led by former Shell Executives, the Company has developed and proved its own proprietary process to produce graphene from readily available low-cost natural gas feedstock. The final result is **high quality, low cost, scalable, tuneable and low / no contaminant graphene**.
- The proprietary process is held as a trade secret with a number of product patents.
- Targeting globally critical **Energy Savings and Energy Storage Solutions** applications
- Marketing Energy Savings products, developing next generation Graphene Aluminium-Ion batteries technical and commercial opportunities



WHAT IS GRAPHENE?

THE CARBON WONDER PRODUCT

Graphene is the first two-dimensional material and is classed as a “super-material” offering many properties.

GMG focuses on its extreme thermal conductivity, enhanced lubrication and ion storage.

GMG Graphene has significant potential to enhance the performance of a wide range of materials and is expected to drive development of disruptive technologies and transform industries. It is classified as a nanomaterial (i.e. its dimension is on the nanoscale between 1-100nm) and looks like black powder.

MELTING POINT

950^0C+ Stability in oxygen free environment

WEIGHT ASPECT RATIO

Light & up to 300m2/gm of surface area

ION STORAGE

High density capacity for ion storage

THERMAL CONDUCTIVITY

Extreme Heat Diffusivity

ENHANCED LUBRICATION

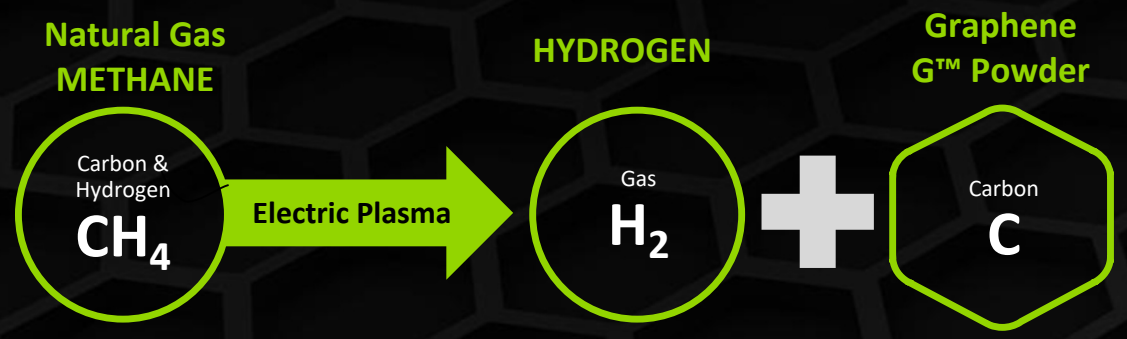
Extreme lubrication and wear reduction

TENSILE STRENGTH

Very strong when integrated into materials

GMG'S COMPETITIVE ADVANTAGE

GMG GRAPHENE PRODUCTION



OTHER GRAPHENE PRODUCTION

- ✔ Instantaneous & Continuous
- ✔ Low-Cost Inputs and Setup
- ✔ Unconstrained Fast Scalability (after validating quality)
- ✔ Controlled Definability
- ✔ High Quality Grade Graphene (University Verified)
- ✔ Cogeneration Capabilities
- ✔ Low environmental footprint

- ✘ Mining Constraints & Gestation
- ✘ Cost Inputs and Setup
- ✘ Constrained Scalability
- ✘ Variable Definability
- ✘ Impurities form Graphene Oxide
- ✘ Environmental Footprint

FROM NATURAL GAS TO FINAL PRODUCT

Competitive Advantage

Once product quality is validated for the application, GMG's manufacturing process is scalable, instantaneous and uniform in quality.

- Low-Cost Inputs and Setup
- Unconstrained Fast Scalability

Natural Gas

We start with low-cost natural gas feedstock that is readily available

Our Proprietary Process

Cracks natural gas (methane) into Graphene and Hydrogen in a continuous process

GMG Graphene

Our process allows (after validating product quality) definable platelet size to produce to specifications enabling our product portfolio

Our Product Lines

- **THERMAL-XR®**
- **LUBRICANT**
- **ALUMINIUM-ION BATTERY**

GMG'S PRODUCT MARKETS

Graphene Manufacturing Group

THERMAL-XR®™

HVAC ENERGY SAVING COATINGS

Deployed

Air-Conditioning Efficiency Paint

Commencing revenue with customers in various countries

LUBRICANT™

AUTOMOTIVE FLUIDS

Development

Engine Oil Additives

Engaging prospects in Australia, SE Asia & Middle East.

ALUMINIUM-ION BATTERY™

ENERGY STORAGE BATTERY

Development

Developing Commercial Prototypes

University of Queensland Collaboration. Coin cell and pouch pack prototypes currently in development.

Sources: Publicly available market size data and internal Management estimates.

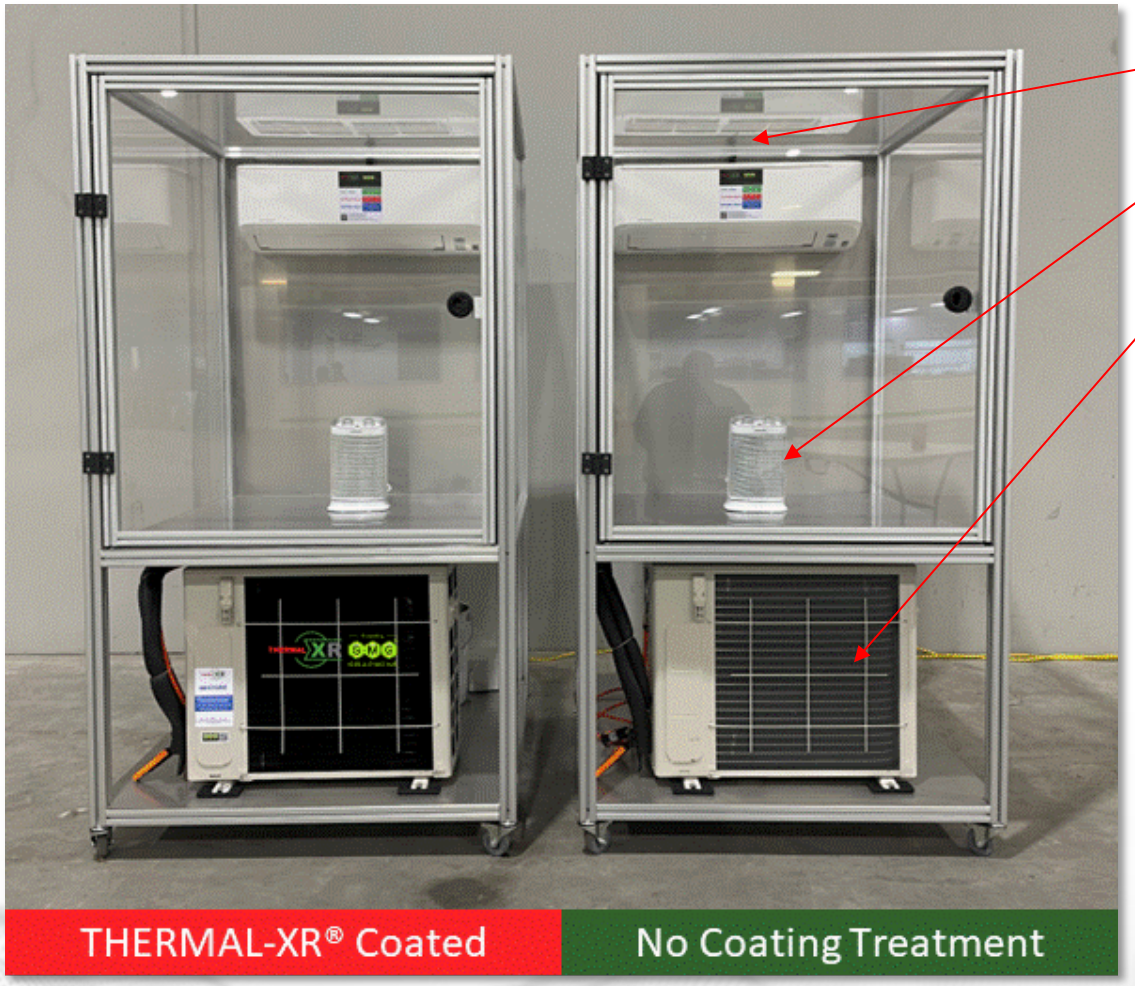
THERMAL-XR®

THERMAL-XR® powered by GMG Graphene has created a unique and novel way of increasing heat transfer and improving the thermal efficiency of HVAC-R equipment.

It is suitable for applying on aluminium and copper coils used in air-cooled heat exchange equipment, namely air conditioning and refrigeration.

- **Energy Savings. Up To The Highest (CMVP) Approved Result to Date ~ 46%**
- **Emission Reductions.**
- **Corrosion Protection.**
- **Increased Thermal Efficiency**

NEW AIRCONDITIONER TEST PROCEDURE



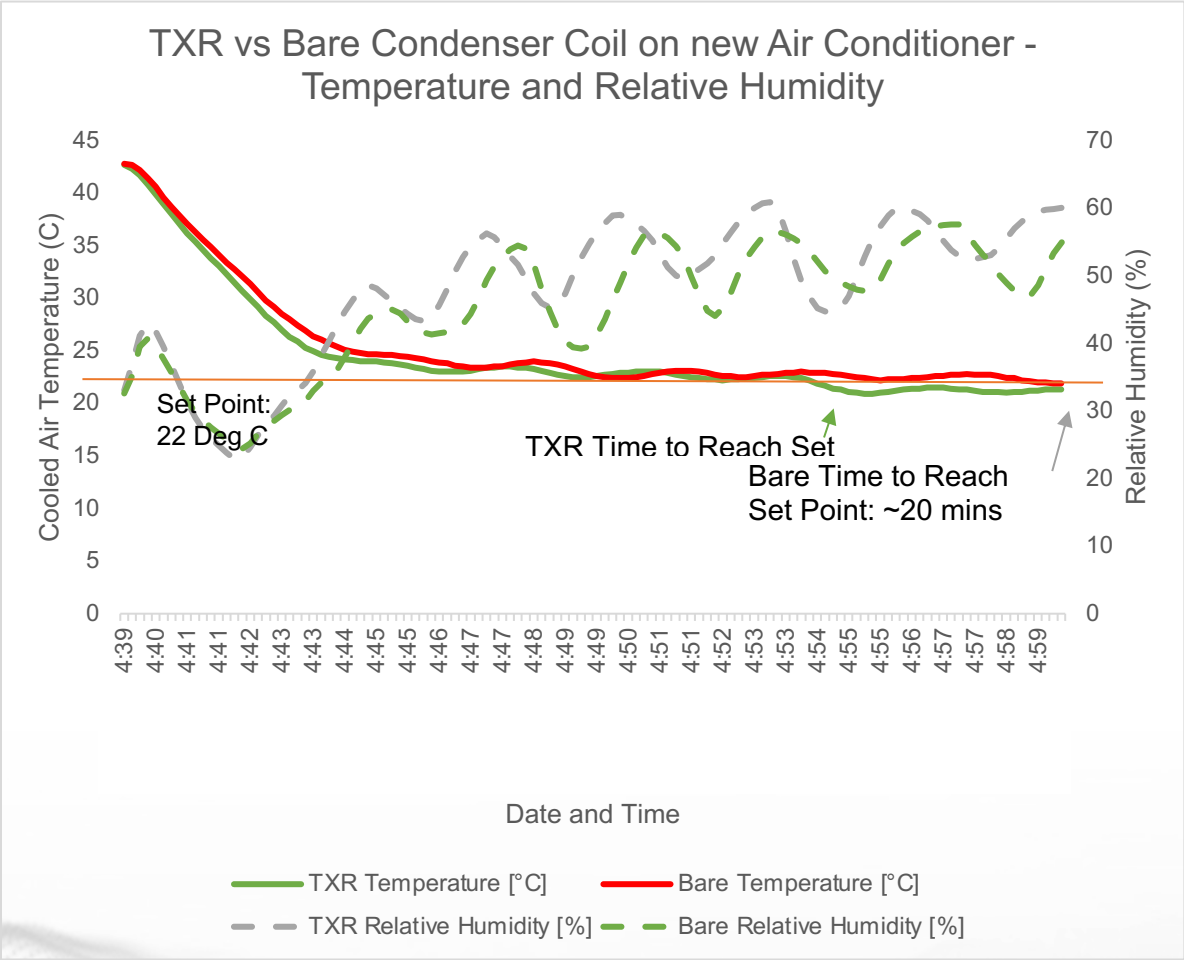
Testo smart probes monitoring and recording.

Heaters turned on to reach 45^{0}C start temperature.

At 45^{0}C air conditioners are turned on, setpoint 22^{0}C.

Time & Energy Consumption comparison between THERMAL-XR® coated air conditioner and Non-Coated to achieve setpoint 22^{0}C.

TXR RESULTS



- Graph (left) is representative of multiple tests.
- **Average ~ 20% reduction in time to achieve setpoint 22^{0}C with THERMAL-XR®.**
- Starting internal temperatures of 45^{0}C
- Similar or less power used by Thermal-XR coated air conditioner versus non coated air conditioner.
- GMG is an **AFFILIATE OF THE THERMAL AND FLUID SCIENCES AFFILIATES PROGRAM** at **STANFORD UNIVERSITY** to further understand the thermal transfer properties of its Graphene and its applications.

Stanford University | Industrial Affiliates Programs

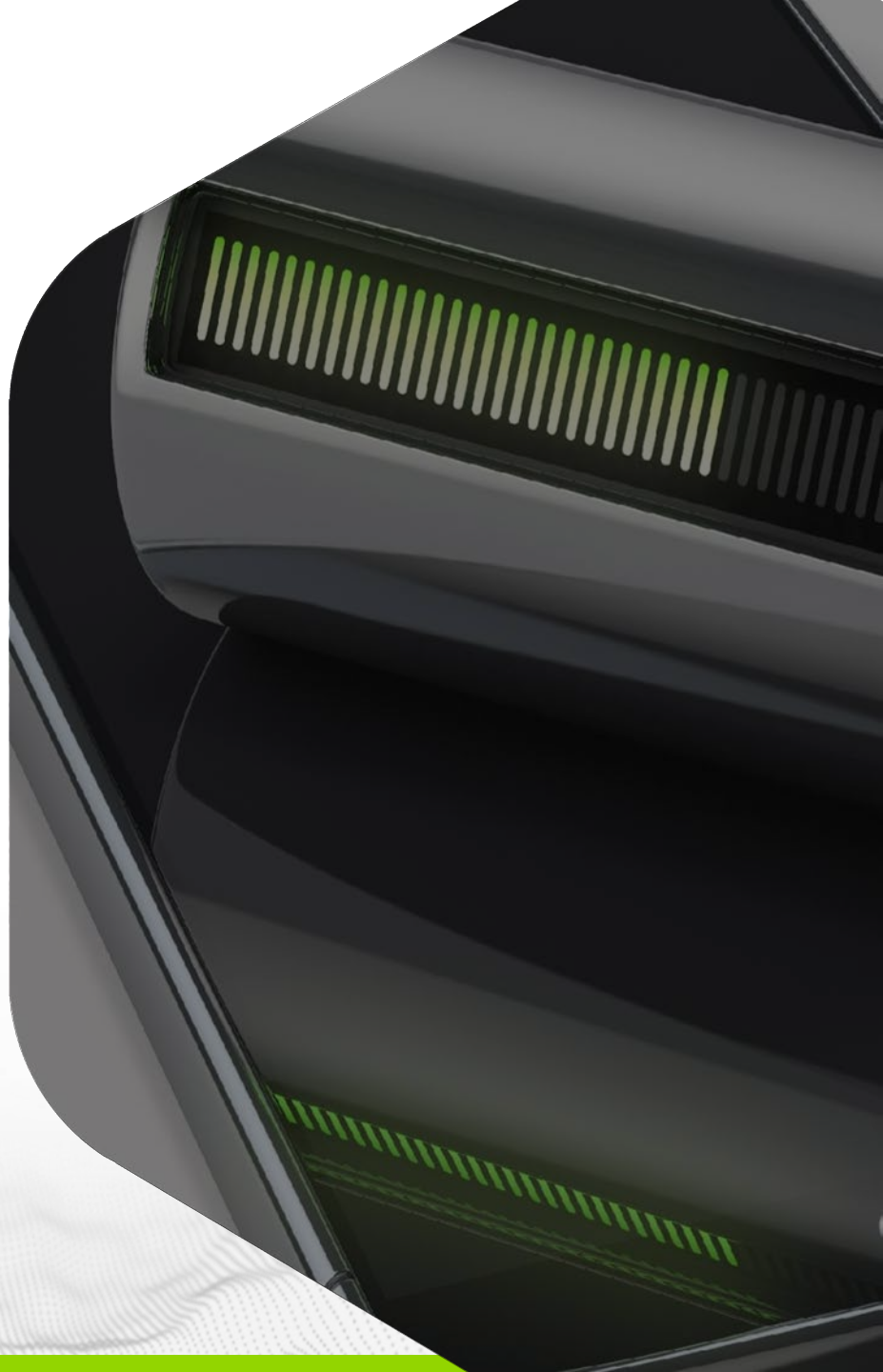
GRAPHENE ALUMINIUM ION BATTERY

Following earlier collaboration, in 2021 GMG entered into a research agreement with the University of Queensland ("UQ") to develop graphene aluminum-ion batteries.

Graphene Manufacturing Group was granted an ***exclusive licence of the patent-pending technology for battery cathodes.***

G™ ALUMINIUM-ION BATTERY – INDICATIONS SO FAR

- Compares favourably with Lithium-Ion Batteries
- Interchangeable (at 3+ volts)
- Rechargeable
- Up to 70 Times Faster-charging
- Up to 3x More Battery Life
- Greener & Safer
- No Lithium, Copper, Cobalt, Manganese or rare earth materials – uncomplicated supply chain
- Ongoing Intellectual Property collaboration between UQ & GMG



ANNOUNCEMENT: OUR PARTNERS IN THE BATTERY VALUE CHAIN

R&D

Graphene Aluminium-Ion Battery Development

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

Key Input Materials

Aluminium Products

RioTinto

Scaling and automating of our proprietary Graphene Manufacturing Process

wood.

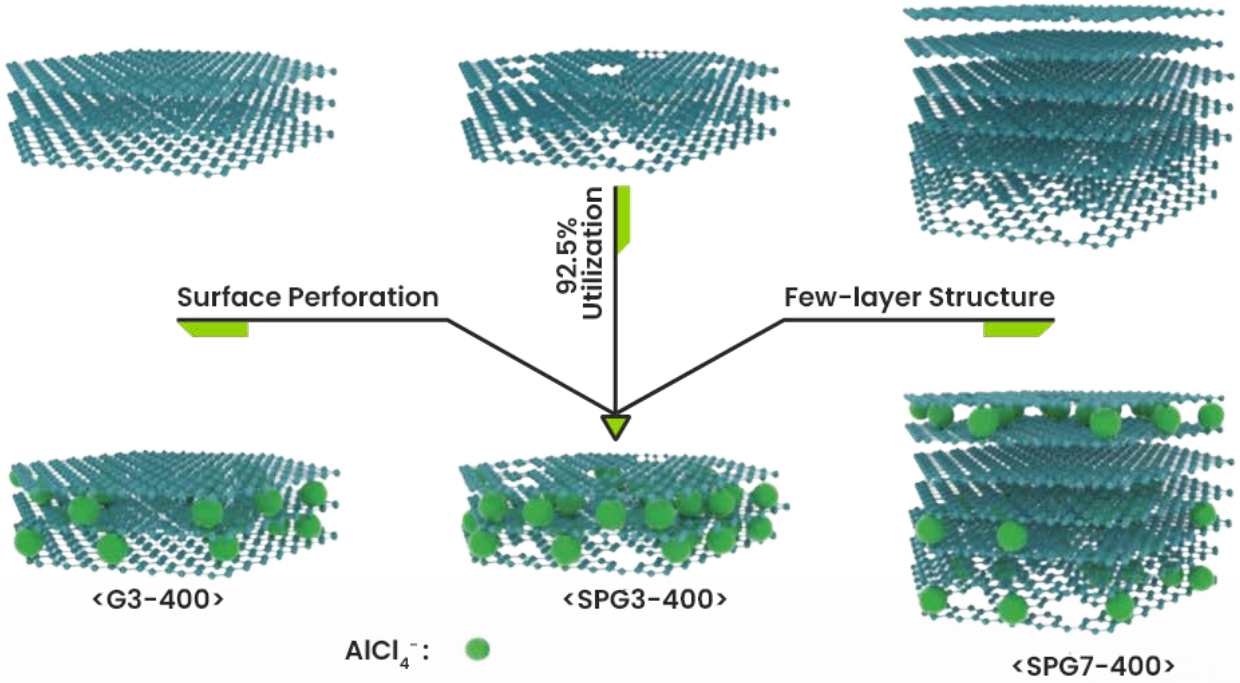
G+Al Battery Manufacturing at Scale

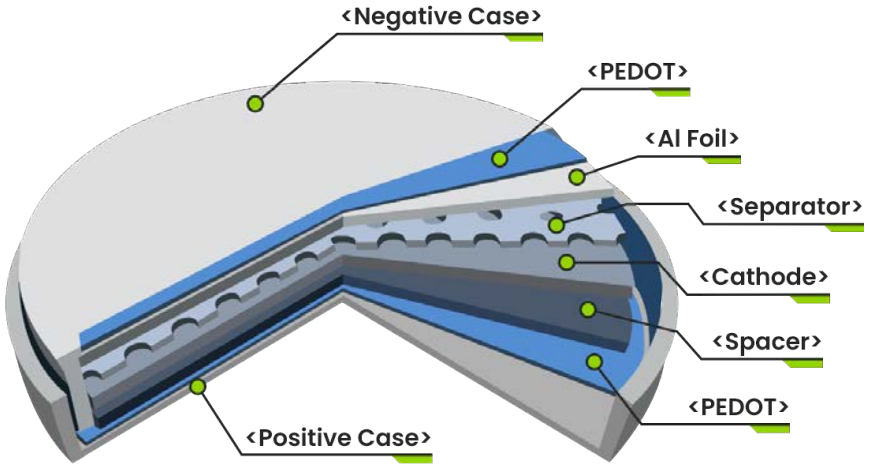
BOSCH Invented for life

Product Development and Global Sales

Ongoing Discussions with Major Global Brands

THE UNIVERSITY OF QUEENSLAND NANOTECHNOLOGY





UQ battery cells use nanotechnology to insert Aluminium ions (atoms without some electrons) inside tiny perforations in GMG Graphene platelets.

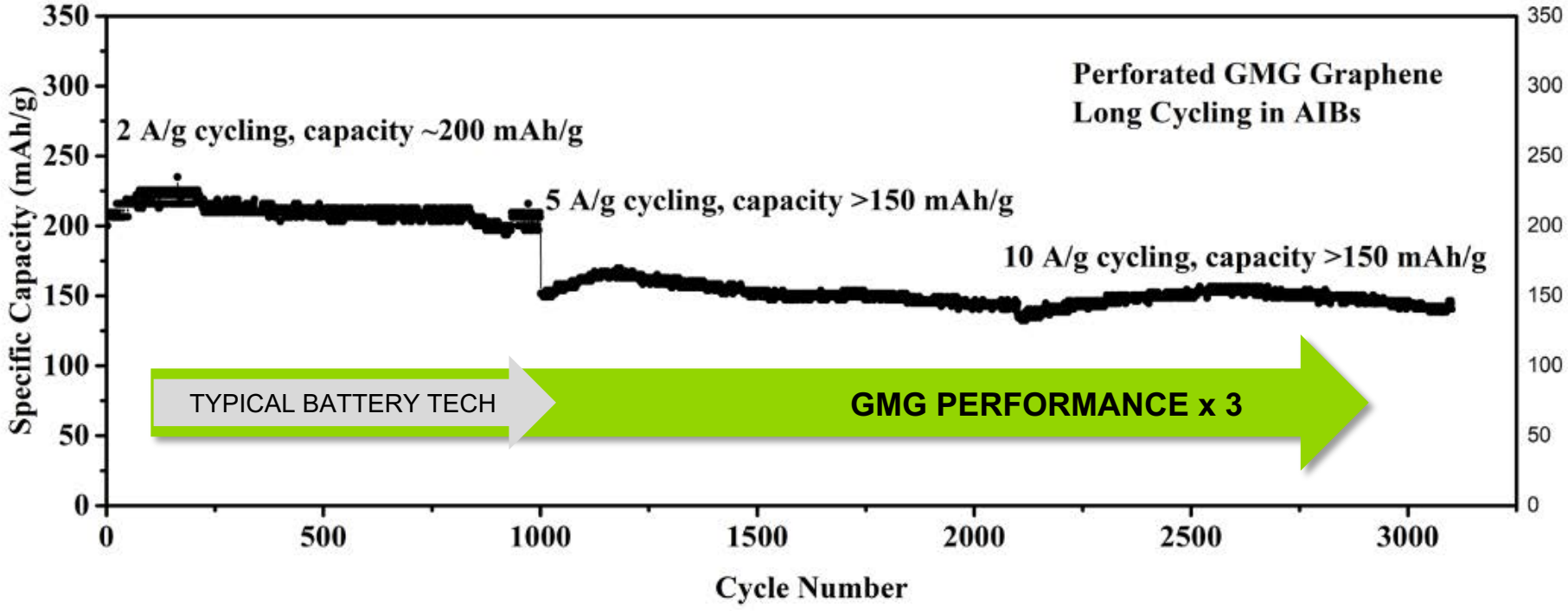
PERFORMANCE DATA COIN CELL BATTERIES

Initial performance data when tested in coin cells for the patent-pending surface perforation of Graphene in Aluminium-ion batteries developed by GMG and The University of Queensland.

Battery Technology	Electrode Materials	Energy Density (Wh/kg)	Power Density (W/kg)	Calculated Time to Fully Charge Average Phone Battery (minutes)
Graphene Aluminum-Ion Batteries:				
Taiwan/Stanford US	Natural graphite/Al	~68.7	~41.1	60 - 110
Stanford US	CVD graphitic foam/Al	40	~3000	1 - 5
GMG + UQ	**GMG + UQ Graphene/Al**	**150-160**	**~7000**	**1 - 5**

Source: 1. Hongjie Dai, Nat. Commun., 2017, 8:14283 2. Hongjie Dai, Nature, 2015, 520, 325, and 3. University of Queensland testing data.

2032 COIN CELL BATTERY PERFORMANCE TEST



Recent battery performance data released on June 22nd, in conjunction with The University of Queensland, confirmed **a very high cycle rate for Graphene Aluminium-Ion coin cell batteries.**

HIGHLY STABLE OVER THOUSANDS OF CYCLES

All testing was carried out on coin cells with perforated GMG graphene in aluminium ion battery at ambient temperature cycling from 2.4V to 0.5V, 1000 cycles at 10 Coulomb (2 A/g), 1000 cycles at 30 Coulomb (5 A/g), 1000 cycles at 66 Coulomb (10 A/g).

GRAPHENE ALUMINIUM-ION BATTERIES

- Multiple customer types with major brands included have stepped forward requesting battery samples for testing, collaboration and potential purchasing for use in their products.
- The types of applications are varied – because of the battery's potentially wide and varied performance range.
- These applications can utilise the battery in the following formats:
  - Coin Cell Battery
  - Pouch Pack Battery

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

- REMOTES / IOT DEVICES
- PERSONAL ELECTRONICS
- SMART DEVICES/TOOLS
- HOUSEHOLD & GRID STORAGE
- ELECTRIC VEHICLES / AVIATION

UNIVERSITY OF QUEENSLAND GLOBAL PATENT APPLICATION

GMG's partner, University of Queensland, **has filed a global patent application for the G+AI Battery** under the Patent Corporation Treaty.

- 20 year[1] licence agreement, between GMG and UniQuest (the commercialisation arm of UQ).
- GMG to pay Uniquest a royalty on sales of G+AI Batteries.
- This patent application is an important step in securing the intellectual property and global commercialisation rights for the G+AI Battery technology that GMG has rights to develop and deploy.

[1] The licence agreement has a term of 20 years or longer, should patents remain in place in certain countries.

GMG & WOOD COLLABORATION AGREEMENT

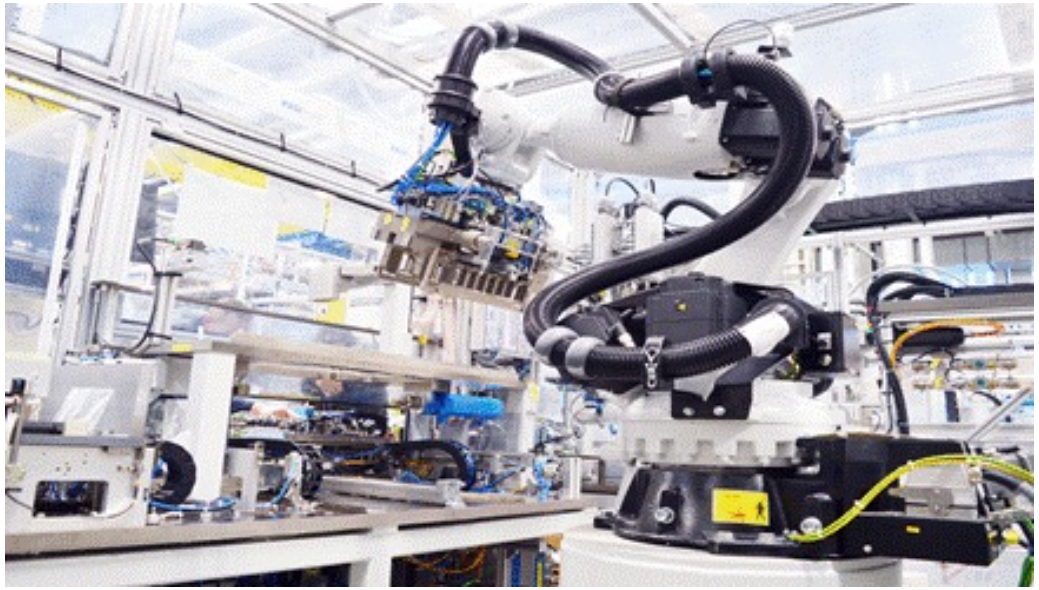
- Wood is a global leader in consulting and engineering across energy and the built environment. Wood provides consulting, projects and operations solutions in more than 60 countries, employing around 40,000 people.
- Wood will support GMG in scaling up and automating its proprietary natural gas to graphene manufacturing process.
- Non-binding Letter of Intent – signed.

GMG & RIO TINTO COLLABORATION AGREEMENT

- GMG and Rio Tinto will:
  - Explore the use of energy saving products in Rio Tinto's operations,
  - Explore working together to support GMG's development of Graphene Aluminium Ion (G+Al) batteries, and
  - Collaborate on mining and other industrial applications
- Non-binding Letter of Intent – signed.

GMG & BOSCH COLLABORATION AGREEMENT

- Once we achieve a successful commercial prototype of a GMG Graphene Aluminium Ion Battery, sales agreements and a final investment decision – GMG plans to build and operate an initial automated production facility for batteries in coin cell format.
- BOSCH (BAMS) intends to design and deliver a Graphene Aluminium Ion Battery manufacturing plant.
- Non-binding Letter of Intent – signed.



BOSCH
Invented for life

GMG PILOT PLANT COMMISSIONING – DEC 2021

"The commissioning of our Battery Pilot Plant is an important milestone for GMG. Not only will it allow us to develop, manufacture and test our own G+AI Battery coin cell and subsequently pouch packs in-house, it will also enable the Company to accelerate the commercial development of our G+AI Batteries, work with future customers and further build on our internal expertise. We also expect the Battery Pilot Plant to accelerate optimisation of our G+AI Battery prototypes, building on the encouraging results we have already achieved which are generating significant interest from prospective customers."

GMG CEO & Managing Director, Craig Nicol

G+AI 2032 COIN CELL PROTOTYPES

- G+AI 2032 battery coin cell prototypes have been shipped to prospective customers for testing and evaluation with the following customer feedback:
  - Faster charging and discharging capacity than lithium ion batteries
  - High area capacity similar or higher than lithium ion batteries.
  - Next development with 3+ volts (currently 1.7 nominal volts).
- The coin cell prototypes development is ongoing.
- Battery grade graphene manufacturing quality program is also ongoing.
- Pouch Pack Pilot Plant – planned to be operational **before end of June 2022.**

* Source: Nature Energy, 2019, 4, 560; Joule, 2019, 3, 1094

GMG SHARE STRUCTURE

- Ticker: **TSXV - GMG**
- Shares Outstanding: **77,999,681**
- Market Capitalization (As at June 6th) **~C$263M**
- Options: **5,158,427**
- Warrants: **3,164,968**
- Management and Board Ownership: **~35%**
- Cash at Bank (March 31st, 2022): **~A$14.1M**

Graphene Manufacturing Group

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