



Graphene Manufacturing Group

**ENERGY SAVING AND ENERGY STORAGE SOLUTIONS**

[www.graphenemg.com](http://www.graphenemg.com)

TSX.V: GMG

May 2021



Graphene Manufacturing Group

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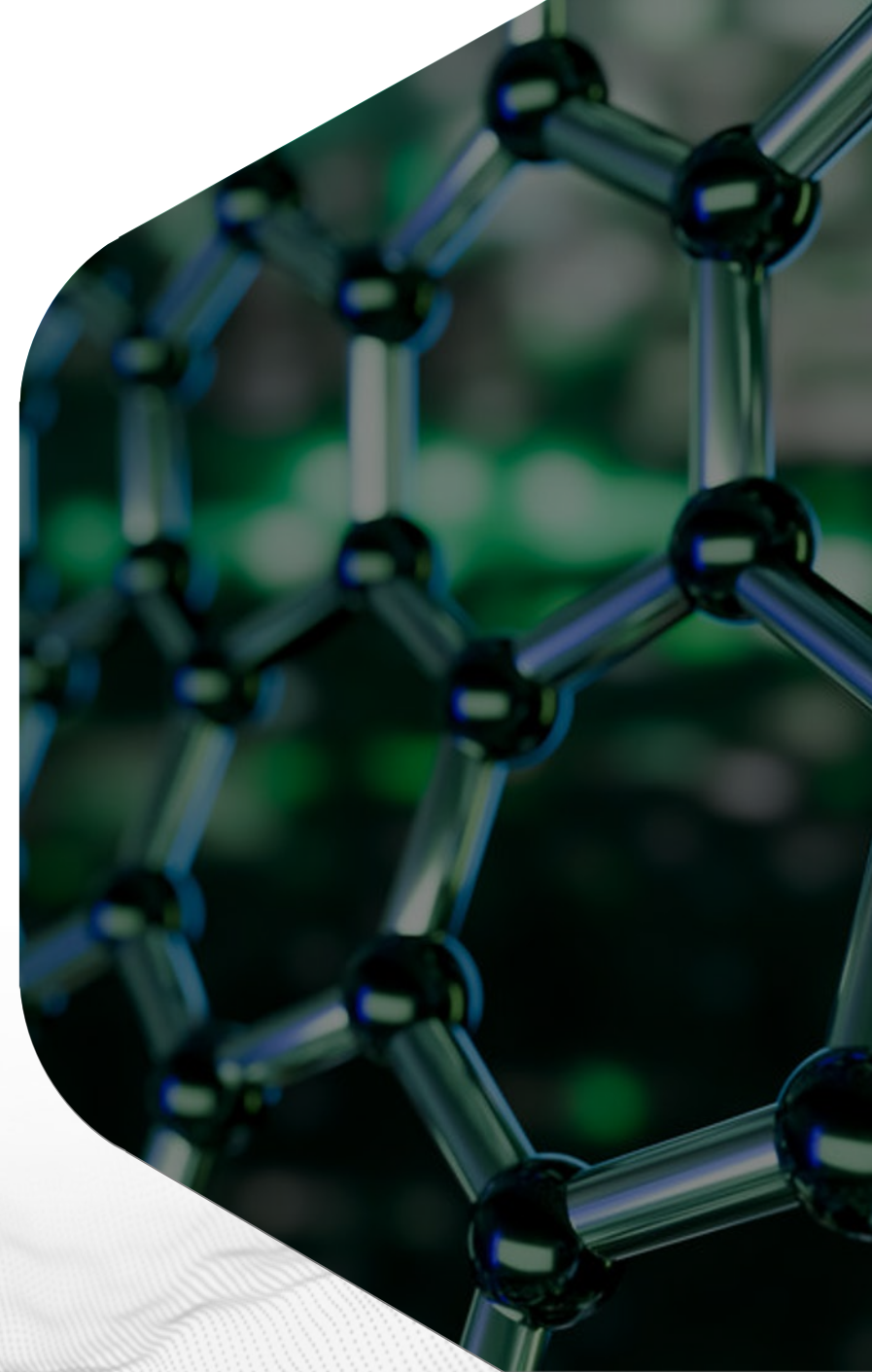
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# GRAPHENE MANUFACTURING GROUP

- 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 applications patent-pending
- Our products range from advanced Energy Savings Solutions to next generation Graphene Aluminium-Ion batteries.





# ENVIRONMENTAL, SOCIAL & GOVERNANCE (ESG)

- **Purpose driven**

*Graphene enabled solutions providing more benefits and less costs*

- **Focussed on society's big challenges ... and opportunities**

*Energy Saving and Energy Storage Solutions*

- **Committed to progressing UN Sustainable Development Goals**

*Commencing with: affordable and clean energy; climate action; industry, innovation and infrastructure; gender equality*

- **Active collaborations**

*With customers, local stakeholders, academia, governments, industry associations, and technology institutions*

- **Transparent, values based governance**



# MANAGEMENT & BOARD OF DIRECTORS

## 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 Fellow Australian Society of Certified Practising Accountants (FCPA) and Chartered Governance Institute (FCG); a Member of the Institute of Directors UK and the Australian Institute of Company Directors (AICD).

## Chris Ohlrich (CFO & Director)

Chris Ohlrich has over 20 years of commercial, finance and corporate transaction experience and is a Chartered Accountant. Chris has a strong background in the delivery of major M&A and capital raising transactions developed during an investment banking career with Deutsche Bank and Investec Bank, and more recently through senior commercial and finance leadership roles in the energy sector. Chris has a Bachelor of Commerce and Bachelor of Laws from the University of Queensland. Chris is a member of the Institute of Chartered Accountants Australia (ICAA) and the Australian Institute of Company Directors (AICD).

## 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

## 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.

## Will Ollerhead (Director)

Mr. 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.

## Our Team

Global Sales & Marketing Specialists  
Operations & HSEQ Specialists  
Engineering & Technology Specialists

Financial & Capital Market Specialist  
Carbon & Scientific Specialist

# WHAT IS GRAPHENE?

## THE CARBON WONDER PRODUCT

Graphene is the first two-dimensional material and is classed as a “super-material” offering extremely high strength, electrical and thermal conductivity, hydrophobicity, impermeability to all gases and as well as a range of other valuable properties.

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.

## GRAPHENE PROPERTIES



**THERMAL CONDUCTIVITY** Extremely thermally conductive.



**WEIGHT, ASPECT RATIO** Extremely light – up to 300m<sup>2</sup> of surface area per gram.



**TENSILE STRENGTH** Extremely strong when mixed into various materials.



**MELTING POINT** Extremely high, very stable up to 950°C & higher in oxygen free environment.



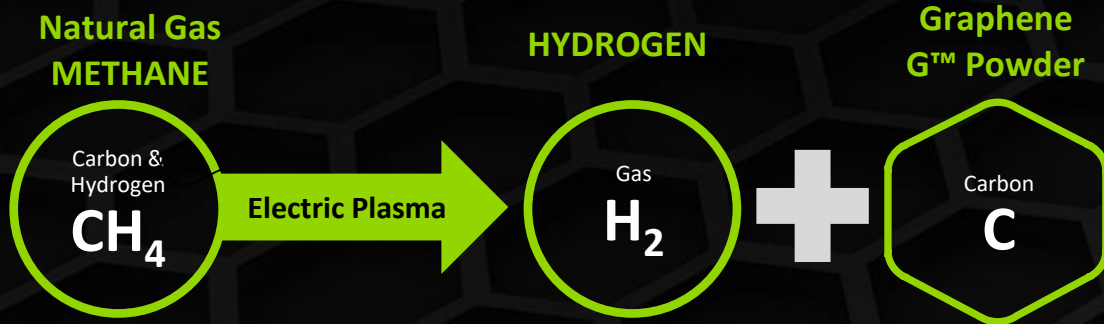
**ENHANCED LUBRICATION** Extreme lubrication and wear reduction.



**CORROSION RESISTANT** - Highly Hydrophobic (water repellent).

# GMG'S COMPETITIVE ADVANTAGE

## GMG GRAPHENE PRODUCTION



## OTHER GRAPHENE PRODUCTION

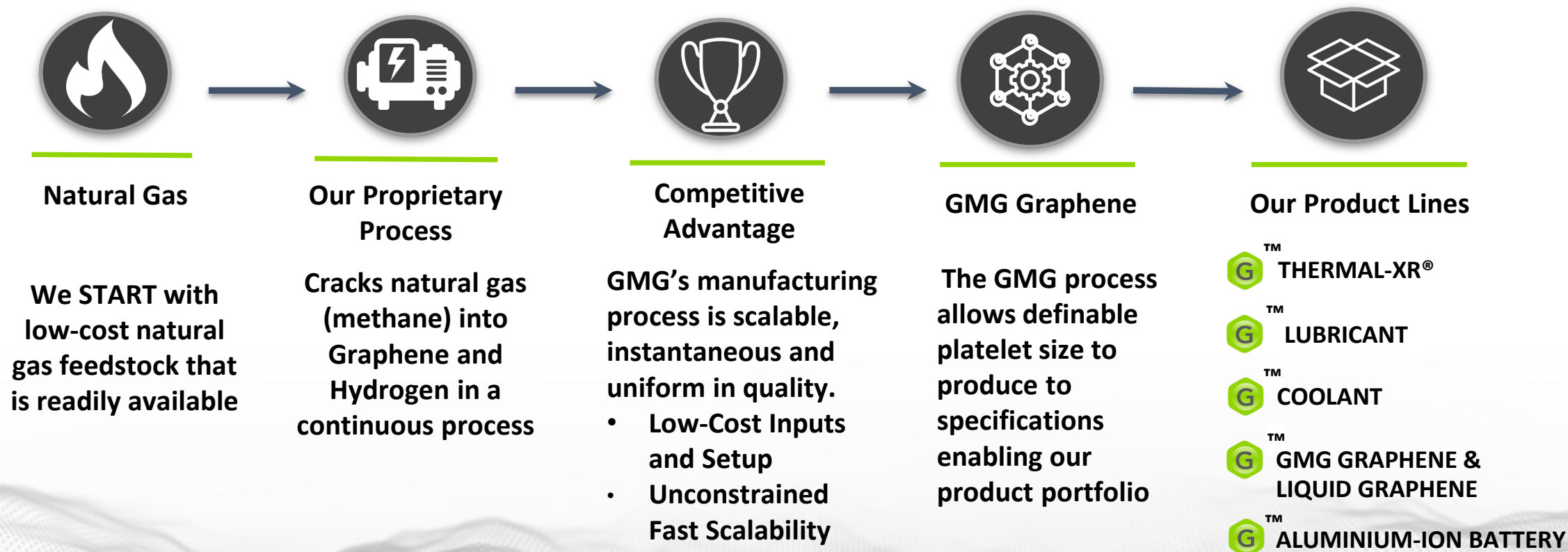


- ✓ Instantaneous & Continuous
- ✓ Low-Cost Inputs and Setup
- ✓ Unconstrained Fast Scalability
- ✓ Controlled Definability
- ✓ High Quality Grade Graphene (University Verified)
- ✓ Cogeneration Capabilities
- ✓ Low environmental footprint

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



# THE GMG PROCESS: FROM FOSSIL FUEL TO FINAL PRODUCT





# GMG GRAPHENE: VERY HIGH QUALITY

***“GMG materials have very high purity and no trace elements and over perform existing graphene materials on market, that can be competitive advantage for many applications”***

The University of Adelaide – Graphene Enabled Industry Transformation ARC Hub



GMG's Graphene high quality can be seen in many ways – **including its extremely dark black colour** (GMG graphene on the right)

# GMG PRODUCTS: ENERGY SAVING & ENERGY STORAGE SOLUTIONS



## ENERGY SAVING SOLUTIONS

- **GMG™ THERMAL-XR®**
- **GMG™ LUBRICANT**
- **GMG™ COOLANT**
- **GMG GRAPHENE & LIQUID GRAPHENE**



## ENERGY STORAGE SOLUTIONS

- **GMG™ ALUMINIUM – ION BATTERIES**
- **BATTERY MATERIAL**



# GMG'S PRODUCT MARKETS



## HVAC ENERGY SAVINGS COATINGS

Deployed



Air-Conditioning Efficiency Paint

Commencing revenue with customers in various countries

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



## AUTOMOTIVE FLUIDS

Development



Engine Oil and Coolants Fuel Efficiency Additives

Engaging prospects in Australia, SE Asia & Middle East.



## ENERGY STORAGE BATTERY

Development



Developing Commercial Prototypes

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

# ENERGY SAVING SOLUTIONS: OUR PRODUCTS



## **THERMAL-XR®**

- A unique method of improving the conductivity of heat exchange surfaces in Heating, Ventilation, Air Conditioning and Refrigeration (HVAC-R).
- The process coats and protects heat exchange surfaces against corrosion.
- **This can result in a significant efficiency improvement and energy cost savings.**
- GMG sells to companies to reduce their Air conditioning Energy Costs and Emissions



## **LUBRICANT™**

- GMG Graphene + Oil
- **Concentrate can be added to an existing fully formulated lubricant.**
- G Lubricant is made by GMG to be sold as a concentrate in lubricating oils to reduce friction and wear.



## **COOLANT™**

- GMG Graphene + Heat Transfer Fluid/Coolant
- **Concentrate can be added to an existing fully formulated coolant**
- G Coolant is made by GMG to be sold as a concentrate to reduce energy costs and emissions.



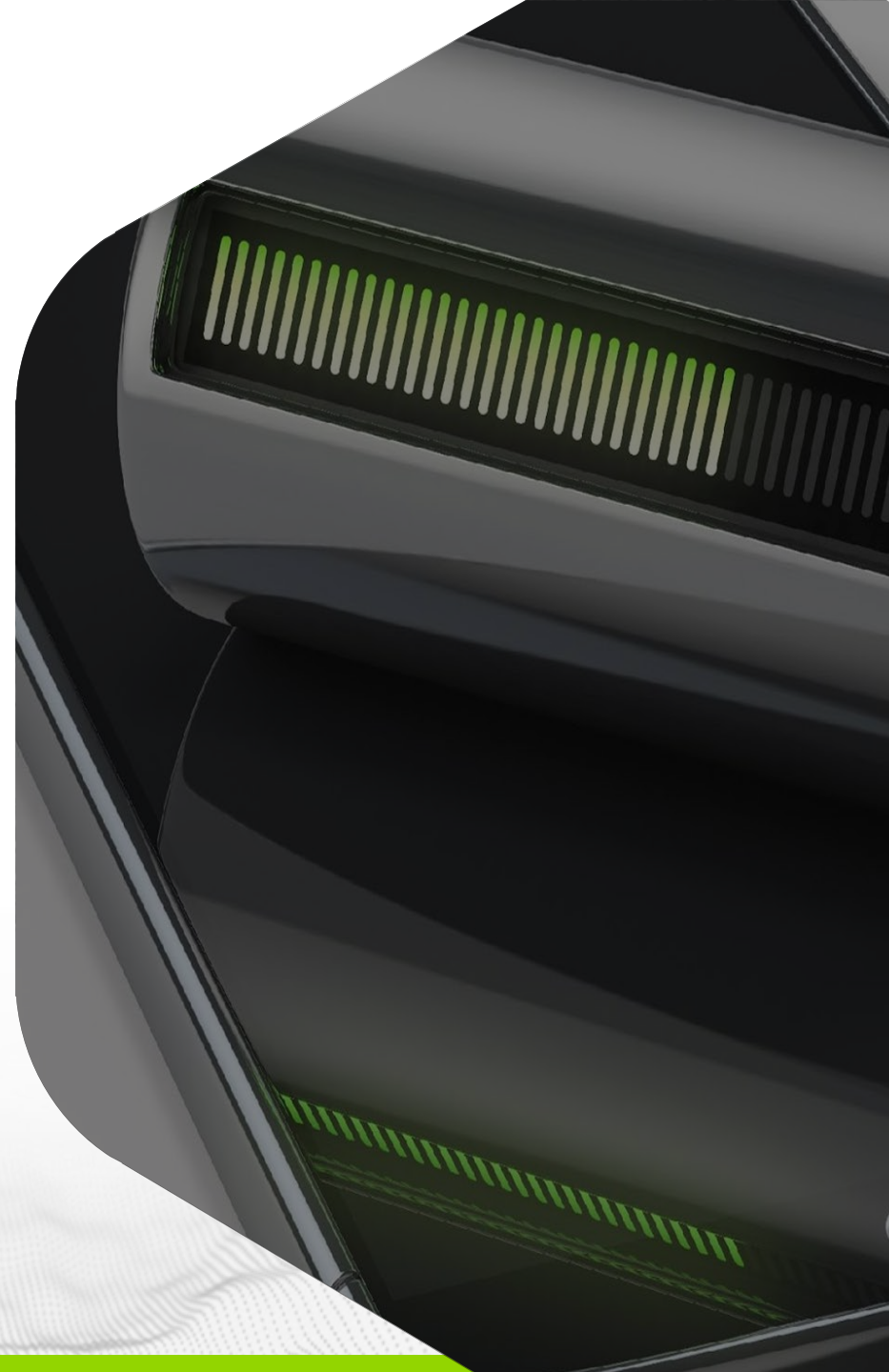
# GMG & THE UNIVERSITY OF QUEENSLAND

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 granted ***exclusive licence of the patent-pending technology for battery cathodes.***

## ALUMINIUM-ION BATTERY – INDICATIONS SO FAR

- Outperforms Lithium-Ion Batteries
- Greener & Safer
- Interchangeable
- No Lithium or rare earth materials – uncomplicated supply chain
- Rechargeable
- Ongoing Intellectual Property collaboration between UQ and GMG
- Up to 70 Times Faster-charging
- Up to 3x More Battery Life



# 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)
<b>Graphene Aluminium-Ion Batteries:</b>				
Taiwan/Stanford US	Natural graphite/Al	~68.7	~41.1	60 - 110
Stanford US	CVD graphitic foam/Al	40	~3000	1 - 5
<b>GMG+UQ</b>	<b>GMG+UQ Graphene/Al</b>	<b>150-160</b>	<b>~7000</b>	<b>1 - 5</b>

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

- UQ testing results shows strong indication of potential to outperform Li-Ion batteries in charge time, capacity, life, safety and materials supply chain.
- Ongoing GMG and UQ Australian Research Council funded project is to produce commercial prototype batteries with higher energy densities.

“The real differentiator about these batteries is their very high-power density of up to 7000 watts/kg, which endows them with a **very high charge rate**. Furthermore, graphene aluminium-ion batteries provide major benefits in terms of longer battery life, battery safety (very low fire potential) and lower environmental impact (more recyclable)”

- **Dr Ashok Nanjundan, GMG Chief Scientific Officer**

# GRAPHENE ALUMINIUM-ION BATTERIES

- GMG aims to manufacture commercial battery prototypes for personal devices, phones, laptops, electric vehicles and grid storage with technology developed at the University of Queensland (UQ).
- Currently looking to bring coin cell commercial prototypes for customer testing by end 2021.
- A pouch pack commercial prototype for customer testing is targeted before end 2022.



# SHARE STRUCTURE

- ◆ **Ticker:** TSXV - GMG
- ◆ **Shares Outstanding:** 69,081,717
- ◆ **Market Capitalization (as of May 1<sup>st</sup>):** ~C\$83M
- ◆ **Options:** 6,202,454
- ◆ **Warrants:** 1,699,930
- ◆ **Management Ownership:** 39%



# GMG SUMMARY

- 3<sup>rd</sup> party verified superior product quality over competing “graphite – graphene”
- Low product source costs with scalable unique process
- Proven production process (GMG 100% owned, self developed technology) with low production CAPEX
- Selling TXR today, lubricants under customer trials, Graphene Aluminium-Ion battery being tested with UQ
- Sole commercial rights to UQ Graphene + Aluminium-Ion Battery IP
- Globally experienced board and management team led by ex Shell international team



Graphene Manufacturing Group

**THANK YOU**

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