



HYDROGRAPH

CSE: HG | OTCQB: HGCPF | FRA: M98

IGNITING MATERIAL CHANGE

Investor Presentation
July 2024

Forward-Looking Statement

This deck contains certain “forward looking statements” and certain “forward-looking information” as defined under applicable Canadian securities laws. Forward-looking statements and information can generally be identified by the use of forward-looking terminology such as “may”, “will”, “expect”, “intend”, “estimate”, “upon” “anticipate”, “believe”, “continue”, “plans” or similar terminology. Forward-looking statements and information include, but are not limited to: the use of the net proceeds from the previously announced private placement, anticipated benefits resulting from the Marketing Services Agreement, the future exercise of the Options, ability to successfully increase commercial scale production at its manufacturing facility, and the timing thereof, the potential valuation of Company, any EBITDA predictions, the commercialization of HydroGraph’s products that lead to customer contracts resulting in our potential valuation and EBITDA predictions, and the Company’s business plans and strategies.

Forward-looking statements and information are based on forecasts of future results, estimates of amounts not yet determinable and assumptions that, while believed by management to be reasonable, are inherently subject to significant business, economic and competitive uncertainties and contingencies. Forward-looking statements and information are subject to various known and unknown risks and uncertainties, many of which are beyond the ability of HydroGraph to control or predict, that may cause HydroGraph’s actual results, performance or achievements to be materially different from those expressed or implied thereby, and are developed based on assumptions about such risks, uncertainties and other factors set out herein, including but not limited to: HydroGraph’s ability to implement its business strategies; risks associated with general economic conditions; adverse industry events; stakeholder engagement; marketing and transportation costs; loss of markets; volatility of commodity prices; inability to access sufficient capital from internal and external sources, and/or inability to access sufficient capital on favorable terms; industry and government regulation; changes in legislation, income tax and regulatory matters; competition; currency and interest rate fluctuations; and other risks. HydroGraph does not undertake any obligation to update forward-looking information except as required by applicable law. Such forward-looking information represents management’s best judgment based on information currently available. No forward-looking statement can be guaranteed, and actual future results may vary materially. Accordingly, readers are advised not to place undue reliance on forward-looking statements.



Proceeded by stone, copper, bronze, iron, steel, plastic and silicon, we are now entering the *graphene* age.

Graphene, a nano material, is made up of pure carbon atoms and is the strongest material known to man; it will help usher in an age of nanotechnology, which will touch virtually every known industry.



What We Do

We produce the **highest quality graphene** in the industry at the greatest cost efficiency

HydroGraph uses a patented “explosion synthesis process”, which yields the highest purity, most powerful graphene in the industry.

- Our production process is the most environmentally friendly process in the world, and *commercialization has begun*
- Hydrograph graphene is being tested in over 20 different applications
- Our current scalable production capacity is **10 tons per year**
- New production units can be built in **2-3 months**
- **Low capital intensity** – US\$10M to US\$12M of capex to generate US\$100M of sales
- Next phase **fully funded**– completed financing raising CAD\$3.6M – 55% of existing shareholders participated; proceeds to support commercialization activities, R&D and production scale up



HydroGraph Highlights



2017
Founded



16
Employees



3 Patents Granted
8 Pending



11
Graphene Products

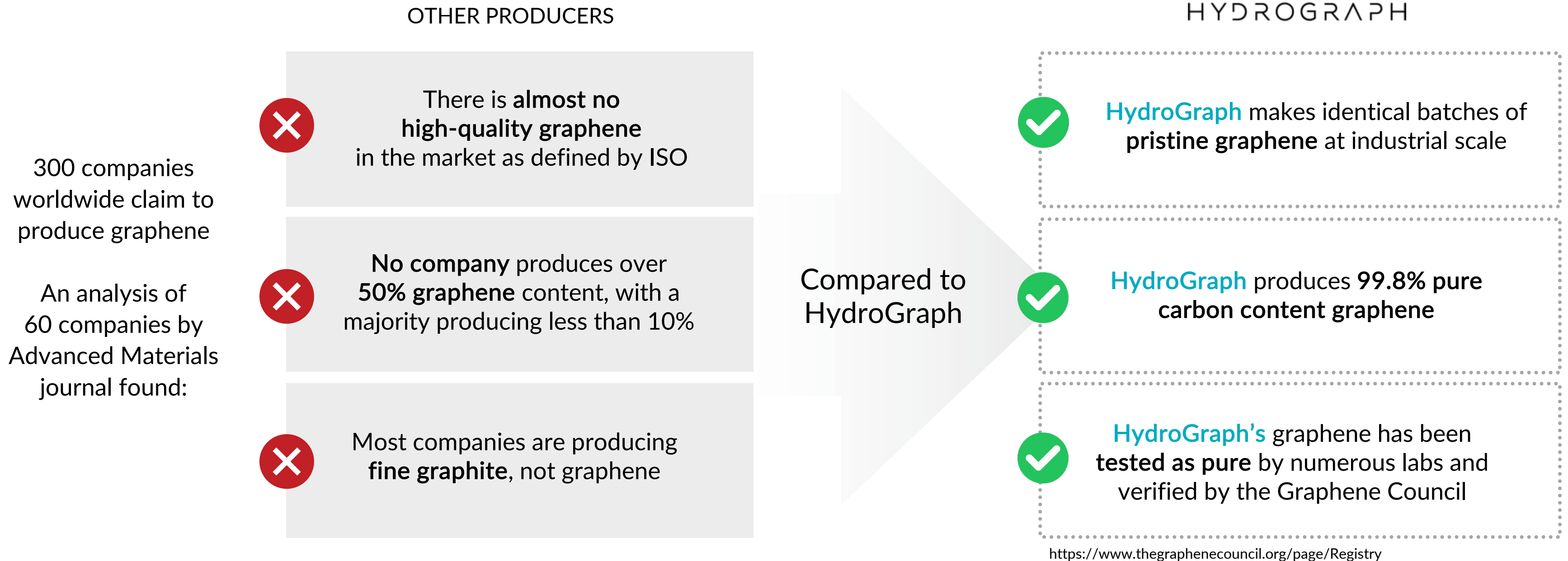


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Global Quality Problem: Not All Graphene Is The Same

While many companies are developing graphene production methods, the truth is that not all graphene is the same quality



A Sustainable Solution for a Sustainable World

HydroGraph produces pristine graphene with the smallest environmental footprint



No chemicals or solutions as part of the process



Minimal energy consumption



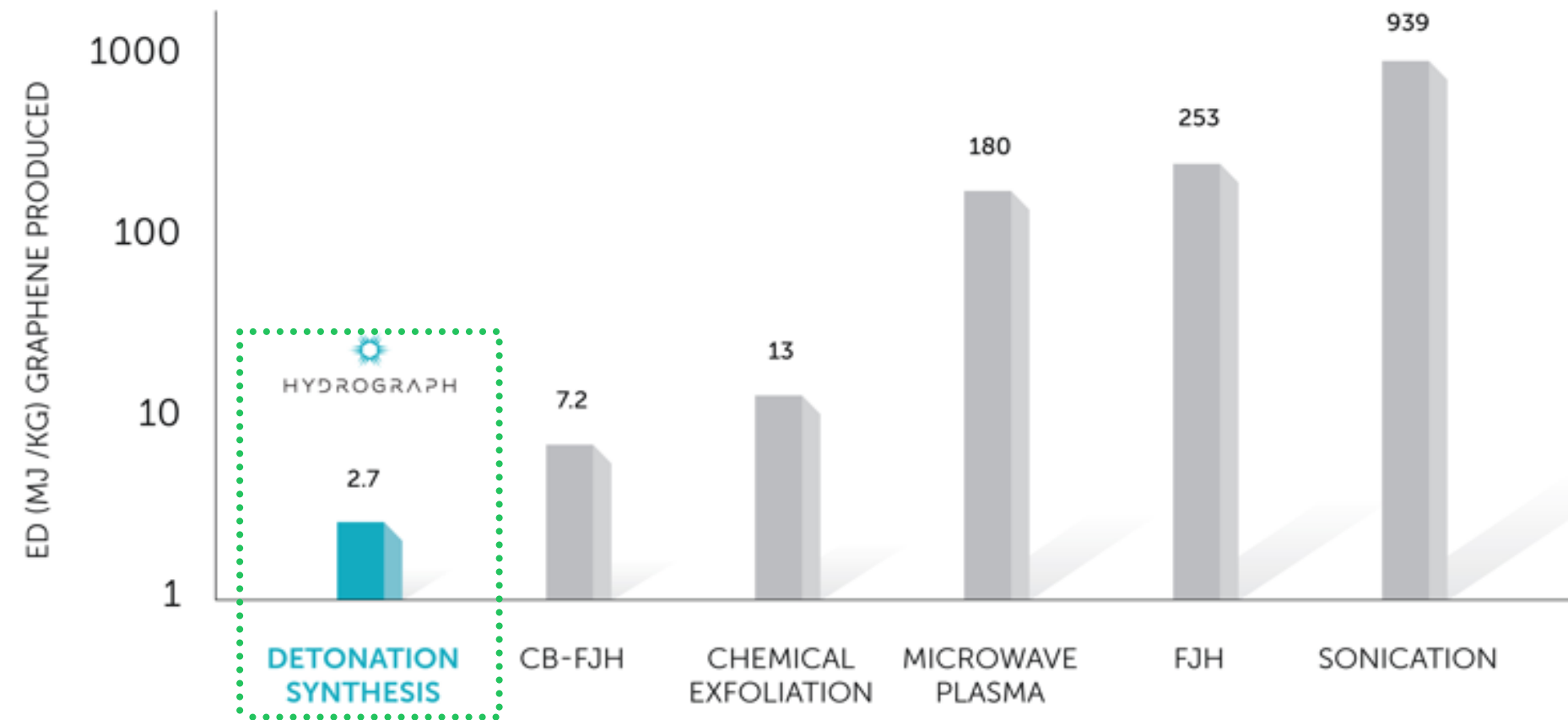
No greenhouse gas emissions

HydroGraph graphene helps customers increase the mechanical properties of materials by 20% to 50%, requiring less of the original material to be produced.

For example, our graphene:

- Increases ultimate strength of PET, a plastic, by 22% at 0.5% graphene added by weight
- 23% increase in ultimate strength for recycled plastics (LDPE)
- Improvements of 22% in strength for epoxy resins

Energy Demand for Producing Graphene
(Megajoule/Kilogram)^{1,2,3}



Legend:

CB-FJH: Carbon Black – Flash Joule Heating

FJH: Flash Joule Heating



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References:

1. Juong et al., Nature | Vol577 | 30 January 2020 | 647
2. Wyss et al., Communications Engineering, (2022)
3. US patent application US2017/0113935A1

Graphene: The “Wonder” Material Of The Future Made Available Today



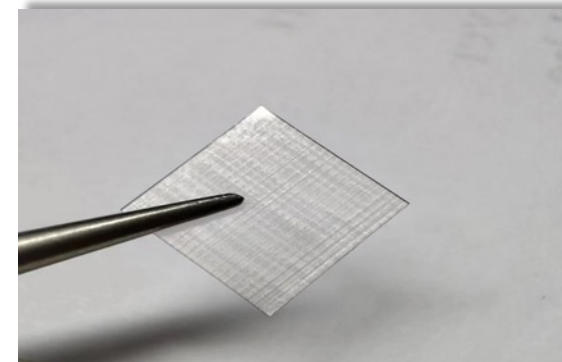
STRENGTH

200x stronger than steel



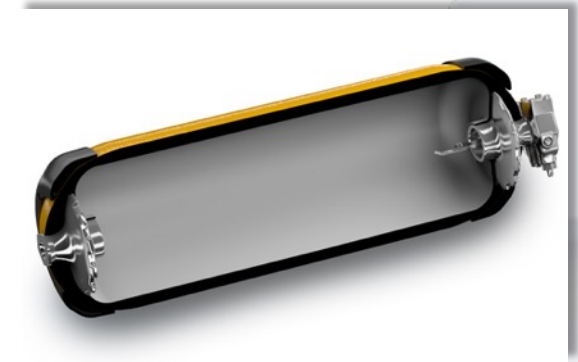
FLEXIBILITY

Can bend & stretch to **120%** of original size



THERMAL CONDUCTIVITY

10x the conductivity of copper



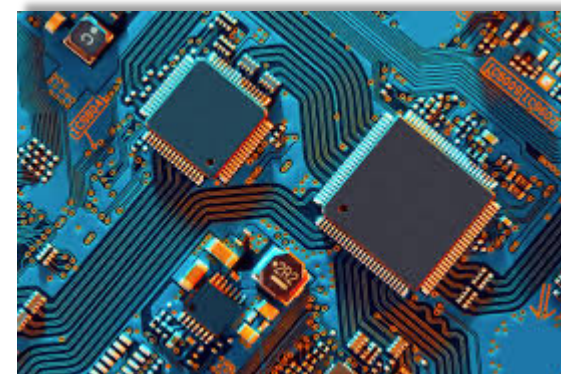
IMPERMEABILITY

Hydrogen atoms **cannot penetrate** its structure



ELECTRICAL CONDUCTIVITY

1,000x current capacity of copper



ELECTRONIC BEHAVIOUR

Electrons can move at near **light speed** through it



OPTICAL PROPERTIES

Highly **transparent**

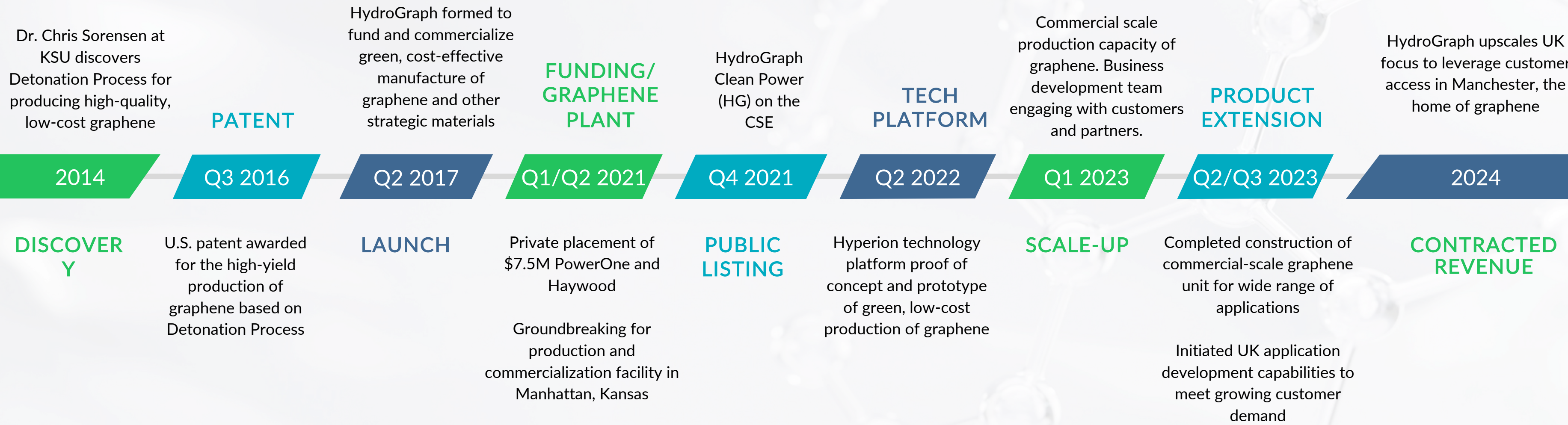


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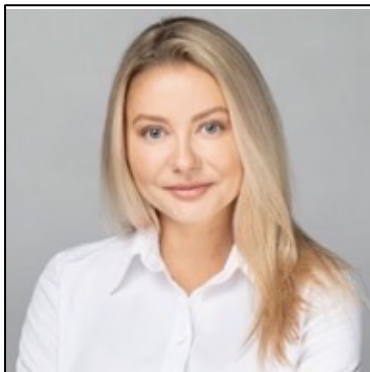
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On Track to Commercial Production

Product testing completed, ready for commercialization



Best-in-Class Executive Team



A 15-year background in emerging technologies and portfolio management, with experience in investor relations; on HydroGraph board since lab scale; Director of Operations for Frontline Crossings, and Chief Operating Officer with Omada Technologies.

Kjirstin Breure

President and Interim CEO



More than 30 years of experience as a finance and biz dev executive with previous roles held at Linde and Air Products; 10 years in CFO roles with small and mid-size companies; M.B.A. in finance from Wharton and a civil engineering degree from Lafayette College.

Bob Wowk

CFO



More than 25 years as a physicist; invented 3M’s graphene-like carbon coatings and contributed to 190 invention submissions and 20 granted US patents. Authored more than 33 peer-reviewed papers and teaches at Western University, Canada.

Ranjith Divigalpitiya

Chief Science Officer



As the former Cortelyou-Rust University Distinguished Professor in the department of physics at Kansas State University, Chris invented the the company’s Hyperion technology. He has seven patents and nearly 300 publications and is a fellow of the American Physical Society.

Chris Sorensen

VP R&D



As former VP of Engineering, Stephen developed Hydrograph’s current production equipment and is building a working prototype for our hydrogen production as well. In his role as VP of Operations, he has evolved into commercial design and developing trade secrets for the business.

Stephen Corkill

VP Operations



Stefan a Distinguished Professor emeritus at K State. He received his B.S. and PhD in chemistry from the University of Saarland, Germany. Previous posts include postdoctoral research associate at Columbia University, an assistant professor and subsequently an associate professor-ship in chemical and process engineering at the University of Karlsruhe, Germany. Stefan holds a PhD, has authored more than 200 publications and holds 14 patents.

Stefan Bossman

Lead Chemist

- ✓ Multiple start-up experiences
- ✓ 100+ years of combined industry experience
- ✓ Proven track record & success in scaling tech
- ✓ CAD ~\$2.0M personal funds committed to date

Board of Directors

David Williams

Chairman

Kjirstin Breure

Director, President, and Interim CEO

Paul Cox

Director (Independent)

David Morris

Director (Independent)



James Baker

Advisory Board Member

More than 25 years’ experience in the defense, aerospace and security market leading and managing high technology businesses, and currently Professor of Practice at the University of Manchester and CEO of Graphene@Manchester, encompassing the Graphene Engineering Innovation Center (GEIC) and the National Graphene Institute (NGI). Responsible for business strategy development and delivery, including commercialization opportunities.

Our Strategy

Become the leading global producer of high-quality graphene

1

Produce identical batches of pristine graphene at industrial scale

HydroGraph has the capacity to produce the highest quality graphene at industrial scale in identical batches.

This is an industry first.

2

Employ centralized production model

To secure IP and boost margins, HydroGraph will build a centralized facility near an acetylene supply.

Gas costs mainly arise from compression and transport, while graphene is inexpensive to ship.

3

Establish production in key geographical regions

As customer demand grows through HydroGraph's application development activities, the Company will build additional centralized facilities to guarantee supply.

4

Expand capabilities to include formation and masterbatch

To increase market penetration HydroGraph will include formulation and masterbatch offerings so customers can easily integrate graphene into their products without going through a testing process with the Company.



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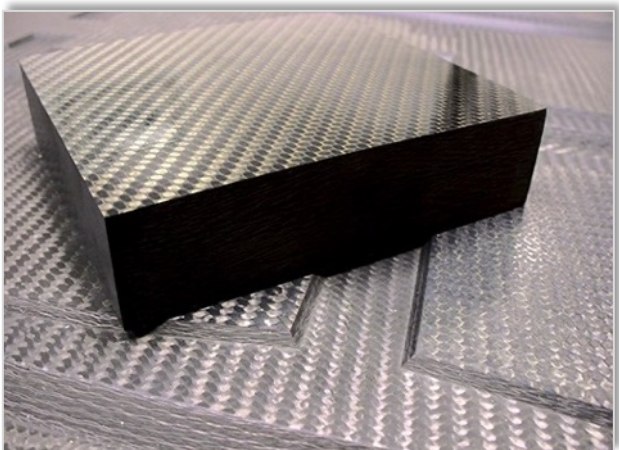
Our Target Markets



LUBRICANTS

\$160B Global Market

- 80% reduction of wear
- 24X improvement of lifetime
- 70% increase of lubricity
- Environmental benefit: longer life means less oil extracted and less spent oil to be disposed of



COMPOSITES

\$90B Global Market

- 8 orders of magnitude increase in conductivity
- Low (< 1-wt%) loading for mechanical improvement
- 14% improvement of thermal conductivity
- 25 – 30% improvement in strength in PET and epoxy



COATINGS

\$200B Global Market

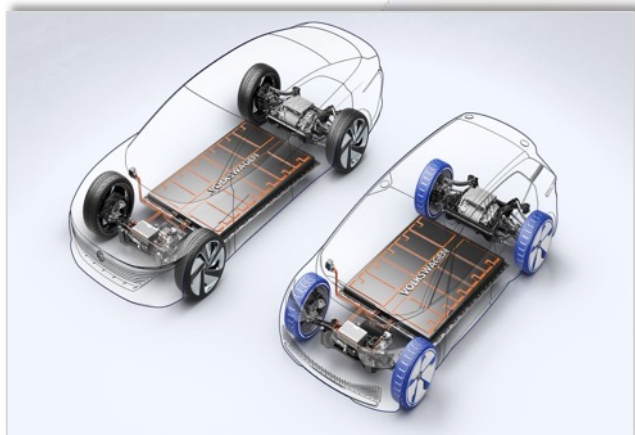
- Enhanced durability
- Light-weighting
- Enhanced electrical conductivity (static dissipative)
- Anti-corrosion



CEMENT/CONCRETE

\$860B Global Market

- 24% increase strength with 0.04 wt-%
- 15% reduction in energy demand and Global Warming Potential as LCA benefits
- Reduced porosity leading to reduced water permeability, lowering freeze/thaw damage and rebar corrosion



ENERGY STORAGE

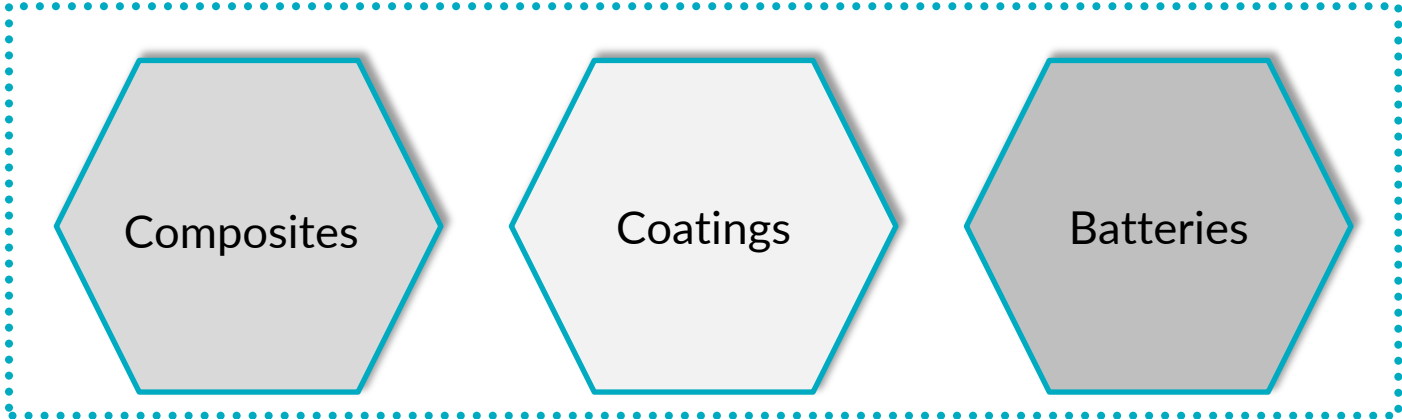
\$250B Global Market

- 47% increased Charge Acceptance Rate in lead acid batteries resulting faster charging
- Extends battery life by reduced sulfation
- Outperforms leading cathode catalyst in lithium-air batteries
- 4X capacity improvement in supercapacitors compared to high surface carbon black

HydroGraph's Path to Market

Graphene demand is ready for commercial scale

Primary Target Markets



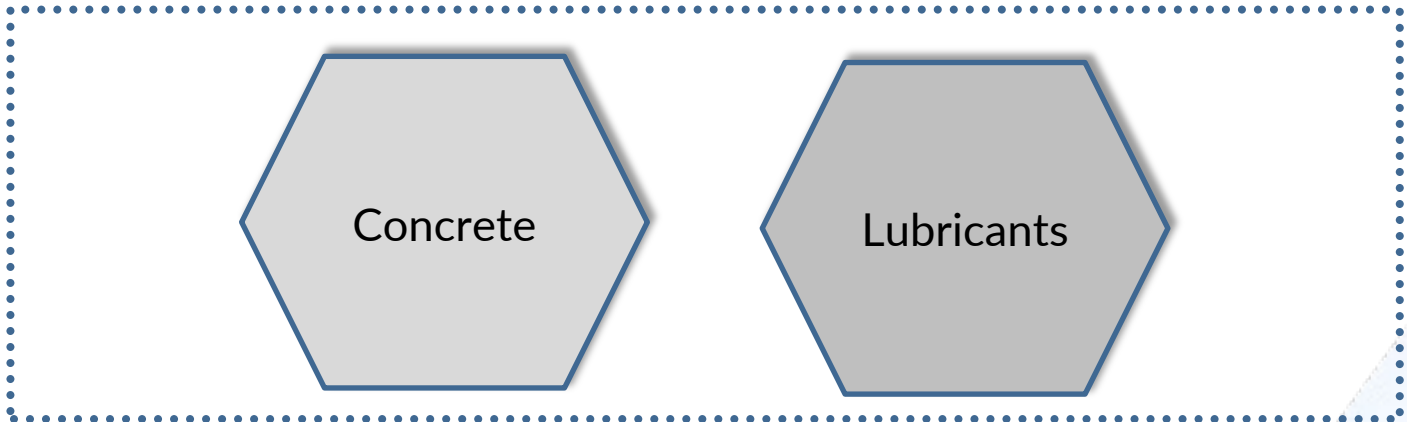
\$1.0B

Estimated HydroGraph
Priority Market Size By
2028*



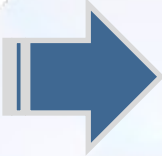
The University of Manchester
Graphene Engineering Innovation Centre

Secondary Target Markets



\$1.5B

Estimated HydroGraph
Priority Market Size By
2028*



Pursue partnerships and advance
R&D to unlock business
development opportunities in
secondary target markets



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Strategic Partnership

HydroGraph partnered with the GEIC in 2023

HydroGraph Graphene Production Facility
Manhattan, Kansas, US

Graphene Engineering Innovation Centre (GEIC)
Manchester, UK – [Birthplace of graphene](#)

Manchester, where graphene was discovered in 2004, remains a hub for graphene activity and talent.

The GEIC serves as a key hub for customers to interact with graphene experts.

- The GEIC, containing all relevant industrial prototyping machines and characterization devices needed to commercialize graphene materials, is expediting the path to market
- As a university-affiliated institution, GEIC staff must maintain impartiality when selecting graphene for customer projects
- HG's graphene has demonstrated exceptional performance across various applications
- This cost-effective gateway facilitates customer engagement for the Company
- HG plans to further expand efforts to explore new application areas and attract new customers
- HG's business development team utilizes data obtained from new materials
- We collaborate on application development with both the GEIC and our own HydroGraph team onsite, gaining access to customers through the GEIC network.



James Baker

CEO, GEIC
HydroGraph Advisory Board



Our Technology: The Hyperion System

Disruptive, patented and scalable



Readily Available Local Feedstock

EXTENSIVE APPLICATIONS

HydroGraph’s Hyperion System will change the landscape of nanotechnology.

The Hyperion System

PATENTED EXPLOSION SYNTHESIS PROCESS

Uses minimal energy and produces no waste. Ideal for commercial deployment: modular, scalable, and eco-friendly.

99.8% Pure Graphene

HIGHEST QUALITY MATERIALS

We produce the highest-purity, most crystalline graphene in the market.



Units can be produced in three months



Building additional units to increase capacity



Source a larger US facility as demand grow. Not reliant on China for source of graphite.



Units are located near cost-effective gas sources or at customer locations if needed for supply chain security*

*In co-located scenarios, HydroGraph will maintain, own, and operate all units.

What is Graphene



Thermal Conductivity

Highest ever measured at $\sim 4000 \text{ Wm}^{-1} \text{ K}^{-1}$



Strength

Graphene has a strength of 130 GPa, higher than steel



UV Resistance

Blocks harmful UV rays by up to 70%



Electron Mobility

As high as $200,000 \text{ cm}^2/\text{V}\cdot\text{s}$, much higher than silicon



Electrical Resistance

Graphene electrical resistivity of just $0.2 \times 10^{-6} \Omega \cdot \text{cm}$



Flame Resistant

Graphene significantly reduces flammability if added to polymers



High Surface Area

As much as $2,630 \text{ m}^2/\text{g}$, very high surface area



Flexibility

Graphene can stretch up to 25% of its original length



Transparent

Single layer graphene transmits approximately 97.2% of light



Impermeability

Blocks all other elements, even hydrogen



Thinness

A single layer of graphene is just 0.345 nm



Stiffness

Young's modulus 0.95 to 1.1 TPa , some of the highest ever measured



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Patented Technology

PATENTED TECHNOLOGY

Fractal Graphene Patented No: 9,440, 857 B2

The 2016 patent for the high-yield production of fractal graphene via detonation is the founding technology for HydroGraph. The detonation closed system produces the highest quality products, while conserving energy, preventing emissions and is modular and scalable for clients. Additionally, the HydroGraph portfolio now contains patents relating to the production of nanomaterials, applications involving nanomaterials and clean energy.

REACTIVE GRAPHENE

Disc. No.: 2019-064; Attorney Docket No.: 52468

Title: "Graphene/Graphene Oxide Core/Shell Particulates and Methods of Making and Using the Same"

PCT Application No.: PCT/US2020/038055

Filing Date: June 17, 2020

GRAPHENE INK

RE: Disc. No. 2019-066

Title: "Nano-inks of Carbon Nanomaterials for Printing and Coating"

PCT Patent Application No.: PCT/US2020/039547

Filing Date: June 25, 2020

GRAPHENE ENHANCED CARBON FIBER

Disc. No.: 2017-008; Docket No.: 49240-US

Title: "Additive Manufacturing of Continuous Fiber Thermoplastic Composites"

U.S. Application No.: 16/487,622 (PCT/US2018/018800)

HYDROGEN PRODUCTION

Disc. No.: 2021-027; Attorney Docket No.: 54713-PCT

Title: "Process for Synthesis of Syngas Component"

U.S. Provisional Patent Application No.: 63/161,625

Filing Date: March 16, 2021



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Composites

PROBLEM

Plastic use contributes to multiple environmental issues such as pollution and CO₂ production.

SOLUTION

Address challenge by improving the mechanical properties of plastics using graphene as composites. Plastic users can reduce usage without compromising performance.

RESULTS

PET improvements: modulus - 18%, strength - 25%;
breaking load - 115%

Epoxy improvements: modulus - 23%, strength - 30%;
elongation - 11%

Save energy in processing plastics.

Improve properties of recycled plastics to match that of virgin plastics.

COMPOSITE CASE STUDY

Next Steps



- Work with plastic compounders and major users to commercialize HG graphene.
- Obtain FDA approval for food contact applications (in process)

“In the 12 years we’ve been experimenting with graphene, carbon nanotubes and nano materials in general, we’ve never seen anything like the results we’ve gotten with HydroGraph’s FGA-1 graphene. We’re excited about the potential to marry cost savings with sustainability as we move forward.”

Chris Surbrook,
Head of New Business Development
Midland Compounding & Consulting



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Additive for Cells

PROBLEM

Electrical conductivity of most electrodes need to be improved for more efficient performance of batteries because any internal resistance is an energy loss.

SOLUTION

Use our FGA-1 as a conductive additive in electrode materials to boost performance

RESULTS

Lead acid battery electrode additive

Dynamic charge acceptance by 47% ↑ vs. carbon black

Super capacitor additive

Capacitance by 300% ↑ vs. activated carbon

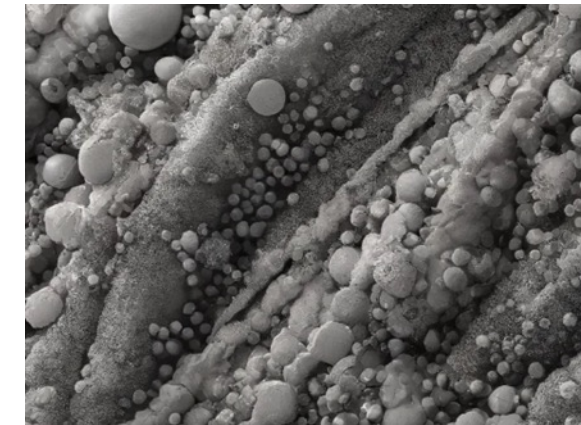
Lithium – O2 Battery cathode catalyst

Discharge capacity by 14 X ↑ vs. carbon black

Next Steps



- Pursue supply agreements with battery and supercapacitor manufacturers
- Negotiating supply agreement (currently)



“HydroGraph’s fractal graphene has shown significantly higher results while the team at HydroGraph has been incredibly supportive.”

Maithri Dissanayake,
Head of Product
Volfpack



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Cement / Mortar

PROBLEM

Cement industry contribute to 8% of global emissions by humans.¹

1. Nature 597,593-594 (2021), <https://www.nature.com/articles/d41586-021-02612-5>

SOLUTION

Use HG graphene in cement to improve mechanical strength, reduce volume used and improve durability.

RESULTS

- Multiple testing at various sites have shown double digit compressive strength improvements
- **Lifecycle analysis:** Global warming potential and energy demand reduced by 10 - 15% normalized by compressive strength. i.e., for a given strength 10 – 15 % less env. impact.
- At 400 ppm loading of HG graphene, compressive strength increases by 15%
- Pore size decreases – enhanced durability of concrete

Next Steps



- Engage cement manufacturers
- Complete third-party commercial testing (ongoing)

“This study shows that Hydrograph’s graphene, which is manufactured through scalable and cost-, energy- and CO₂-efficient detonation synthesis, can be of a huge benefit to the engineering and environmental performance of concrete and cement.”

Prof. Narayanan Neithalath
Arizona State University



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PROBLEM

Lung cancer is the world's deadliest cancer. Need a method of detecting early at lower cost.

SOLUTION

Use graphene nano particles decorated with fluorescent protein as sensors that can be read with a common fluorescence plate reader.

RESULTS

Clinical trials in three countries have shown 90% efficacy in early detection of lung cancer ***at a cost of a COVID test.***

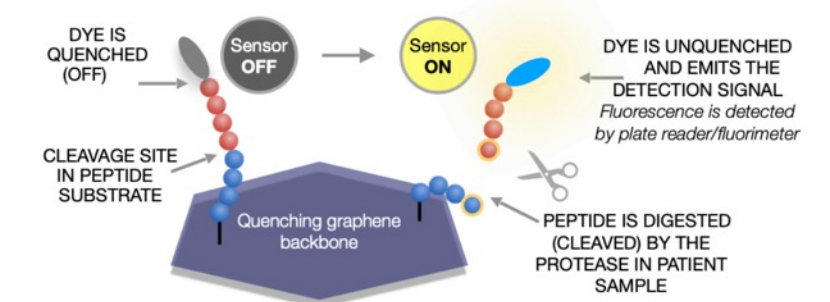
Detects at stage 1 when it is treatable.

Hawkeye Bio is currently shipping kits to US clinics.

Next Steps



- Supplying quantities of FGA-1 to Hawkeye Bio
- Extending technology platform to detect at least 14 other cancers + demographically significant diseases



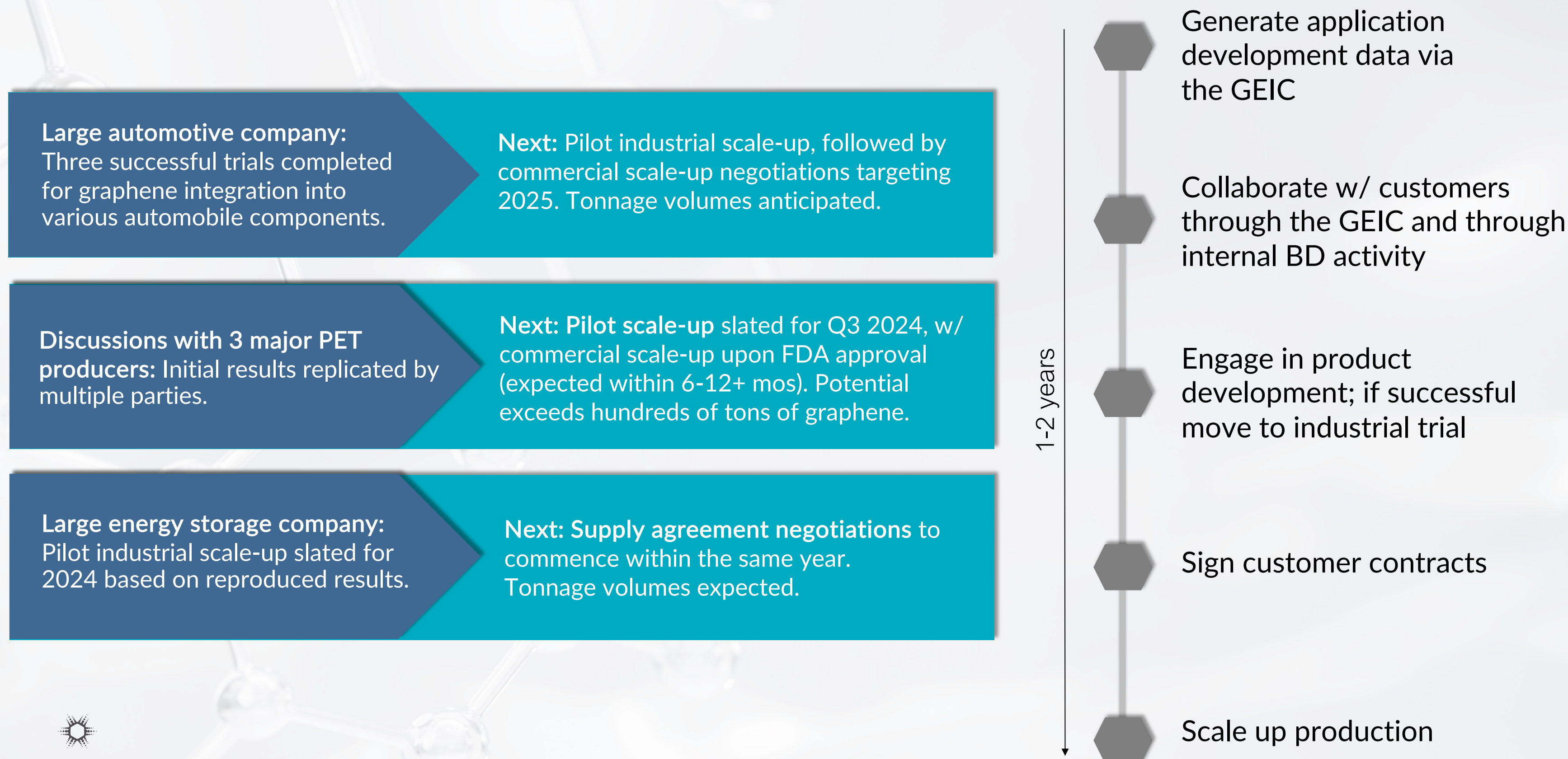
Mode of action of the Sensor

“Hawkeye Bio leverages HydroGraph’s pristine graphene to manufacture pharmaceutical grade biosensors for the detection of lung cancer from a standard blood draw. HydroGraph’s manufacturing process reproducibly yields the 99.8% high purity and consistent geometry required for Hawkeye’s ultra-sensitive diagnostic tests.”

Andre de Fusco
Co-founder and CEO
Hawkeye Bio



HydroGraph's Commercialization Process



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Why Invest?

1 | HIGHEST PERFORMING

HydroGraph produces the highest performing graphene in the industry at industrial scale

2 | CONSISTENT RESULTS

Unlike other graphene producers, HydroGraph produces identical batches

3 | GREEN FOOTPRINT

The Hyperion System, the Company's production unit, uses the lowest energy in the industry and produces no waste

4 | GLOBAL REACH

HydroGraph's high-performance graphene can improve virtually every industry and has near unlimited potential impact

5 | STRONG ECONOMICS

HydroGraph unlocks value for the customer by strengthening competitive advantage

6 | SIGNIFICANT VALUATION UPSIDE

Low CAPEX process, large end markets, rapid market growth and differentiated products all lead to significant upside

Key Catalysts

- Expanded application development capabilities
- Close first major multiyear contract in 2024
- Increased product line

Capital Structure

Basic Shares Outstanding	231M
Options Outstanding	16M
Warrants Outstanding	60M
Fully Diluted	307M
Market Cap (as of June 11, 2024)	CAD\$43.0M



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THANK YOU

APPENDIX



Kjirstin Breure, President and Interim CEO
kjirstin.breure@hydrograph.com



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Website: hydrograph.com
IR Contact: ir@hydrograph.com



Partnerships and Industry Certification

MANCHESTER
1824

The University of Manchester
Graphene Engineering Innovation Centre

The GEIC, at the University of Manchester, helps companies develop and launch new technologies, products and processes that exploit the remarkable properties of graphene and other 2D materials.



جامعة خليفة
Khalifa University

RIC2D, at Khalifa University, is part of a strategic investment by the Government of Abu Dhabi, to advance the scientific development and commercial deployment of technologies derived from graphene and other 2D materials.



VERIFIED[®] GRAPHENE
— PRODUCER —
THE GRAPHENE COUNCIL

The Verified Graphene Producer[®] Certification

- The highest standard in the industry!
- The only credential with independent, third party, in-person inspections of graphene production facilities
- Verification of production methods and volumes, and quality control processes
- Based on the Graphene Classification Framework (GCF).

HydroGraph is currently one of only five companies to be certified globally and the first company in the Americas to be certified.



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FRACTAL GRAPHENE

Patent for the high-yield production of graphene via detonation

Market Problem

Graphene has been recognized as the first “super material” of the 21st century. However, commercialization of graphene was not feasible before now.

Conventional methods for producing graphene were:

- Producing inferior and inconsistent graphene, sometimes graphite
- Very expensive
- Not scalable
- Inconvenient
- Involving toxic chemicals
- Using vast amounts of electricity
- Addressable markets include:
 - Lubricants
 - Energy storage
 - Resins
 - Specialty chemicals
 - Coatings

HydroGraph Patented Solution

Now: HydroGraph’s proprietary detonation technology – Hyperion System– produces turbostratic graphene that is:

- 99.8% pure
- 2 to 7 layers thick
- Identical from batch to batch
- High value
- Uses very little energy
- Green: using acetylene & oxygen as feedstock with net-zero emissions
- Scalable
- Modular design that can be deployed virtually anywhere

“The Hyperion method to create graphene is an example of an elegant synthesis. Fill a chamber with acetylene and oxygen, ignite the mixture with a small spark, and voila, high-purity graphene is formed.”

– Dr. Chris Sorensen,
the creator of the
Hyperion process



REACTIVE GRAPHENE

Graphene/Graphene Oxide Core/Shell Particulates and Methods of Making and Using the Same

Market Problem

Certain high-valued applications require additional functionalization to:

- Enhance bonding and integrating graphene with other materials
- Bring attractive properties, such as tensile strength, elasticity and conductivity, to more complex materials
- Address applications in a vast number of areas, including:
 - Medicine and biology
 - Resins and composites
 - Dispersions
 - Functional coatings
 - Plastics

HydroGraph Patented Solution

HydroGraph has responded by producing Reactive Graphene, which can bond more easily to other materials thanks to its reactive shell that is functionalized with carboxylic acid groups.

- HydroGraph leaves the graphene inner core intact, a huge advantage compared to standard graphene oxide which is only 70% carbon content vs. HydroGraph's 96%.
- HydroGraph's reactive graphene is a "pristine functionalized graphene"
- Due to the success of the material, HydroGraph has extended the product line to include a host of other functionalizations

"We can tailor this graphene to virtually any application; just name it. We can perform the entire palette of organic chemistry reactions on the graphene's surface and keep it intact. The future is extremely bright with regards to us integrating graphene into just about any material you can imagine"

– Dr. Stefan Bossman,
HydroGraph's lead chemist

