

Investor  
Meeting

Nov 2021

An aerial photograph of rolling green hills, likely in a rural or agricultural area. The hills are covered in lush green grass and are arranged in a series of gentle, undulating slopes. The lighting is soft, creating a sense of depth and texture in the landscape. The hills recede into the distance, creating a sense of vastness and natural beauty.

# Improving the Environment

Using advanced materials

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Mission ▶

To solve some of the world's biggest  
problems using the widest portfolio  
of 2d materials inc graphene

Improved  
Recyclability

Longer Life

Reduction of  
Fossil-Based  
Plastics

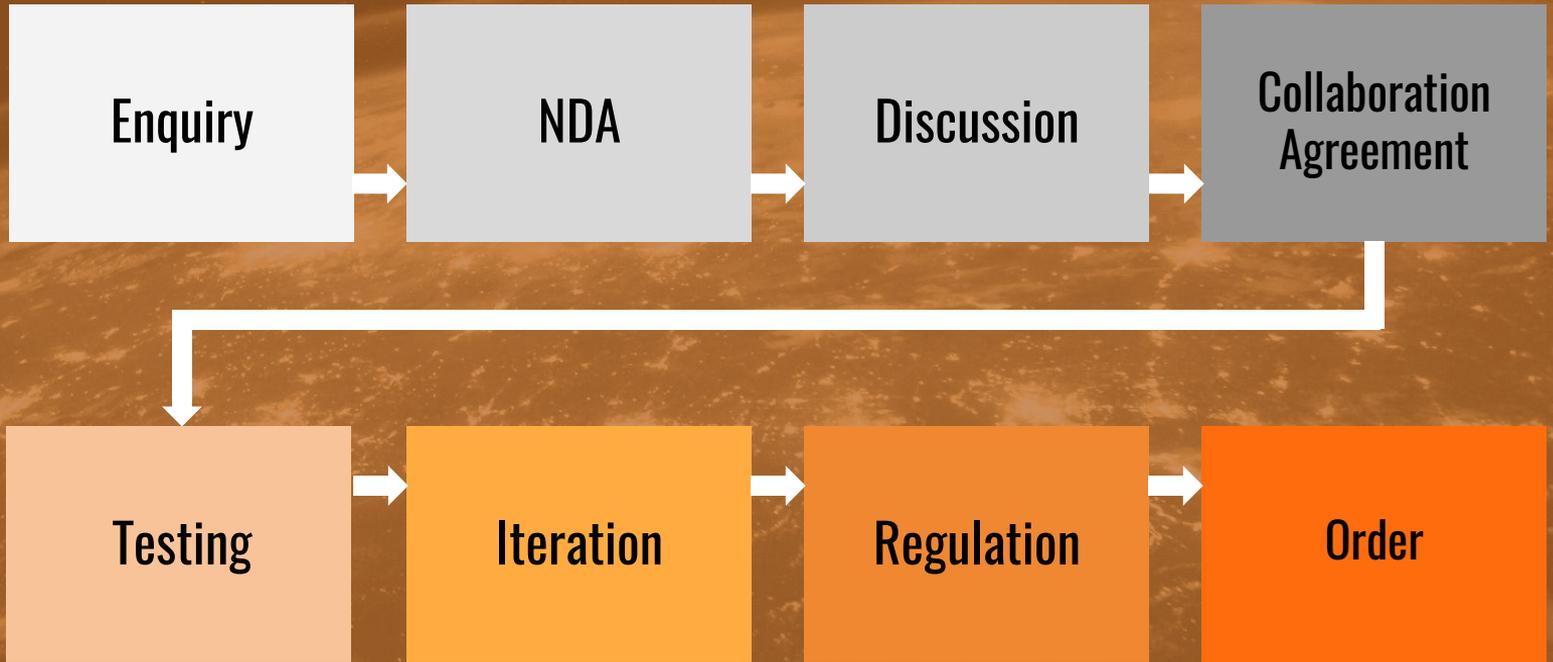
Reduced  
Maintenance

Lightweighting

Reduced Raw  
Materials  
(cement, metals...)

Enable  
Bio-Based  
Products

# Business Process



# Operations

**Graphene**

**Manchester  
Research**

**Spain  
Research**

**Ulster  
Testing**

**Cambridge  
Research**

**Longhope  
Production**

**USA  
Commercial**

**China  
Commercial**

**South Korea  
Production**

**Non-Graphene**

**Banbury**

**Westcott**

Graphene

Longhope  
Production

Move from  
**2000 sqft**  
to  
**18,000 sqft**

Brought forward plans for 10,000 sqft Innovation Centre currently in construction that will feature a demonstrator floor featuring graphene enhanced concrete with graphene enhanced polypropylene fibres eliminating the need for steel rebar.

Spanish assets being commissioned

# Financial highlights 31 March 2021

Group revenue

**£6.6m**

(2020 £8.3m)

Adjusted LBITDA

**£1.8m**

(2020 £1.6m)

Loss before tax

**£8.1m**

(2020 £4.7m)

Cash at 31 March 2021

**£2.4m**

(2020 £1.7m)

Total Equity

**£16.5m**

(2020 £15.7m)

Monthly cash burn (pre Lanstead/IUK)

**£0.3m**

(2020 £0.2m)

## Our history

2010

Company formed

2013

Floated on the AIM submarket on the London Stock Exchange

2014

Acquired majority holding in 2-DTech Limited, a developer and supplier of early stage graphene products, from the University of Manchester

2015

2016

Acquired AAC Cyroma Limited

2017

Acquired majority holding in Cambridge Graphene Limited from Cambridge University

2018

Acquired majority holding in Gnanomat S.L.

2019

Incorporation of US-based sales arm Versarien Graphene Inc. and China-based subsidiary Beijing Versarien Technology Limited

2020

£5m loan provided by Innovate UK for graphene scale up

Acquired and set up Versarien Korea Ltd

\* Adjusted LBITDA (Loss before interest, tax, depreciation and amortisation) excludes exceptional items and share based payment charges.

\*\* IFRS 16, leases, was adopted on 1 April 2019 using the modified retrospective approach and comparatives are therefore not restated under this method. The impact of this adoption has resulted in a reduction in LBITDA of £0.7 million in 2020.



# Carbon fibre Developments

Introduction

Mission ▶ To enable the adoption of Carbon Fibre in Transport

Size of market

**UK £4bn\***

Problem being solved

Need to commercialise lower cost manufacturing, open up new markets and reduce weight in components

Solution being proposed

Graphene enhanced composites have shown clear advantages in improving strength and reducing weight.



\*

(KTN, 2021)

<https://ktn-uk.org/wp-content/uploads/2021/07/Opportunities-in-the-UK-Composites-Industry-Lucifer-Public-Version.pdf>

# S

Carbon fibre  
Developments

Technical

Graphene enhanced carbon fibre reinforced plastics (G-CFRP) offer advantages that can be tuned to a particular client need.

1. Mechanical - Improve mechanical strength by at least 10% ✓
2. Visual - Surface quality to meet Lotus Paint specification LMS 110 Rev 3 ✓
3. Price - Reduce cost by 10% (stretch target 25%) ✓



# S

Carbon fibre  
Developments

Commercial

## Sectors

### Airbus

Graphene Flagship  
Project to show  
heated elements  
within a structure.



### Westfield

Lightweighting



### Lotus

Lightweighting





Mission ▶ **To reduce CO2 used in construction.**

### Size of market

**24.7m tons**  
of Ready Mixed Concrete  
used in the UK\*

**250,000**  
miles of roads\*\*

### Problem being solved

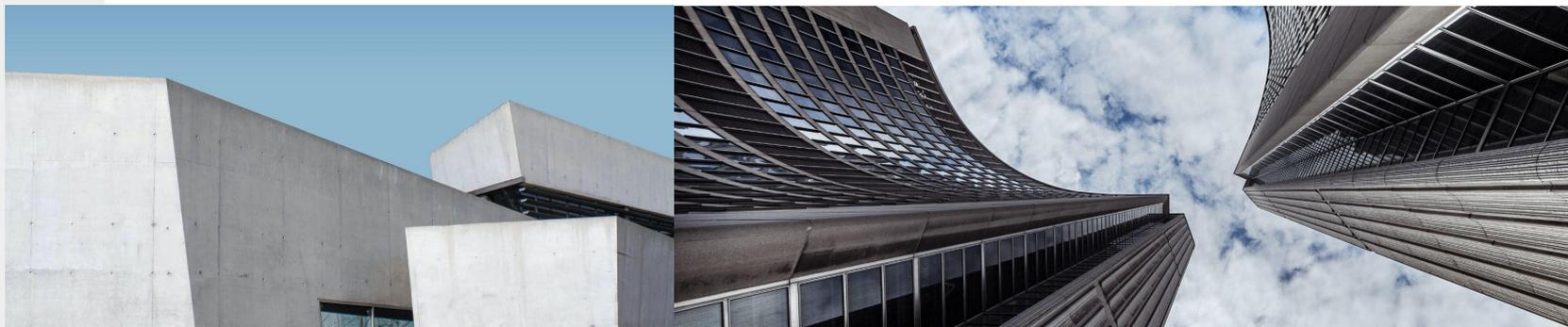
Significant reduction in the amount of CO2 as a result of reducing the amount of cement used in Ready Mix whilst maintaining the strength, reduction in drying and curing time, reduction or elimination of Steel.

### Solution being proposed

Graphene reinforced concrete, graphene enhanced polymer fibres, and recycled materials.

\*<https://www.statista.com/statistics/476772/ready-mixed-concrete-production-in-the-united-kingdom-uk/>

\*\*<https://www.gov.uk/government/statistics/road-lengths-in-great-britain-2020/road-lengths-in-great-britain-2020>





**Construction**

**Technical**

# Opportunities:

Extend asset life by eliminating cracking etc

Potential to use graphene enhanced recycled PP chopped fibres replacing ferrous rebar

Develop Self Healing Concrete

Faster Curing without cracking

Develop Non Destructive Rapid Repair (Microwave)

Additive Manufacturing (3D Concrete Printed formwork and walls)

All above; cheaper, lighter, safer, faster & helping Net Zero CO<sub>2</sub>

## Studies demonstrated that graphene concrete can:

Improve compression strength +38%

Improve flexural strength >14% - 45%

Increase split tensile strength >15%

Improve water permeability (> 200%) near 0

Accelerate curing & early strength

Reduce/eliminate cracking

Increase corrosion resistance





**Construction**

Commercial

## Sectors

### Concretene™

Nationwide Engineering - powders working with the GEIC

### Cementene™

Inks working with other major producers

### Highways

LEP's and County Councils

### Non Government Body

Flood Defences

### HS2

Printed concrete



### Rail

Light, Quick Deployment,  
Flexible Design Buildings

The background of the slide is a photograph of Earth as seen from space, showing the curvature of the planet and the dark void of space. The text 'Other Project Areas' is located in the top-left corner.

## Other Project Areas

**Wind Turbine Bases**

**Flooring Screed**

**Building House Raft**

**Very Light Rail (VLR) Structures**

**Water Industries**

**Slipform Road/Runways**



Mission ▶ **To reduce the amount of fossil fuel based plastics used**

### Size of market

**3.3m\***

Tonnes of plastic processed in the UK alone

### Problem being solved

Reduction in the use and improvement in the recyclability of plastics particularly in packaging

### Solution being proposed

Graphene enhanced plastics and graphene reinforced bio based plastics

Working with a number of global packaging companies



\*<https://www.bpf.co.uk/industry/default.aspx>

# A

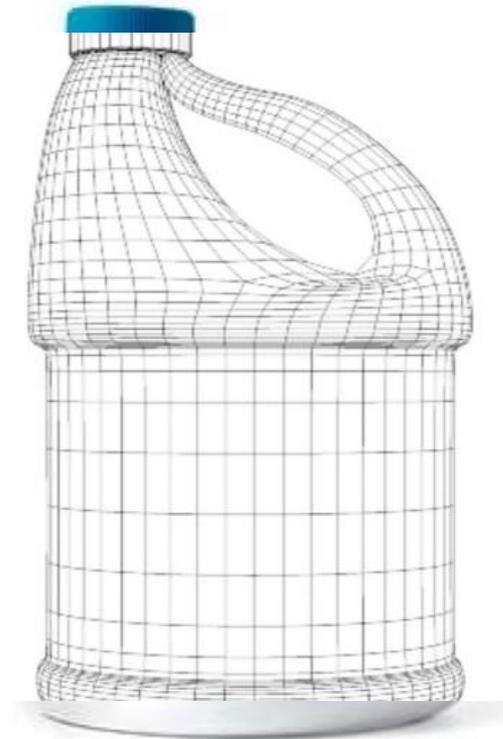
## Polymers

## Technical

Plastic packaging accounts for 44% of plastic used in the UK, but 67% of plastic waste, and over 2 million tonnes of plastic packaging is used each year. The vast majority of this is made from new, rather than recycled plastic. Versarien are examining the potential lightweighting effect of adding graphene as a reinforcing filler into HDPE blow moulded bottles or improving the performance of recycled plastics.

The solution is to produce graphene/HDPE compounds or masterbatches that can be directly converted into blow moulded bottles.

**R&D has focussed on developing robust QA methods and ensuring the graphene masterbatching is effective and is producing the correct compositions.**



### **WEIGHT REDUCTION**

Pilot scale trials with two different shaped bottles have shown ~20% weight reduction possible at 1.5-2% graphene loading following top-load strength testing

# Sectors

## Optical Wear



## Airway Medical Suction Unit (AMSU™)



## Packaging



◀ Blow moulded containers



◀ Coated films



▲ Blown films

## Mission ▶ To revolutionise the textile industry

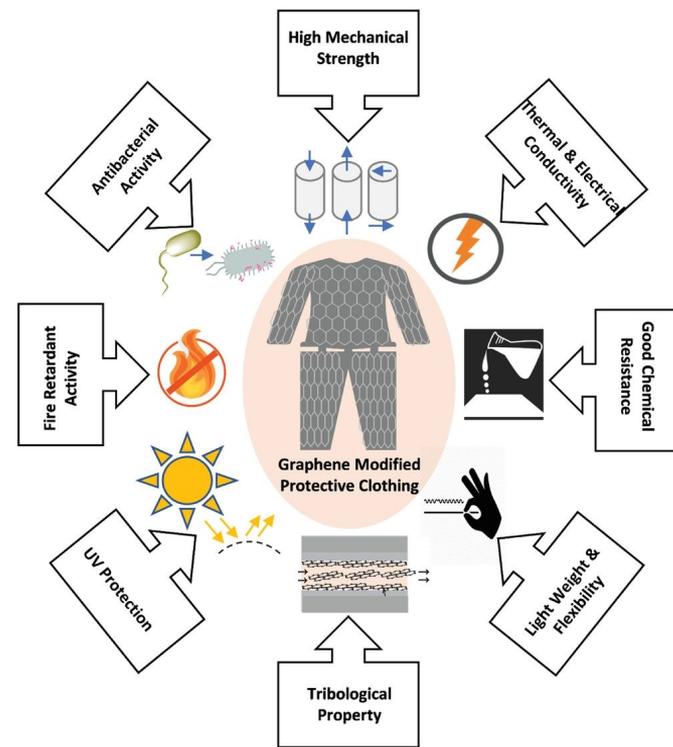
Size of market **£5.8bn\***

### Problem being solved

Reduction in fossil fuel based polymers, improvement in performance, extension in lifetime of garments, improved recyclability and increased functionality

### Solution being proposed

Printing of 2d material inks, graphene enhanced polymer fibres and recycled materials.



\*<https://www.ukft.org/british-textiles-in-numbers/>

Leisure

Technical



Phase 1. **Printing**

Phase 2. **Yarns**

Phase 3. **Wearables**





Leisure

Commercial

## Sectors

Clothing

**Civilian**

Clothing

**Military**

Clothing

**Specialist**

I.e. Olympic,  
Fire, Police



Mission ▶

**To improve the performance of tyres and rubbers, inc footwear**

### Size of market

\*Footwear to reach a figure of

**\$440bn**

by 2026

### Problem being solved

Reduction in fossil fuel based polymers, improvement in performance, extension in lifetime of components, improved recyclability, increased functionality

### Solution being proposed

Graphene reinforced biomaterials and conventional elastomers

\*<https://www.globenewswire.com/news-release/2021/07/12/2260906/0/en/Global-Footwear-Market-to-Reach-440-Billion-by-2026.html>

# E

Elastomer

## Technical

### EV Tyre compounds

Reduction in rolling resistance ~5% = greater range in electric vehicles and fuel efficiency in ICE vehicles.

Improved longevity – Abrasion significantly improved with new graphene variant



### Footwear compounds

Tensile strength +50%  
Modulus +30%  
Elongation +20%  
Tear Strength +23%

Compared to non-graphene  
reference compound

# E

Elastomer

Commercial

## Sectors

Tyres

**Enso**



Footwear

**Vivo  
Barefoot**



Footwear

**Flux**



## A Global Company



**USA**

Number of  
NDA's

**22**

Number of active  
projects

**14**

Number of  
collaborative  
agreements

**5**

## **Sectors**

Coating and Anticorrosion, Composites, Packaging/Bottling, Fabrics, Polymers, Elastomers, Thermal Transfer Fluids, Insulation Materials.

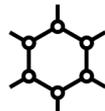
# South Korea

**>100+ Patents including 29 patent families**

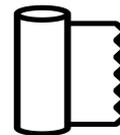
Generally covering:



Process  
Equipment



Graphene  
Growth



Substrate  
Pre-Treatment



Post  
Treatment



Transfer



Devices



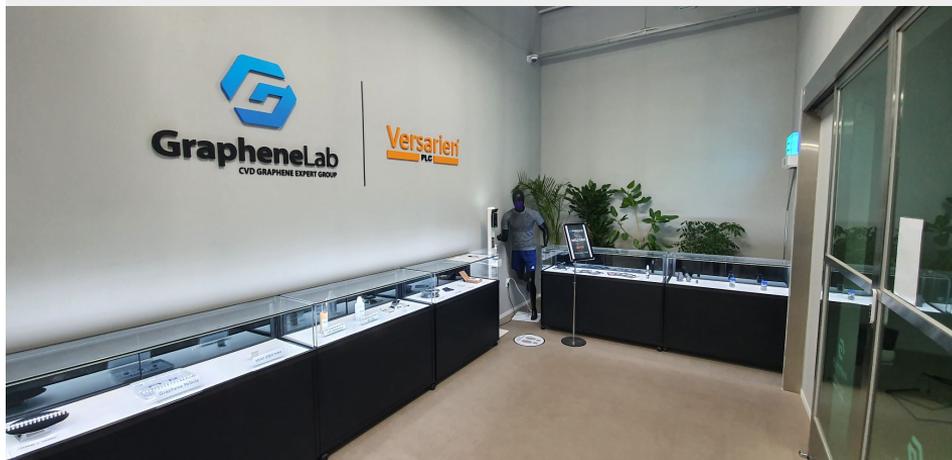
Metal  
Removal

# South Korea

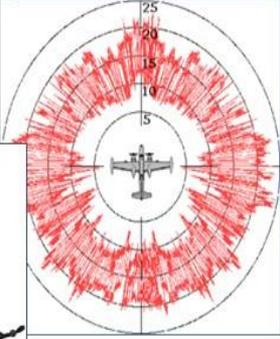
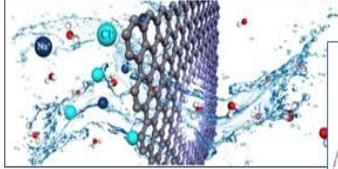
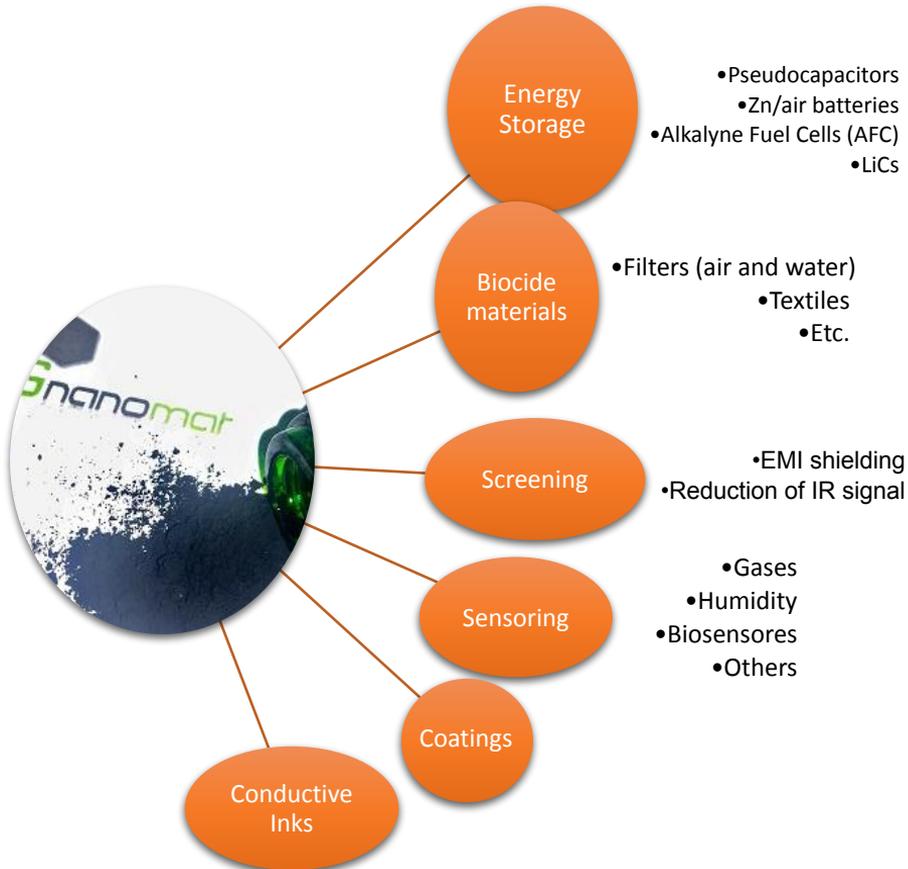
Equipment moved and  
commissioned

Class 1000 clean room

First samples made  
October 2021



# Applications of hybrid materials (G+NPs)



Gnanomat, a  
company of  
Versarien PLC

**Company founded in  
2014 and acquired by  
Versarien PLC in 2018.**

**Located in Madrid (Spain) in  
Parque Científico de Madrid.**

**Team of nine employees:**

**4 PhD, specialist in Energy  
Storage, advance materials  
and industrial engineering**



# Gnanomat technology and activities

## Applications

### SUPERCAPS

Development of innovative asymmetric pseudocapacitor prototype. This technology is utilized in the SUPPORTIVE project led by 2DTech.

EU funding obtained in INNPRESSME project to manufacture devices more eco-friendly.

Application to Defence projects in collaboration with Indra and other relevant partners.

Portfolio of materials with great performance.

### BIOCIDE

Provision of materials that Versarien tested and developed in biocide assays with excellent results.

As results of these tests, Gnanomat was invited to the EU grant application INNGENIO.

### ZINC-AIR BATTERIES

Development of nanomaterial that showed a very good behaviour in electrodes of these batteries avoiding pollutant materials.

IP protection applied and collaborations with development centers and customers.

### EM SHIELDING

Recently, these materials showed interesting superparamagnetic properties that were exploited in different collaborations. In the last week **Gnanomat signed a collaboration with a final customer** to develop this application in a specific situation.

### ALKALINE FUEL CELLS

Collaborations with customer to exploit potential application in this industry.

### OTHER APPLICATIONS

Gnanomat is collaborating with different institutes to tests new properties, applications etc. as sensing, other catalytic properties and toxicity evaluation.

## Products Commercialization

Launch of different products (advanced materials of graphene combined with nanoparticles of metal and metal oxides with high added value). Currently expanding the portfolio.

Development products and other industrial solutions to integrate in our customer products (inks, formulations, etc.). This business line is under development.

## Product Manufacturing Optimization

Upgrade of capabilities supported by the funding of the INNPRESSME project of the EU.

Development of manufacturing strategies to reduce costs, improve yields, etc.

Development of new products of industrial value to address other applications of provide more solutions to customers.

## Collaboration and Partnering

Due to Gnanomat SME profile and versatility to design and manufacture products, is a perfect partner to include in projects.

Gnanomat received recently different invitations to be part of consortia to apply to projects: INNGENIO, RIA (EU) and PERTE (Spain call).



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**Thank you**

